

GENERAL CATALOGUE 2004/2005

Industrial Components



- Electromechanical Relays
- Timers
- Counters
- Programmable Relays
- Level Controllers
- Limit Switches
- Pushbutton Switches
- Low Voltage Switch Gear
- Temperature Controllers
- Solid State Relays
- Panel Indicators
- Power Supplies

Advanced Industrial Automation

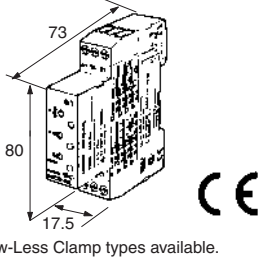
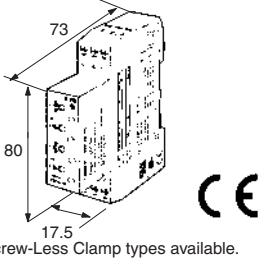
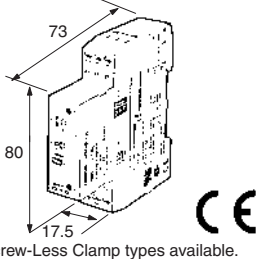
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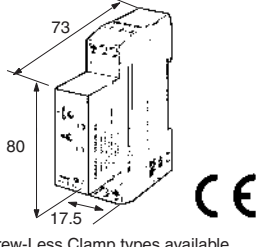
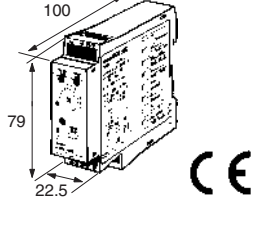
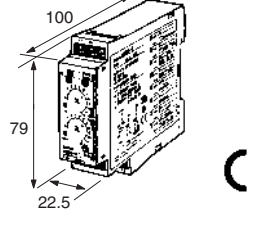
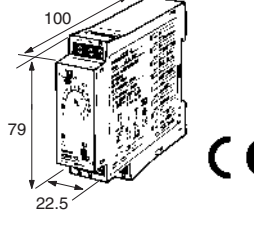
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Timers

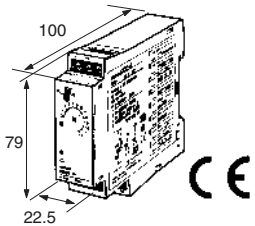
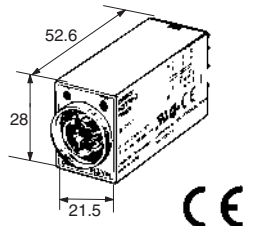
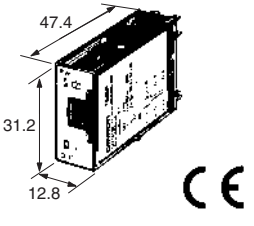
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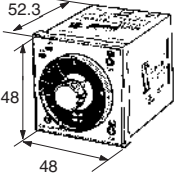
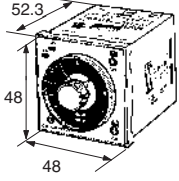
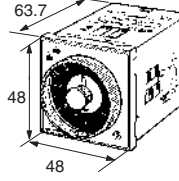
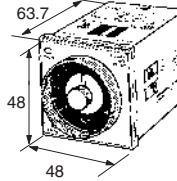
Timers

Classification		Analogue Timer		
Model		H3DS-M/-S/-A	H3DS-F	H3DS-G
Features		DIN Track Mounting, Standard 17.5 mm Width, Solid-state Multifunctional Timer with Smart Dial/Selector-locking Mechanism	DIN Track Mounting, Standard 17.5 mm Width, Solid-state Twin Timer with Smart Dial/Selector-locking Mechanism	DIN Track Mounting, Standard 17.5 mm Width, Solid-state Star-delta Timer with Smart Dial/Selector-locking Mechanism
Appearance and dimensions				
Time range		0.1 s..120 h	0.1 s..12 h	1 s..120 s
Supply voltage		24..230 VAC (50/60 Hz)/ 24..48 VDC	24..230 VAC (50/60 Hz)/ 24..48 VDC	24..230 VAC (50/60 Hz)/ 24..48 VDC
Power consumption		AC: 32 VA max./3.0 W max. (typical: 30 VAC/ 2.7 W) at 230 VAC, 14 VA max./2.2 W max. (typical: 13 VAC/ 2.1 W) at 100..120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC, 1.4 W max. (typical: 1.3 W) at 48 VDC	AC: 33 VA max./2.2 W max. (typical: 31 VAC/ 2.0 W) at 230 VAC, 11 VA max./1.9 W max. (typical: 9.7 VAC/ 1.7 W) at 100..120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC, 1.4 W max. (typical: 1.2 W) at 48 VDC	AC: 21 VA max./1.7 W max. (typical: 20 VAC/1.6 W) at 230 VAC 11 VA max./2.0 W max. (typical: 8.6 VAC/1.5 W) at 100..120 VAC DC: 1.3 W max. (typical: 1.2 W) at 24 VDC 0.7 W max. (typical: 0.6 W) at 48 VDC
Accuracy of operating time		±1% max.	±1% max.	±1% max.
Setting error		±10%±0.05 s max.	±10%±0.05 s max.	±10%±0.05 s max.
Control output		5 A at 250 VAC/30 VDC	5 A at 250 VAC/30 VDC	5 A at 250 VAC/30 VDC
Contact configuration	Type			
	Time-limit	SPDT	SPDT	SPST-NO
	Instantaneous	---	---	---
Operating mode		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	Flicker OFF start/Flicker ON start With independent time setting for OFF and ON time	Star-delta operation
Life expectancy	Mechanical	10 x 10 ⁶ operations	10 x 10 ⁶ operations	10 x 10 ⁶ operations
	Electrical (Resistive load) (see note 1)	100 x 10 ³ operations (5 A at 250 VAC)	100 x 10 ³ operations (5 A at 250 VAC)	100 x 10 ³ operations (5 A at 250 VAC)
EMC		Conforms to EN61812-1 (EMI: EN55011 class B)	Conforms to EN61812-1 (EMI: EN55011 class B)	Conforms to EN61812-1 (EMI: EN55011 class B)
Approved safety standards (see note2)		UL, CSA, conforms to EN61812-1	UL, CSA, conforms to EN61812-1	UL, CSA, conforms to EN61812-1
Socket	Front Connecting	---	---	---
	Back Connecting	---	---	---
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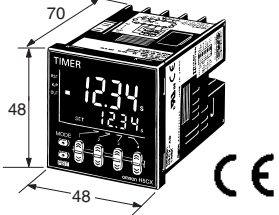

Analogue Timers			
H3DS-X	H3DE-M/-S	H3DE-F	H3DE-G
DIN Track Mounting, Standard 17.5 mm Width, Solid-state Two-wired Timer with Smart Dial/Selector-locking Mechanism	DIN Track Mounting, Standard 22.5 mm Width Timer	DIN Track Mounting, Standard 22.5 mm Width, Solid-state Twin timer	DIN Track Mounting Standard 22.5 mm Width, Solid-state Star-delta Timer
			
0.1 s..120 h	0.10 s..120 h	0.1 s..12 h	1 s..120 s
24..230 VAC/VDC (50/60 Hz)	24..230 VAC/DC (50/60 Hz) 12 VDC (H3DE-M2 only)	24..230 VAC/VDC (50/60 Hz)	24..230 VAC/VDC (50/60 Hz)
5 mA max.	H3DE-S1 AC: approx. 2.7 VA (1.6 W) at 230 VAC DC: approx. 0.7 W at 24 VDC	AC: approx. 3.1 VA (1.8 W) at 230 VAC DC: approx. 0.8 W at 24 VDC	AC: approx. 3 VA (1.8 W) at 230 VAC DC: approx. 0.8 W at 24 VDC
±1% max.	±1% max.	±1% max.	±1% max.
±10%±0.05 s max.	±10%±0.05 s max.	±10%±0.05 s max.	±10%±0.05 s max.
SCR output: 5 mA..0.7 A	5 A at 250 VAC/30 VDC	5 A at 250 VAC	5 A at 250 VAC
---	-M1/-S1	---	---
SCR output	SPDT	SPDT	SPDT
---	---	SPDT (Programmable to Time-limit)	---
ON-delay	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	Flicker-OFF/Flicker-ON start With independent time setting for OFF and ON time	Star-delta operation
---	10 x 10 ⁶ operations	10 x 10 ⁶ operations	10 x 10 ⁶ operations
---	100 x 10 ³ operations (5 A at 250 VAC)	100 x 10 ³ operations (5 A at 250 VAC)	100 x 10 ³ operations (5 A at 250 VAC)
Conforms to EN61812-1 (EMI: EN55011 class B)	Conforms to EN61812-1 (EMI: EN55011 class B)	Conforms to EN61812-1 (EMI: EN55011 class B)	Conforms to EN61812-1 (EMI: EN55011 class B)
UL, CSA, conforms to EN61812-1	UL, CSA, conforms to EN61812-1	UL, CSA, conforms to EN61812-1	UL, CSA, conforms to EN61812-1
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B-39	B-53	B-63	B-69

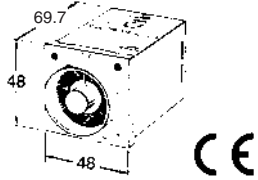
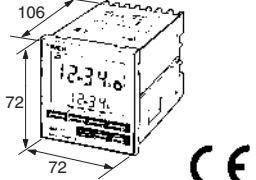
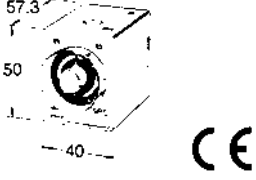
Timers

Classification		Analogue Timers				
Model		H3DE-H	H3YN		H3RN	
Features		DIN Track Mounting, Standard 22.5 mm Width, Solid-state Power OFF-delay Timer	Miniature Timer with Multiple Time Ranges and Multiple Operating Modes		Ultra-slim timer for G2R relay socket	
Appearance and dimensions						
Time range		0.1 s..120 s	0.1 s..10 h		0.1 s..10 h	
Supply voltage		100..120 VAC (50/60 Hz) 200..230 VAC (50/60 Hz) 24 VAC/VDC (50/60 Hz) 48 VAC/VDC (50/60 Hz)	24 VAC (50/60 Hz) 100..120 VAC (50/60 Hz) 200..230 VAC (50/60 Hz) 12, 24, 48, 100..110, 125 VDC		24 VAC (50/60 Hz), 12, 24 VDC	
Power consumption		AC: approx. 1.6 VA (1.0 W) at 230 VAC DC: approx. 0.2 W at 24 VDC	100..120 VAC: approx. 1.5 VA (1.3 W) 100..110 VDC: approx. 1.3 W		24 VAC: approx. 0.8 VA (0.5 W) 24 VDC: approx. 0.5 W	
Accuracy of operating time		±1% max.	±1% max.		±1% max.	
Setting error		±10%±0.05 s max.	±10%±0.05 s max.		±15%±0.05 s max.	
Control output		5 A at 250 VAC	5 A at 250 VAC/3 A at 250 VAC		3 A at 250 A	
Contact configuration	Type		-2/-21	-4/-41	-1/-11	-2/-21
	Time-limit	SPDT	DPDT	4PDT	SPDT	DPST-NO
	Instantaneous	---	---		---	---
Operating mode		Power OFF-delay	ON-delay Interval Flicker-ON		ON-delay Interval Flicker-ON	
Life expectancy	Mechanical	10 x 10 ⁶ operations	10 x 10 ⁶ operations		10 x 10 ⁶ operations	
	Electrical (Resistive load) (see note 1)	100 x 10 ³ operations (5 A at 250 VAC)	4PDT: 200 x 10 ³ operations (3 A at 250 VAC) DPDT: 500 x 10 ³ operations (5 A at 250 VAC)		100 x 10 ³ operations (3 A at 250 VAC)	
EMC		Conforms to EN61812-1 (EMI: EN55011 class A)	Conforms to EN61812-1		Conforms to EN61812-1	
Approved safety standards (see note2)		UL, CSA, conforms to EN61812-1	UL, CSA, LR, conforms to EN61812-1		UL, CSA, conforms to EN61812-1	
Socket	Front Connecting	---	PYF		R2RF	
	Back Connecting	---	PY screw type PYF screwless type		P2R screw type P2RF screwless type	
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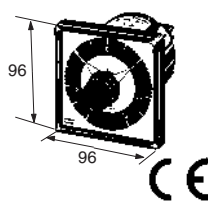
Analogue Timers							
H3CR-A			H3CR-F		H3CR-G		H3CR-H
DIN 48 x 48 mm, Multifunctional Timer with many time ranges, operating modes and wide power supply ranges Optional panel cover in black and gray available)			DIN 48 x 48 mm Solid-state Twin Timers		DIN 48 x 48 mm Solid-state Star-delta Timers		DIN 48 x 48 mm Solid-state Power OFF-delay Timers
							
0.05 s..600 h			0.05 s..300 h		0.5..120 s		0.05 s..12 min
100..240 VAC (50/60 Hz)/ 100..125 VDC, 24..48 VAC (50/60 Hz)/12..48 VDC			100..240 VAC (50/60 Hz), 12 VDC, 24 VDC/VAC (50/60 Hz), 48..125 VDC		100..120 VAC (50/60 Hz), 200..240 VAC (50/60 Hz)		100..120 VAC (50/60 Hz), 200..240 VAC (50/60 Hz), 24 VAC/VDC (50/60 Hz), 48 VDC, 100..125 VDC
H3CR-A/-A8 (When relay ON) AC: approx. 2.1 VA (1.6 W) at 240 VAC DC: approx. 0.8 W at 24 VDC (When relay OFF AC: approx. 1.3 VA (1.1 W) at 240 VAC DC: approx. 0.2 W at 24 VDC			100..240 VAC: approx. 10 VA (2.1 W) at 240 VAC 24 VAC/VDC: approx. 2 VA (1.7 W) at 24 VAC, approx. 1 W at 24 VDC 48..125 VDC: approx. 1.5 W at 125 VDC 12 VDC: approx. 1 W at 12 VDC		100..120 VAC: approx. 6 VA (2.4 W) at 120 VAC 200..240 VAC: approx. 12 VA (3.0 W) at 240 VAC		100..120 VAC: approx. 0.23 VA (0.22 W) at 120 VAC 200..240 VAC: approx. 0.35 VA (0.3 W) at 240 VAC 24 VAC/DC: approx. 0.17 VA (0.15 W) at 24 VAC, approx. 0.1 W at 24 VDC 48 VDC: approx. 0.18 W at 48 VDC 100..125 VDC: approx. 0.5 W at 125 VDC
±0.2% max.			±0.2% max.		±0.2% max.		±0.2% max.
±5%±0.05 s max.			±5%±0.05 s max.		±5%±0.05 s max.		±5%±0.05 s max.
5 A at 250 VAC			5 A at 250 VAC/30 VDC		5 A at 250 VAC/30 VDC		5 A at 250 VAC/30 VDC
-A/-A8	-A8E	-AS/-ABS			-G8EL	-G8L	
DPDT	SPDT	Solid-state	DPDT		SPST-NO	SPST-NO	DPDT
---	SPDT	---	---		SPST-NO	---	---
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			Flicker OFF start Flicker ON start With independent time setting for OFF and ON time		Star-delta timer		Power OFF-delay
20 x 10 ⁶ operations			20 x 10 ⁶ operations		20 x 10 ⁶ operations		10 x 10 ⁶ operations
100 x 10 ³ operations (5 A at 250 VAC)			100 x 10 ³ operations (5 A at 250 VAC)		100 x 10 ³ operations (5 A at 250 VAC)		100 x 10 ³ operations (5 A at 250 VAC)
Conforms to EN61812-1			Conforms to EN61812-1		Conforms to EN61812-1		Conforms to EN61812-1
UL, CSA, LR conforms to EN61812-1			UL, CSA, LR, conforms to EN61812-1		UL, CSA, LR, conforms to EN61812-1		UL, CSA, LR, conforms to EN61812-1
P2CF			P2CF		P2CF		P2CF
PL, P3G			P3G		P3G		P3G
B-107			B-129		B-135		B-143

Timers

Classification		Digital Timers		
Model		H8GN	H5CX	K3NP
Features		Preset Counter/Timer	48 x 48 mm Multifunctional Digital Timer	1/8 DIN Period Meter 5-digit
Appearance and dimensions				
Time range		0.001 s..9999 h	0.001 s..9999 h	Hours, minutes and seconds
Supply voltage		24 VDC	100..240 VAC (50/60 Hz), 24 VAC (50/60 Hz) 12 to 24 VDC	100..240 VAC (50/60 Hz), 12 to 24 VDC
Power consumption		1.5 W max.	AC: approx. 6.2 VA at 264 VAC approx. 5.1 VA at 26.4 VAC DC: approx. 2.4 W at 12 VDC	Depending on the output board selection
Accuracy of operating time		Signal start: $\pm 0.03\% \pm 30$ ms max. Power-ON start: $\pm 0.03\% \pm 50$ ms max.	Power ON start: $\pm 0.01\% \pm 0.05$ s max. Signal start: $\pm 0.005\% \pm 0.03$ s max.	$\pm 0.08\%$ rdg ± 1 digit
Setting error		No error	No error	No error
Control output		3 A at 250 VAC/30 VDC, resistive load (cos ϕ =1)	Contact output: 5 A at 250 VAC Solid state: 100 mA at 30 VDC	See available output board
Contact configuration	Type	---	-A/-A11/-L8	-AS/-A11S/-L8S
	Time-limit	SPDT	SPDT	Solid-state
	Instantaneous	---	---	---
Operating mode		A: ON-delay B: Flicker D: Signal OFF-delay E: Interval F: Accumulative Z: ON/OFF-duty adjustable flicker	A: Signal ON-delay A-1: Signal ON-delay 2 A-2: Power ON-delay 1 A-3: Power ON-delay 2 b: Repeat cycle 1 b-1: Repeat cycle 2 d: Signal OFF-delay E: Interval F: Cumulative Z: ON/OFF-duty adjustable flicker toff: Twin timer OFF start ton: Twin timer ON start	Passing speed Cycle Time difference Elapsed time Length measurement Interval
Life expectancy	Mechanical	10×10^6 operations	10×10^6 operations	---
	Electrical (Resistive load) (see note 1)	100×10^3 operations min. (3 A at 250 VAC)	100×10^3 operations (5 A at 250 VAC)	---
EMC		Conforms to EN61326	Conforms to EN61326	
Approved safety standards (see note2)		UL, CSA, LR, conforms to EN61010-1, conforms to VDE0106/P100, CE marking	cULus, cURus, conforms to EN61010-1	UL, CSA, conforms to EN61010-1
Socket	Front Connecting	---	P2CF	
	Back Connecting	---	P3G	
Page No.		C-59	B-159	B-193

Motor Timer		Digital Timers	Motor Timer	
H2C		H5BR	H2A	
DIN-sized (48 x 48 mm, 45 x 75 mm) Motor Timer with variable time range		72 x 72 mm Timer with easy-to-use functions	Miniature, high-performance Motor Timer	
				
0.2 s..30 h (50/60 Hz)		0.001 s..9999 h	0.2 s..28 h (50/60 Hz)	
110, 115, 120, 220, 240 VAC (50/60 Hz), 100 VAC (50 Hz), 100/110 VAC (60 Hz), 200 VAC (50 Hz), 200/220 VAC (60 Hz)		100..240 VAC (50/60 Hz), 24 VAC (50/60 Hz) 12..24 VDC	100 VAC (50 Hz) 100/110 VAC (60 Hz) 200 VAC (50 Hz) 200/220 VAC (60 Hz)	
Approx. 3.5 VA (3.3 W)		AC: approx. 8 VA at 240 VAC DC: approx. 5 W at 24 VDC	Approx. 3 VA (2.7 W)	
±0.5% ±2% max. setting error		Power start: ±0.01%±0.05 s max. Signal start: ±0.005%±0.03 s max.	±2% ±5% max. setting error	
6 A at 250 VAC		Contact: 5 A at 250 VAC Solid state: 100 mA at 30 VDC	2 A at 250 VAC	
H2C/-8/-F/-R/-FR	-8R	---	H2A-H	H2A
SPDT	SPDT	SPDT, solid-state	SPDT	SPDT
SPDT	---	---	SPST-NO	---
ON-delay		A: Signal ON-delay 1 A-1: Signal ON-delay 2 A-2: Power ON-delay 1 A-3: Power ON-delay 2 b: Repeat cycle 1 b-1: Repeat cycle 2 d: Signal OFF-delay E: Interval F: Cumulative	ON-delay	
30 x 10 ⁶ operations		10 x 10 ⁶ operations	1 x 10 ⁶ operations	
500 x 10 ³ operations (3 A at 250 VAC)		100 x 10 ³ operations (5 A at 250 VAC)	500 x 10 ³ operations (2 A at 250 VAC)	
Conforms to EN61812-1		Conforms to EN61326	Conforms to EN61812-1	
UL, CSA, conforms to EN61812-1		UL, CSA, conforms to EN61010-1	UL, CSA, conforms to EN61812-1	
PF, P2CF			PF	
PL, P3G			PL, P3G	
B-219		This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com		

Timers

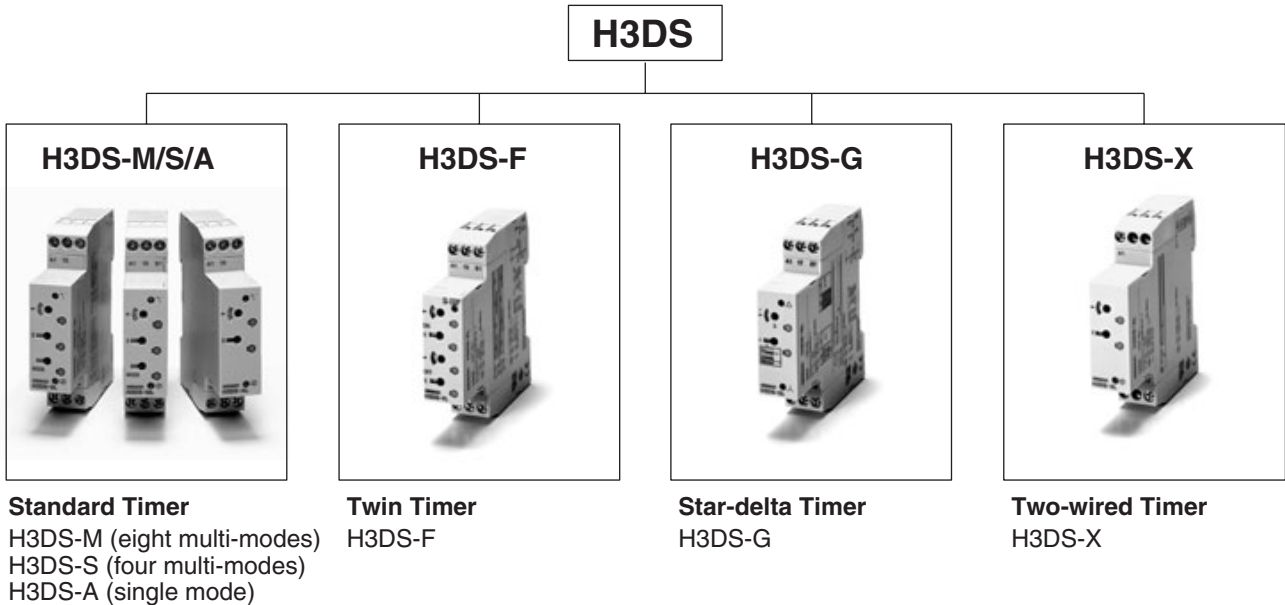
Classification		Motor Timer	
Model		H3AM	
Features		Large setting dial and moving pointers are ideal for easy operation and monitoring	
Appearance and dimensions			
Time range		0.2..60 h (50/60 Hz)	
Supply voltage		100..240 VAC (50/60 Hz)	
Power consumption		Approx. 9 VA (5 W)	
Accuracy of operating time		±0.7% max.	
Setting error		±2% max.	
Control output		5 A at 250 VAC	
Contact configuration	Type	-NS	-NSR
	Time-limit	SPDT	SPDT
	Instantaneous	SPDT (Programmable to Time-limit)	SPDT
Operating mode		ON-delay	
Life expectancy	Mechanical	50 x 10 ⁵ operations	
	Electrical (Resistive load) (see note 1)	100 x 10 ³ operations (5 A at 250 VAC)	
EMC		Conforms to EN61812-1	
Approved safety standards (see note2)		UL, CSA, conforms to EN61812-1	
Socket	Front Connecting	---	
	Back Connecting	---	
Page No.		This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com	

Solid-state Timer H3DS

DIN Track Mounted, Standard 17.5-mm Width Timer Range

- A wide AC/DC power supply range (24 to 230 VAC/ 24 to 48 VDC) reduces the number of timer models kept in stock. (24 to 230 VAC/VDC with H3DS-XL□)
- Smart Dial/Selector-locking Mechanism: Prevents the dials and selectors on the Timer's front panel from being inadvertently operated or being operated without authorization. The lock can only be unlocked and locked with an optional pen-type Lock Key.
- Screw-Less Clamp type available. (H3DS-□LC)
- Sticker provided for easy timer identification and management.
- Terminal clamp left open when delivered (screw terminal type).
- 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.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.

■ Broad Line-up of H3DS Series



Contents

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Solid-state Multi-functional Timer H3DS-M/-S/-A

- Eight operating modes (H3DS-M) and four operating modes (H3DS-S) cover a wide range of applications.
- A wide time setting range of 0.10 s to 120 h.
- Two LEDs indicate power and relay status respectively.



Model Number Structure

Model Number Legend

H3DS - L
 1 2 3

1. M: Multi-function type
S: Standard type
A: Single-function type
2. L: Smart lock mechanism
3. None: Screw terminal type
C: Screw-Less Clamp type

Ordering Information

List of Models

Supply voltage	Control output	Input type	Operating mode (see note)	Model	
				Screw terminal type	Screw-Less Clamp type
24 to 230 VAC (50/60Hz)/ 24 to 48 VDC	Contact output: SPDT (time-limit output SP-DT)	Voltage input	Eight multi-modes: A, B, B2, C, D, E, G, J	H3DS-ML	H3DS-MLC
		No-input available	Four multi-modes: A, B2, E, J	H3DS-SL	H3DS-SLC
			Single mode: A	H3DS-AL	H3DS-ALC

Note: The operating modes are as follows:

- 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

■ Accessories (Order Separately)

Lock Key		Y92S-38
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		PEP-S

Specifications

General

Item	H3DS-ML□	H3DS-SL□	H3DS-AL□
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	A: ON-delay (fixed)
Input type	Voltage input	---	
Output type	Relay: SPDT		
External connections	Screw terminal, Screw-Less Clamp		
Terminal block	Screw terminal type: Clamps two 2.5-mm ² max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm ² max. bar terminals without sleeves.		
Terminal screw tightening torque	0.98 N·m max.		
Mounting method	DIN track mounting (see note)		
Attachment	Nameplate label		
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5 A/AC-14; 250 V 1 A/AC-15; 250 V 1 A/DC-13; 30 V 0.1 A/DC-14; 30 V 0.05 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 range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h
10 h	10 to 120 h

Note: When the time setting dial is set to "0" for any time scale, the output will operate instantaneously.

Ratings

Rated supply voltage (see notes 1 and 2)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
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)	AC: 32 VA max./3.0 W max. (typical: 30 VA/2.7 W) at 230 VAC 14 VA max./2.2 W max. (typical: 13 VA/2.1 W) at 100 to 120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC 1.4 W max. (typical: 1.3 W) at 48 VDC
Voltage input	Max. permissible capacitance between inputs lines (terminals B1 and A2): 2,000 pF Load connectable in parallel with inputs (terminals B1 and A1). H-level: 20.4 to 253 VAC/20.4 to 52.8 VDC 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.

- Since an inrush current of 0.5 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.
- 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 H3DS-ML 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)
Setting error	±10% ±50 ms max. of FS
Signal input time	50 ms min.
Influence of voltage	±0.7% max. of FS (±0.7% ±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5% ±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 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 3 times each in 6 directions Destruction: 1,000 m/s ² 3 times each in 6 directions
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)
EMC	(EMI) EN61812-1 Emission Enclosure: 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) 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)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (Terminal block: IP20)
Weight	Approx. 70 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.

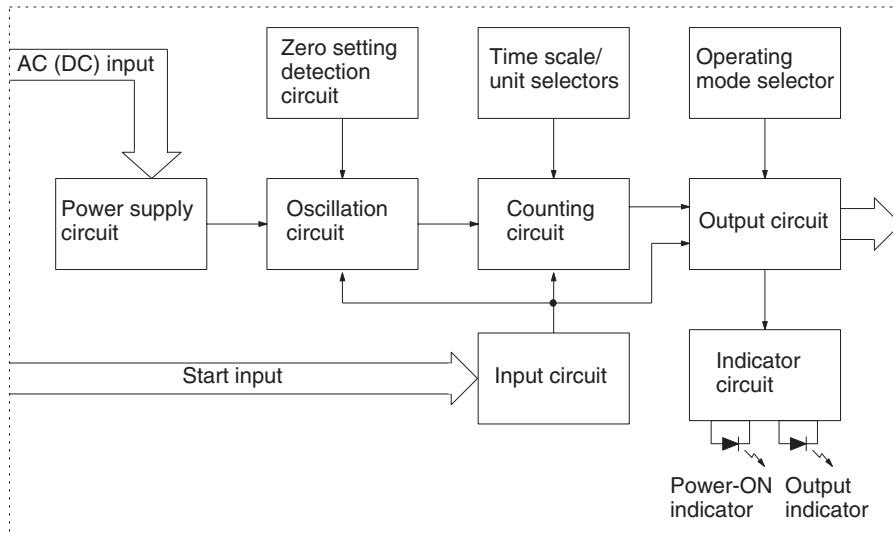
In both cases, a life of 100,000 operations can be expected.

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

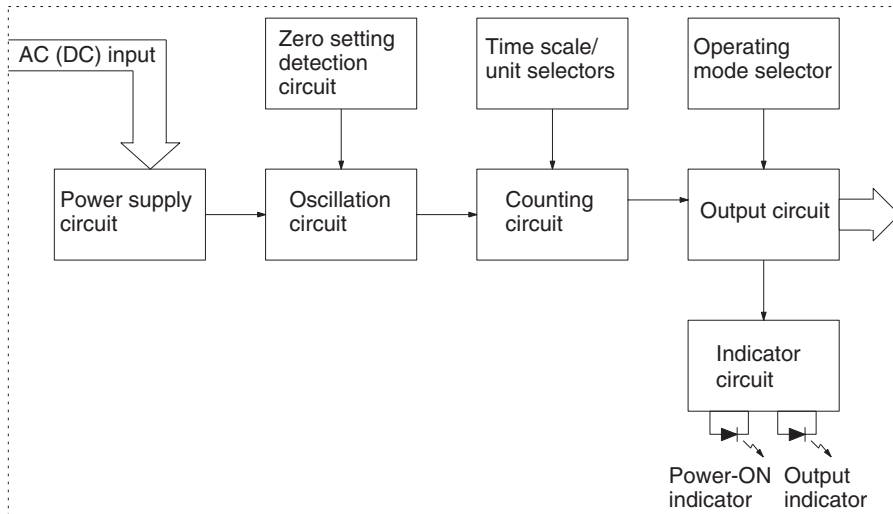
Connections

Block Diagram

H3DS-ML□



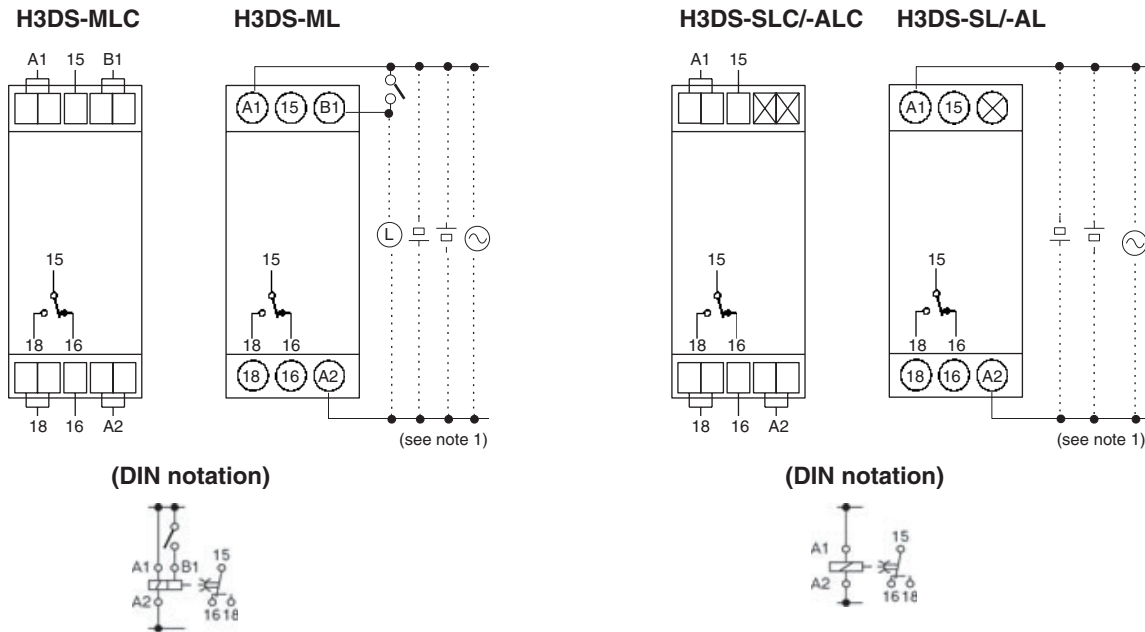
H3DS-SL□/-AL□




I/O Functions

Item		H3DS-ML□	H3DS-SL□/-AL□
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.	Outputs are turned ON according to designated output mode when preset value is reached.

Terminal Arrangement



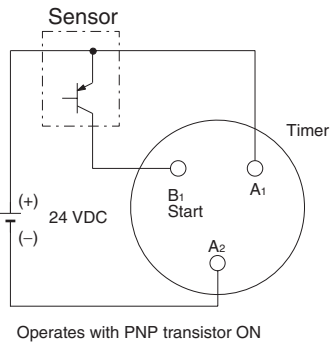
Note: 1. DC supply voltage does not require the designation of polarity.

2. The contact symbol for the H3DS is indicated with  because it offers multiple operating modes and is different from the delayed contact for conventional timers.

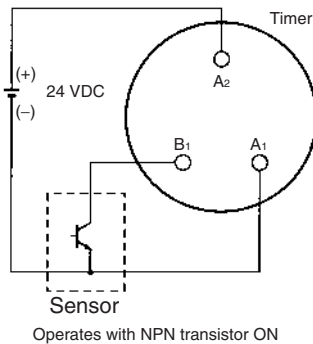
Input Connections

The inputs of the H3DS-ML are voltage (voltage imposition or open) inputs.

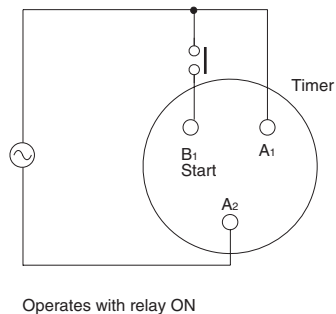
No-contact Input
(Connection to PNP output sensor.)



No-contact Input
(Connection to NPN output sensor.)



Contact Input



Voltage Input Signal Levels

No-contact input	1. Transistor ON Residual voltage: 1 V max. (Voltage between terminals B ₁ and A ₂ 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 B ₁ and A ₂ 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 B ₁ and A ₂ must be within the following ranges: When contacts are ON: 20.4 to 253 VAC/20.4 to 52.8 VDC 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 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 (except for H3DS-AL)

The H3DS-ML/-SL 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 appears in the operating mode display window.

H3DS-ML (8 modes): A, B, B2, C, D, E, G, J
(In order of appearance)

H3DS-SL (4 modes): A, E, B2, J, E, E, J, J
(In order of appearance)

Note: Letters that appear more than once indicate exactly the same operating mode.

Selection of Time Scale

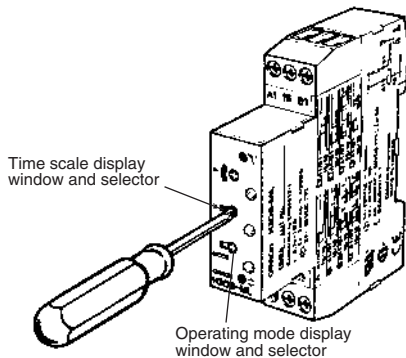
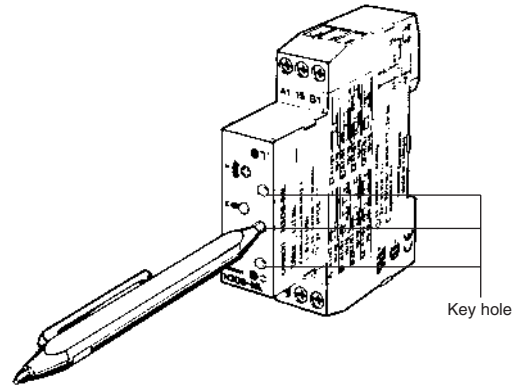
The time scale is selected by turning the time scale selector. The time scales will appear in the following order in the time scale display window on the left of the selector:

1 s, 0.1 s, 1 h, 0.1 h, 10 h, 1 h, 1 m, 0.1 m.

Note: The time scale "1h" appears twice. Both instances indicate exactly the same time scale.

Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial, time scale selector, and operating mode selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.

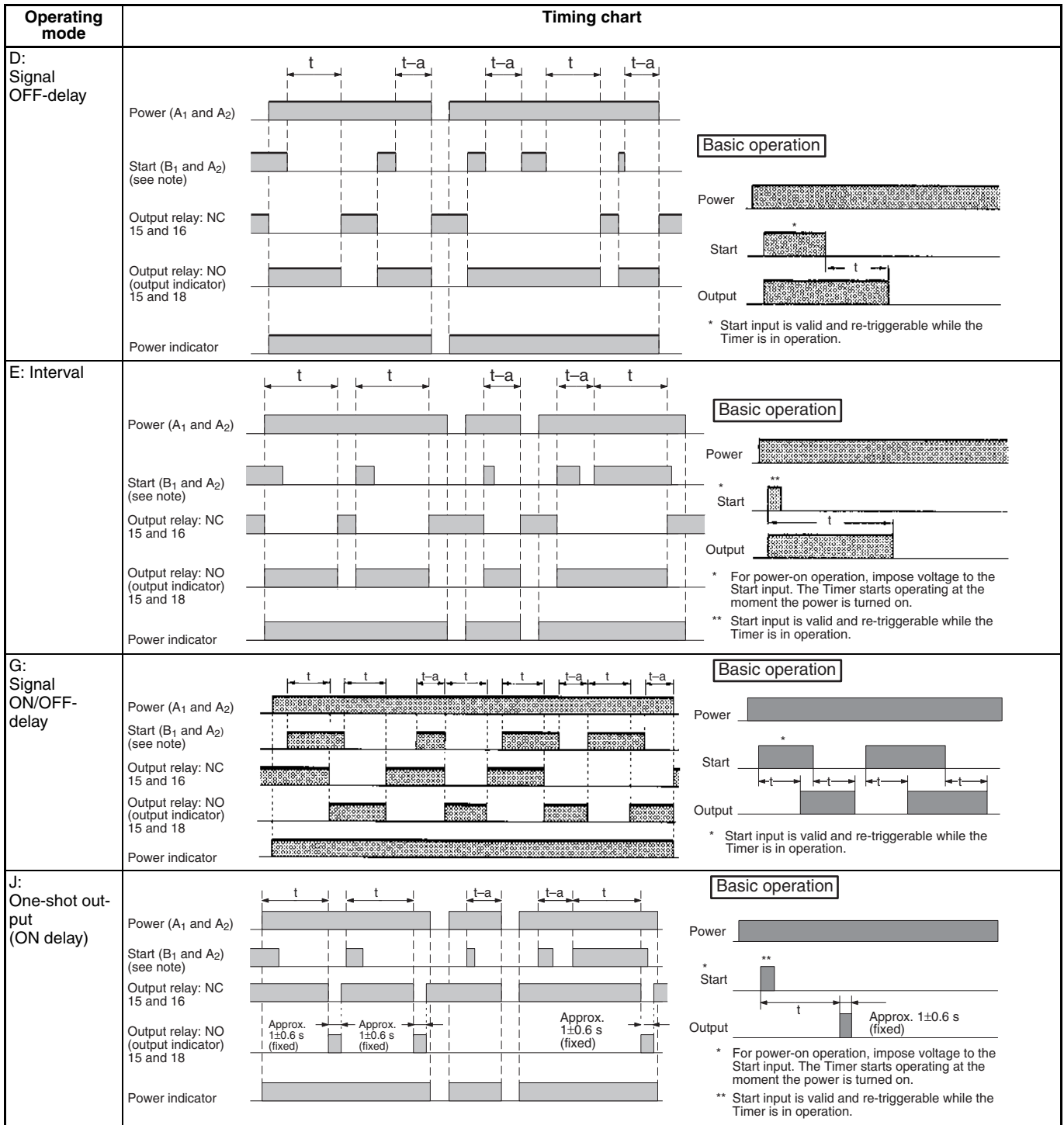


■ Timing Chart

- 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 for H3DS-SL□/-AL□ models. Operation starts at power-on.

Operating mode	Timing chart	
A: ON-delay	<p>The timing chart for ON-delay mode shows the following signals over time:</p> <ul style="list-style-type: none"> Power (A₁ and A₂): A series of pulses with duration t and gaps of duration $t-a$. Start (B₁ and A₂): A single pulse at the beginning of the first power pulse. Output relay: NC (15 and 16): Turns ON at the start of the first power pulse and remains ON during subsequent power pulses. Output relay: NO (15 and 18): Turns ON at the end of each power pulse. Power indicator: Turns ON during each power pulse. 	<p>Basic operation</p> <p>Basic operation: Shows a continuous power signal. A start pulse is applied at the beginning. The output signal is delayed by time t after the start pulse.</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	<p>The timing chart for Flicker OFF start mode shows the following signals over time:</p> <ul style="list-style-type: none"> Power (A₁ and A₂): A series of pulses with duration t and gaps of duration $t-a$. Start (B₁ and A₂): A single pulse at the beginning of the first power pulse. Output relay: NC (15 and 16): Turns ON at the start of the first power pulse and remains ON during subsequent power pulses. Output relay: NO (15 and 18): Turns ON at the end of each power pulse. Power indicator: Turns ON during each power pulse. 	<p>Basic operation</p> <p>Basic operation: Shows a continuous power signal. A start pulse is applied at the beginning. The output signal is delayed by time t after the start pulse.</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	<p>The timing chart for Flicker ON start mode shows the following signals over time:</p> <ul style="list-style-type: none"> Power (A₁ and A₂): A series of pulses with duration t and gaps of duration $t-a$. Start (B₁ and A₂): A single pulse at the beginning of the first power pulse. Output relay: NC (15 and 16): Turns ON at the end of each power pulse. Output relay: NO (15 and 18): Turns ON at the start of each power pulse. Power indicator: Turns ON during each power pulse. 	<p>Basic operation</p> <p>Basic operation: Shows a continuous power signal. A start pulse is applied at the beginning. The output signal is delayed by time t after the start pulse.</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	<p>The timing chart for Signal ON/OFF-delay mode shows the following signals over time:</p> <ul style="list-style-type: none"> Power (A₁ and A₂): A series of pulses with duration t and gaps of duration $t-a$. Start (B₁ and A₂): A single pulse at the beginning of the first power pulse. Output relay: NC (15 and 16): Turns ON at the end of each power pulse. Output relay: NO (15 and 18): Turns ON at the start of each power pulse. Power indicator: Turns ON during each power pulse. 	<p>Basic operation</p> <p>Basic operation: Shows a continuous power signal. A start pulse is applied at the beginning. The output signal is delayed by time t after the start pulse.</p> <p>* Start input is invalid while the Timer is in operation.</p>

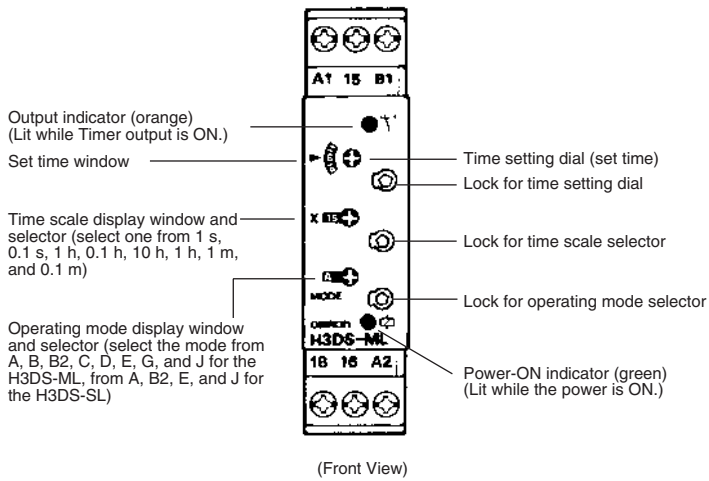
Note: The start input of the H3DS-ML□ model is activated by applying a voltage to B1 and A2 terminals. The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*).



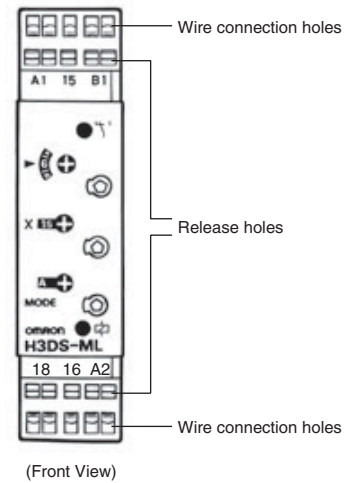
Note: The start input of the H3DS-ML□ model is activated by applying a voltage to B1 and A2 terminals.
The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*).

Nomenclature

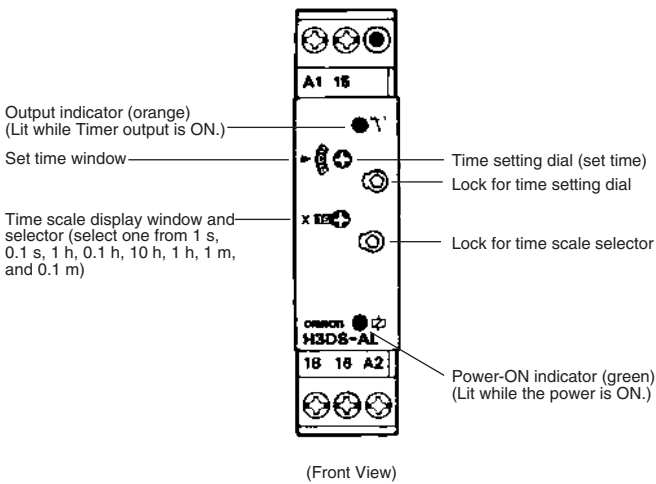
H3DS-ML□/-SL□



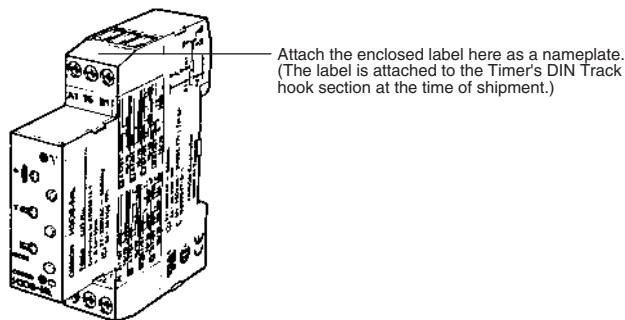
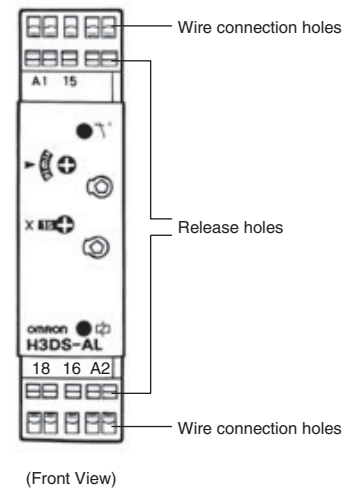
H3DS-MLC/-SLC



H3DS-AL□



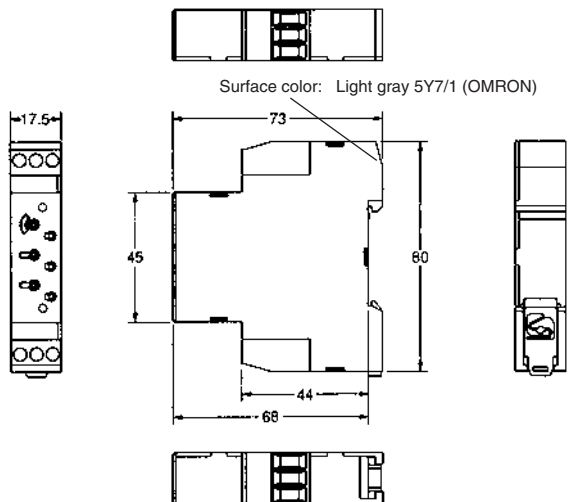
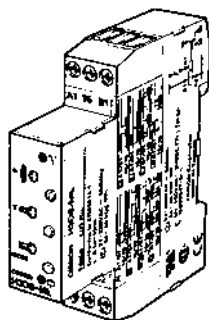
H3DS-ALC



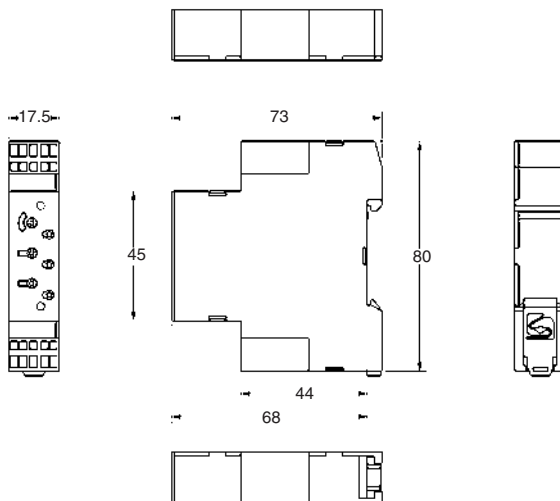
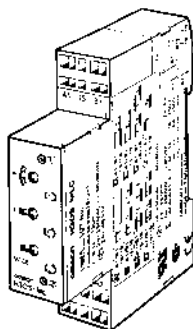
Dimensions

Note: All units are in millimeters unless otherwise indicated.

H3DS-ML/-SL/-AL



H3DS-MLC/-SLC/-ALC



Solid-state Twin Timer H3DS-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

H3DS -F L

1 2 3

- 1. F: Twin timers
- 2. L: Smart lock mechanism
- 3. None: Screw terminal type
C: Screw-Less Clamp type

Ordering Information

List of Models

Operating mode	Supply voltage	Model	
		Screw terminal type	Screw-Less Clamp type
Flicker-OFF/Flicker-ON start	24 to 230 VAC (50/60 Hz)/24 to 48 VDC	H3DS-FL	H3DS-FLC

Accessories (Order Separately)

Lock Key		Y92S-38
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		PEP-S

Specifications

■ General

Item	H3DS-F
Operating mode	Flicker-OFF/Flicker-ON start
Output type	Relay: SPDT
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm ² max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm ² max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Mounting method	DIN track mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 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 1 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 range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h

Note: When the time setting dial is set to "0" for any time scale, the output will operate instantaneously.

■ Ratings

Rated supply voltage (See note.)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
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: 33 VA max./2.2 W max. (typical: 31 VA/2.0 W) at 230 VAC 11 VA max./1.9 W max. (typical: 9.7 VA/1.7 W) at 100 to 120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC 1.4 W max. (typical: 1.2 W) at 48 VDC
Voltage input	Max. permissible capacitance between inputs lines (terminals B1 and A2): 2,000 pF Load connectable in parallel with inputs (terminals B1 and A1). H-level: 20.4 to 253 VAC/20.4 to 52.8 VDC 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: DC ripple rate: 20% max.

■ Characteristics

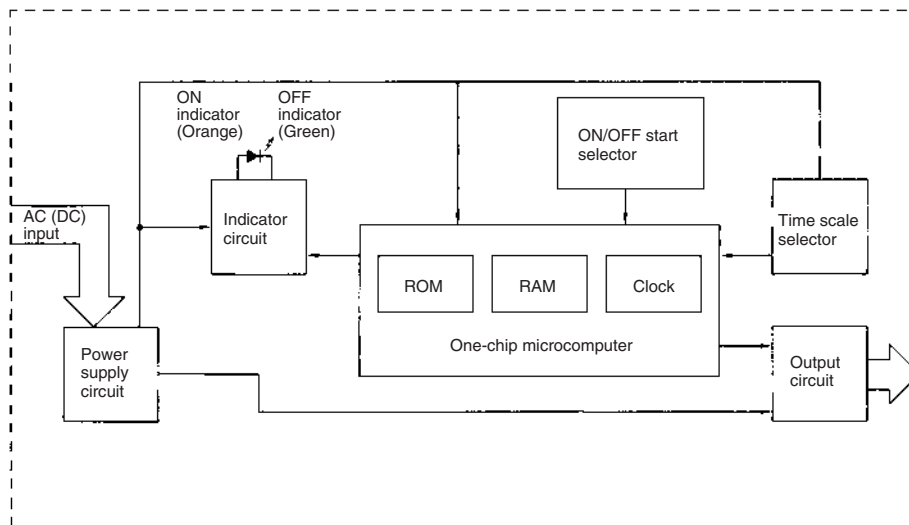
Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 50 ms max. of FS
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5% ± 10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 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: 200 m/s ² , 3 times each in 6 directions Destruction: 300 m/s ² , 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) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: 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) 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)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 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

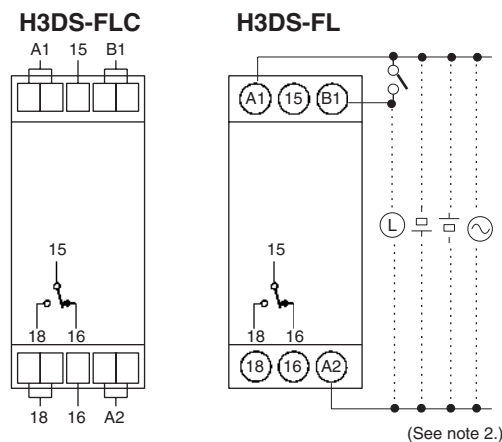
■ Block Diagram



■ I/O Function

Inputs	Flicker-ON start operation begins when inputs are turned ON.	
Outputs	Control output	Outputs are turned ON/OFF according to the time set by the ON-and OFF-time setting dial.

■ Terminal Arrangement



- Note:**
1. If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode.
 2. DC supply voltage does not require the designation of polarity.

Operation

Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired 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.

Settings for ON/OFF Start

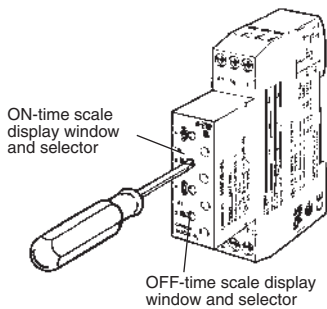
If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode. The operating mode will not change if the state of the applied voltage changes during timer operation.

Selection of Time Scale

The time scale is selected by turning the ON-time scale selector and OFF-time scale selector. The time scales will appear in the following order in each time scale display window on the left of the selector:

0.1 s, 1 h, 0.1 h, 1 m, 1 s, 0.1 h, 0.1 m, 1 s.

Note: The time scales "1 s" and "0.1 h" appear twice. Both instances indicate exactly the same time scale.

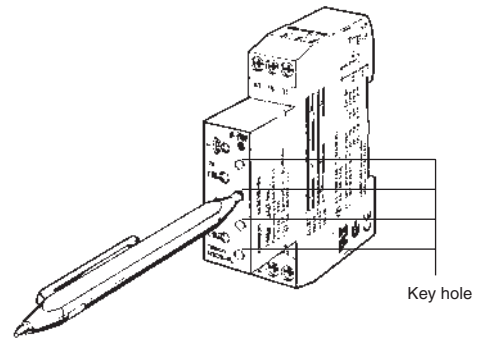


Time Setting

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

Locking/Unlocking of Selectors and Time Setting Dial

The ON/OFF-time setting dials and time scale selectors can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dials or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.



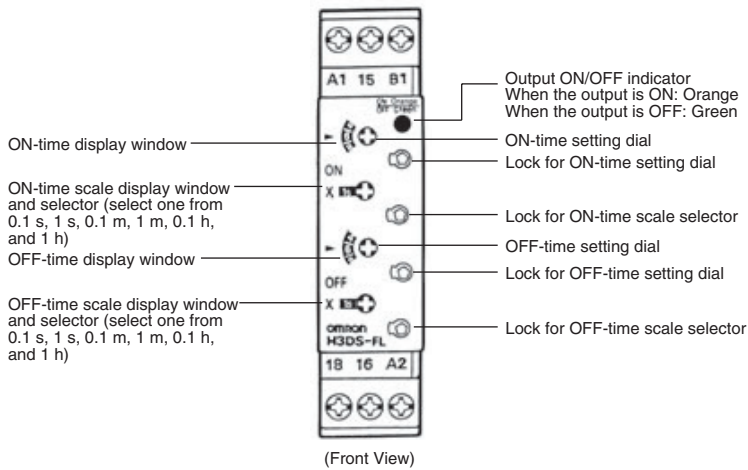
Timing Charts

Operating mode	Timing chart	
Flicker-OFF start (See note 1.)	<p>Power (A₁ and A₂)</p> <p>Output relay: NO 15 and 18 (ON indicator)</p> <p>Output relay: NC 15 and 16</p> <p>OFF indicator</p>	<p>Timing diagram for Flicker-OFF start mode. The diagram shows a series of pulses for Power, ON indicator, and OFF indicator. The ON indicator pulses are labeled with t_{ON} and t_{OFF}. A scale bar indicates 0.1 s min.</p> <p>t_{ON}: ON set time t_{OFF}: OFF set time</p>
Flicker-ON start (See note 1.)	<p>Power (A₁ and A₂)</p> <p>Signal (B₁ and A₂)</p> <p>Output relay: NO 15 and 18 (ON indicator)</p> <p>Output relay: NC 15 and 16</p> <p>OFF indicator</p>	<p>Timing diagram for Flicker-ON start mode. The diagram shows a series of pulses for Power, ON indicator, and OFF indicator. The ON indicator pulses are labeled with t_{ON} and t_{OFF}. A scale bar indicates 0.1 s min.</p> <p>t_{ON}: ON set time t_{OFF}: OFF set time</p>

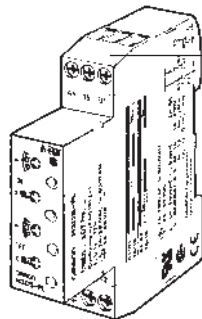
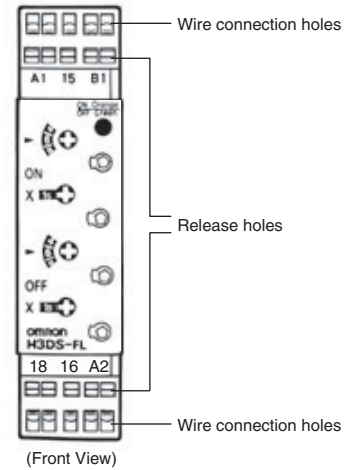
- Note:**
1. If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode.
 2. The reset time requires a minimum of 0.1 s.
 3. When power is supplied in flicker-ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

Nomenclature

H3DS-FL□



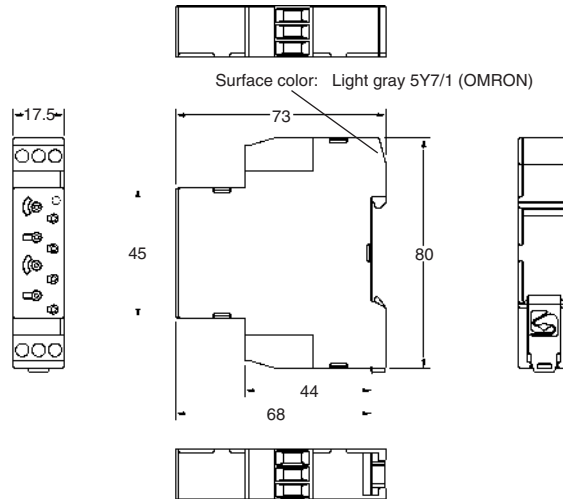
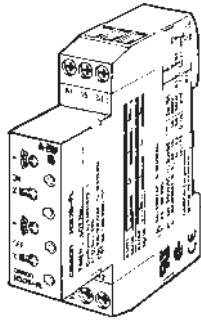
H3DS-FLC



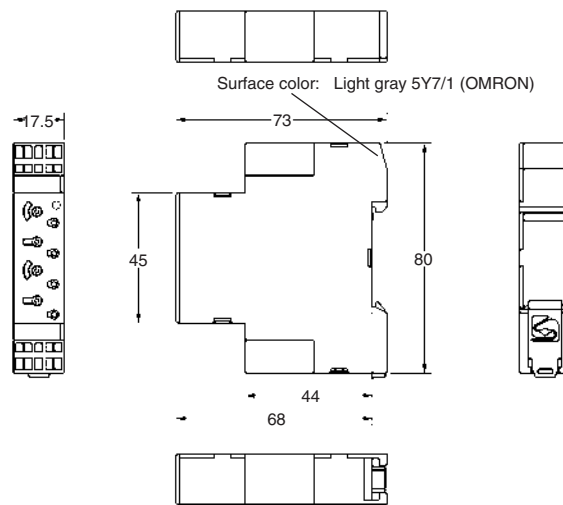
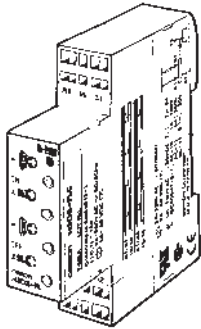
Attach the enclosed label here as a nameplate.
(The label is attached to the Timer's DIN Track hook section at the time of shipment.)

Dimensions

H3DS-FL



H3DS-FLC



Solid-state Star-delta Timer H3DS-G

- A wide star-time range (up to 120 seconds) and star-delta transfer time range (up to 1 second)



Model Number Structure

Model Number Legend

H3DS -G L □
1 2 3

- 1. G: Star-delta timer
- 2. L: Smart lock mechanism
- 3. None: Screw terminal type
C: Screw-Less Clamp type

Ordering Information

List of Models

Operating mode	Supply voltage	Model	
		Screw terminal type	Screw-Less Clamp type
Star-delta operation	24 to 230 VAC (50/60 Hz)/24 to 48 VDC	H3DS-GL	H3DS-GLC

Accessories (Order Separately)

Lock Key		Y92S-38
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		PEP-S

Specifications

■ General

Item	H3DS-G
Operating mode	Star-delta operation
Operating/Reset method	Time-limit operation/Self-reset
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm ² max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm ² max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Output type	(Star operation circuit) Relay: SPST-NO (Delta operation circuit) Relay: SPST-NO
Mounting method	DIN track mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 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 1 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	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, 0.5 s, or 1 s
--------------------------	--

■ Ratings

Rated supply voltage (see note)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.5 s
Reset voltage	2.4 VAC/DC max.
Power consumption	AC: 21 VA max./1.7 W max. (typical: 20 VA/1.6 W) at 230 VAC 11 VA max./2.0 W max. (typical: 8.6 VA/1.5 W) at 100 to 120 VAC DC: 1.3 W max. (typical: 1.2 W) at 24 VDC 0.7 W max. (typical: 0.6 W) at 48 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% ± 50 ms max. of FS
Total tolerance of transfer time	± (25% FS + 5 ms) max.
Influence of voltage	±0.5% max. of FS
Influence of temperature	±5% 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 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: 200 m/s ² , 3 times each in 6 directions Destruction: 300 m/s ² , 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) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: 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) 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)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 g

Note: For reference:

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

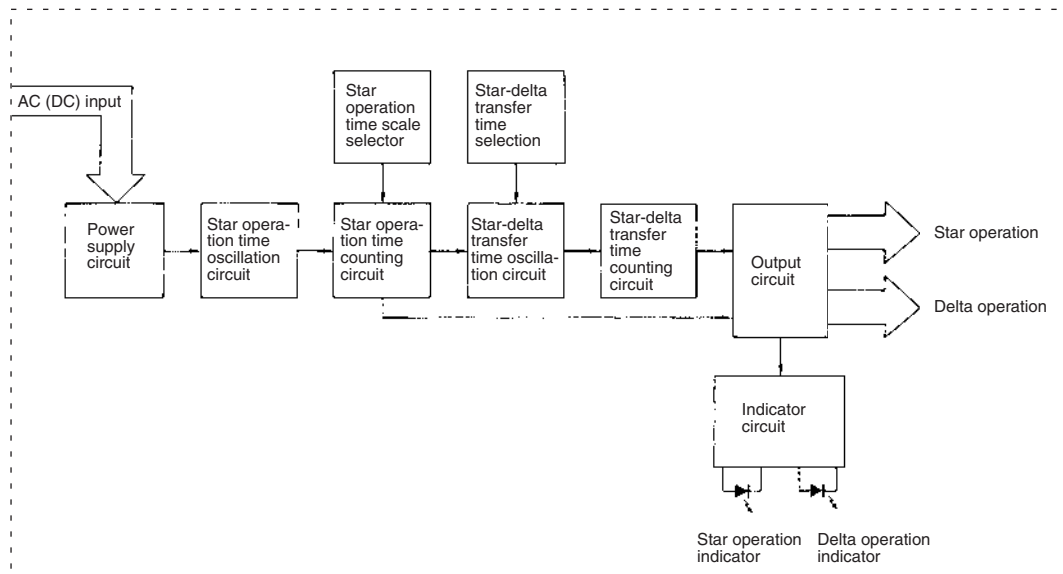
A maximum current of 0.1 A can be switched if L/R is 7 ms.

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

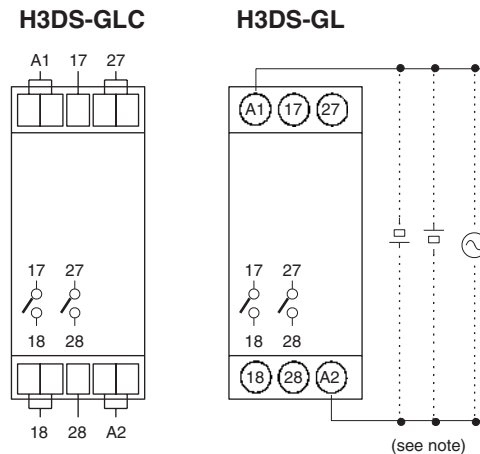
■ Block Diagram



■ 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

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired 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 Time Unit and Time Scale

The star-delta transfer time and star operation time scale are set with the same selector. The star-delta transfer time can be set to 0.05, 0.1, 0.5, or 1. The star operation time scale can be set to a multiplication factor of 1 or 10. If the star-delta transfer time is displayed in the display window in white letters, this means that the star operation time scale is "x10". Refer to the example below.

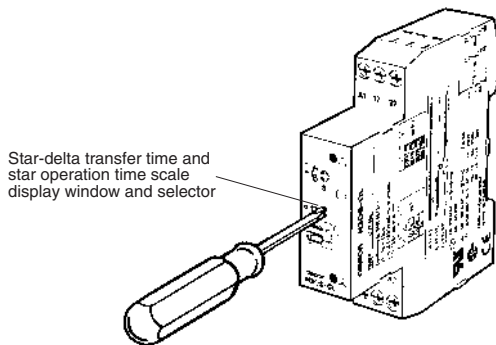
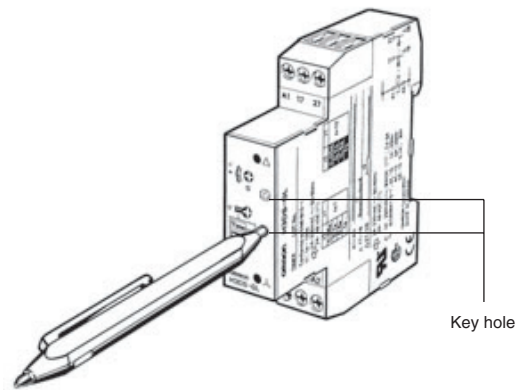
Star-delta transfer time	Star operation time scale
0.05 s	x1
0.1 s	
0.5 s	
1 s	
0.05 s	x10
0.1 s	
0.5 s	
1 s	

Time Setting

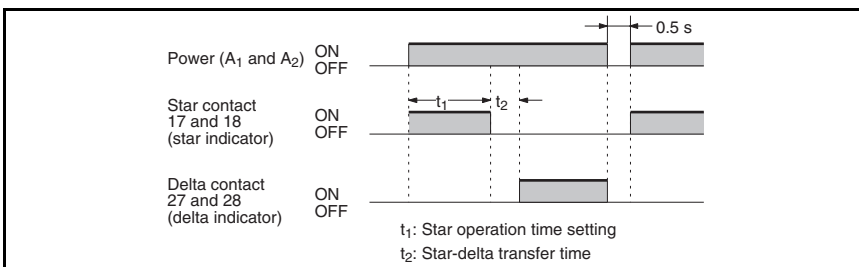
The star operation time of the Timer is set with the time setting dial.

Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial and time scale selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.



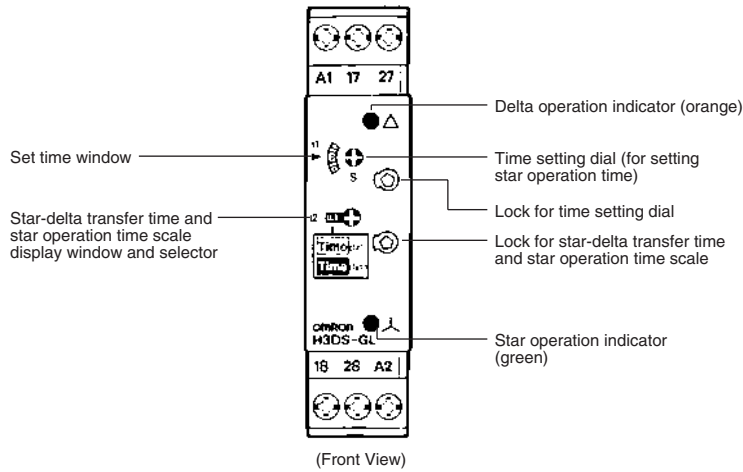
Timing Charts



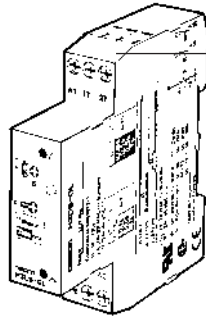
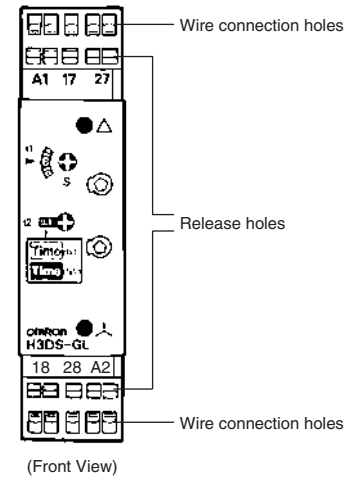
Note: The reset time requires a maximum of 0.5 s.

Nomenclature

H3DS-GL□



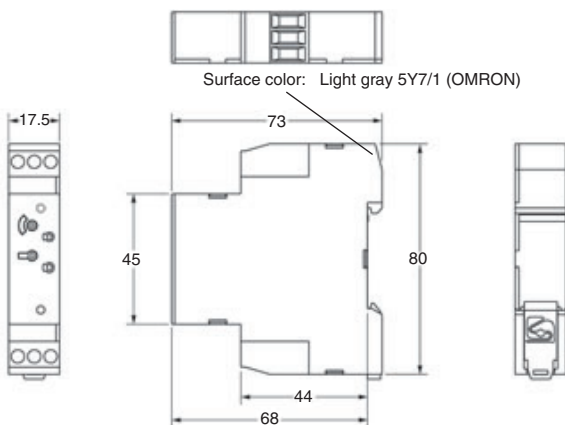
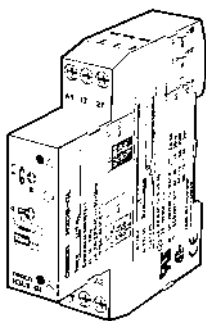
H3DS-GLC



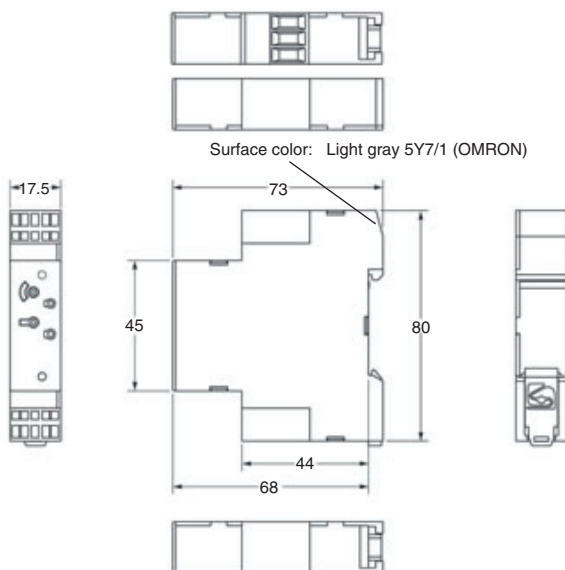
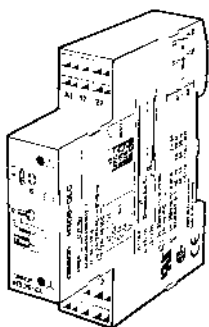
Attach the enclosed label here as a nameplate. (The label is attached to the Timer's DIN Track hook section at the time of shipment.)

Dimensions

H3DS-GL



H3DS-GLC



Solid-state Two-wired Timer H3DS-X

- Covers wide range of supply voltage (24 to 230 VAC/VDC).



Model Number Structure

Model Number Legend

H3DS -X L □
1 2 3

- 1. X: Two-wired timer
- 2. L: Smart lock mechanism
- 3. None: Screw terminal type
C: Screw-Less Clamp type

Ordering Information

List of Models

Supply voltage	Input type	Operating mode	Model	
			Screw terminal type	Screw-Less Clamp type
24 to 230 VAC/VDC (50/60 Hz)	No-input available	ON-delay	H3DS-XL	H3DS-XLC

Accessories (Order Separately)

Lock Key		Y92S-38
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		PEP-S

Specifications

■ General

Item	H3DS-X
Operating mode	ON-delay
Operating/Reset method	Time-limit operation/self-resetting
Output type	SCR output
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm ² max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm ² max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Mounting method	DIN track mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100

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 range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h
10 h	10 to 120 h

Note: When the time setting dial is set to "0" for any time scale, 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	1.0 VAC/VDC max.
Reset current	5 mA max.
Power consumption	5 mA max.
Control output	SCR output: 5 mA to 0.7 A
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%

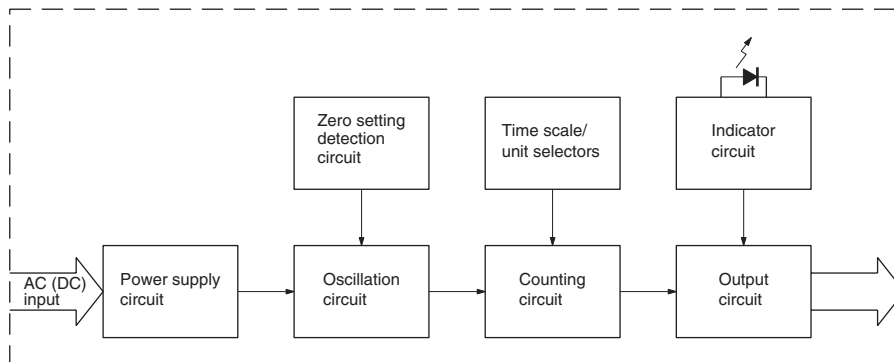
Note: The ripple in DC power supply must be 5% max.

■ Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 50 ms max. of FS
Reset time	0.1 s max.
Influence of voltage	±0.5% max. of FS (±0.5%±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5%±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
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 (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: 200 m/s ² , 3 times each in 6 directions Destruction: 300 m/s ² , 3 times each in 6 directions
EMC	(EMI) EN61812-1 Emission Enclosure: 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) 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)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 g

Connections

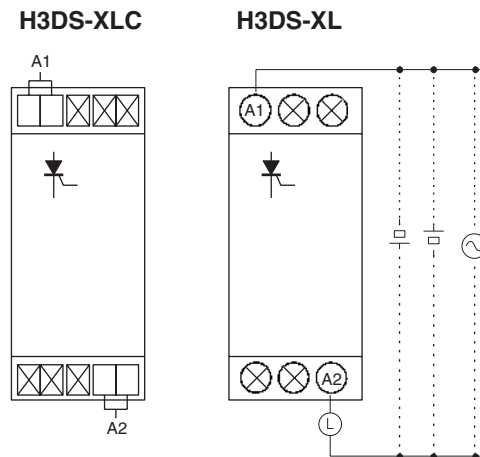
■ Block Diagram



■ I/O Functions

Inputs	---	
Outputs	Control output	Outputs are turned ON when the preset value is reached.

■ Terminal Arrangement



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

Operation

■ Basic Operation

Setting of Selector

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

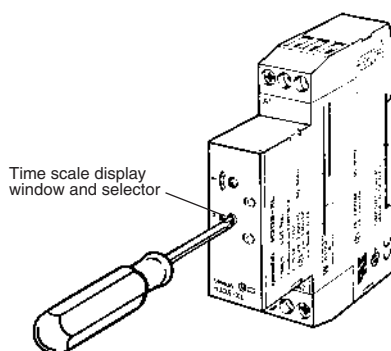
Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

Selection of Time Scale

The time scale is selected by turning the time scale selector. The time scales will appear in the following order in the time scale display window on the left of the selector:

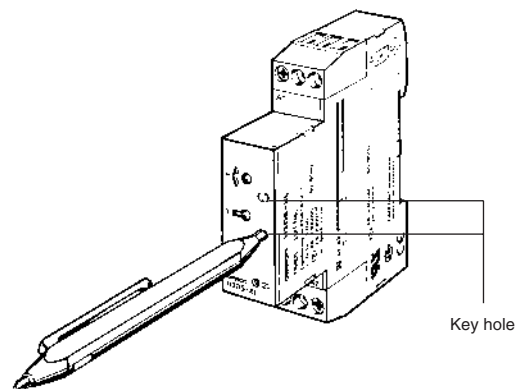
1 s, 0.1 s, 1 h, 0.1 h, 10 h, 1 h, 1 m, 0.1 m.

Note: The time scale “1h” appears twice. Both instances indicate exactly the same time scale.

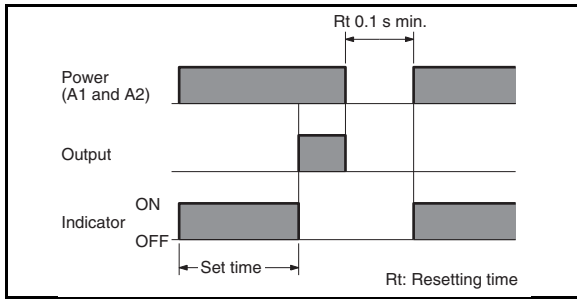


Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial and time scale selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.

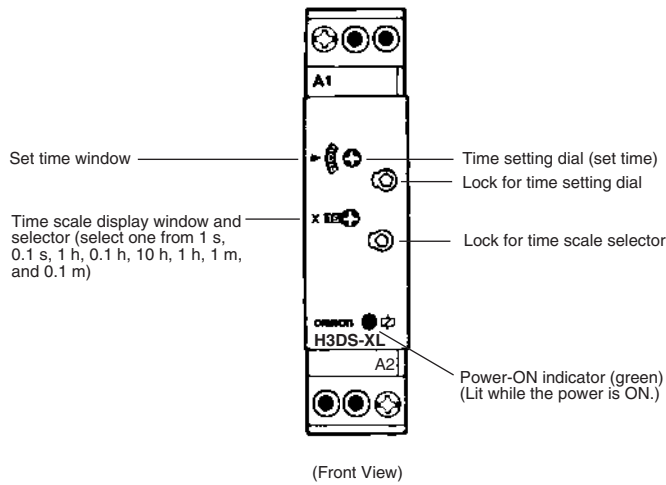


■ Timing Charts

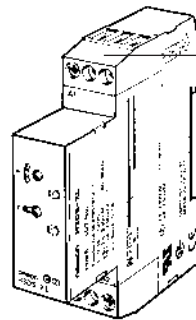
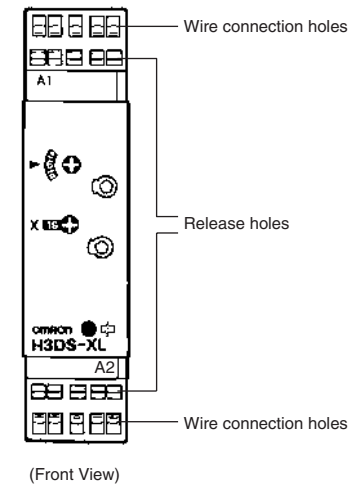


Nomenclature

H3DS-XL□



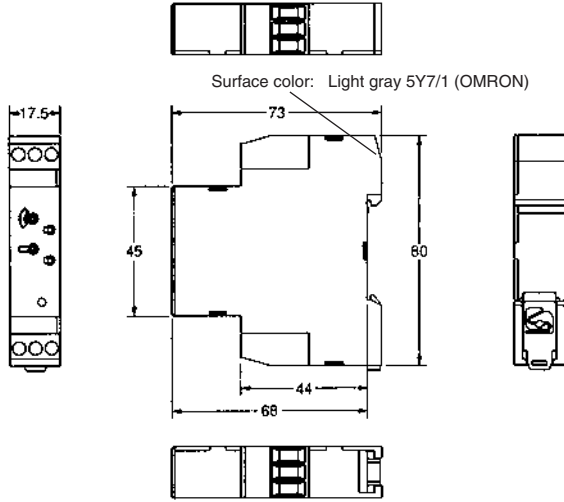
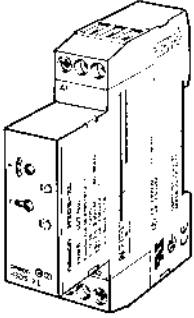
H3DS-XLC



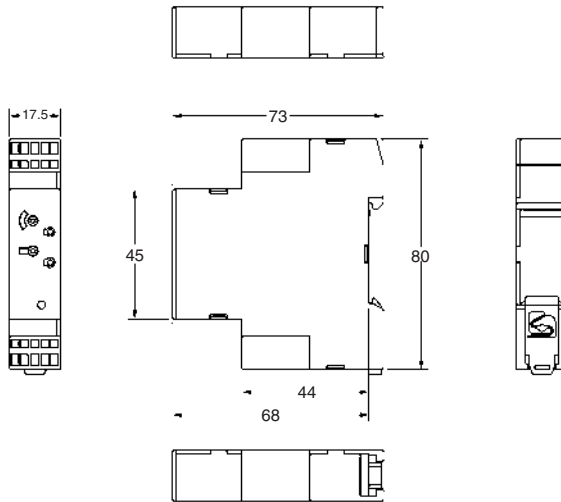
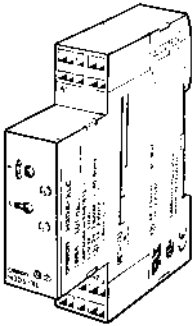
Attach the enclosed label here as a nameplate. (The label is attached to the Timer's DIN Track hook section at the time of shipment.)

Dimensions

H3DS-XL



H3DS-XLC



Installation of Screw-Less Clamp Models

■ Tools

A flat-blade screwdriver should be used to mount the cables.

Applicable Screwdriver

- Flat-blade, Parallel-tip, 2.5 mm diameter

- Flat-blade, Parallel-tip



- Flat-blade, Flared-tip



Cannot be used.

Examples: FACOM AEF.2.5 × 75E
 VESSEL No. 9900-(-)2.5 × 75
 WAGO 210-119
 WIHA 260/2.5 × 40

■ Applicable Wires

Applicable Wire Sizes

0.2 to 1.5 mm², AWG24 to AWG16

Applicable Wire Type

Solid wires, stranded wires, flexible wires, or wires with ferules can be used.

(See note 1) $1.8 \leq \text{Diameter } D \text{ (mm)} \leq 3.0$ (see note 2)

Conductor diameter d (mm) or length of sides a and b (mm) ≤ 1.6



Wires with Ferules



Note: 1. If the overall diameter of the wire is less than 1.8 mm, do not insert the wire past the conductor. Refer to the following diagrams.



2. If the overall diameter of the wire is over 2.8 mm, it will be difficult to use double wiring.

■ Wiring

Use wires of the applicable sizes specified above. The length of the exposed conductor should be 6 to 7 mm.



Fig. 1 Exposed Conductor Length

Use the following wiring procedure.

1. Insert the specified screwdriver into the release hole located beside the wire connection hole where the wire is to be inserted.

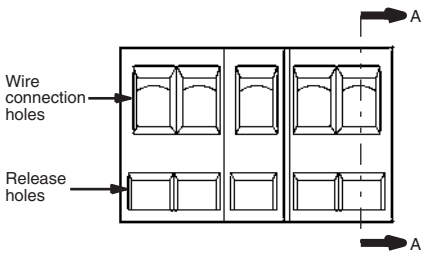


Fig. 2 Wire Connection Holes and Release Holes

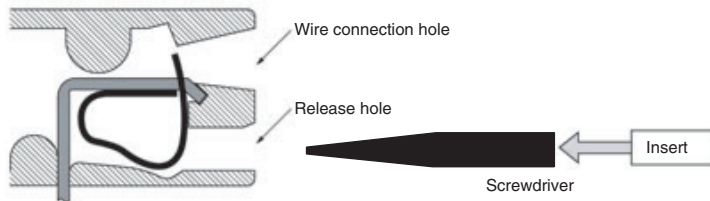
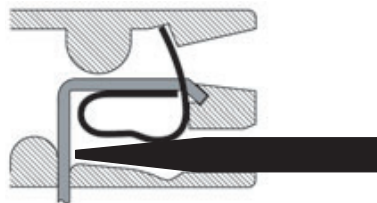
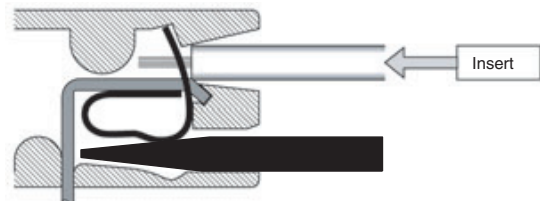


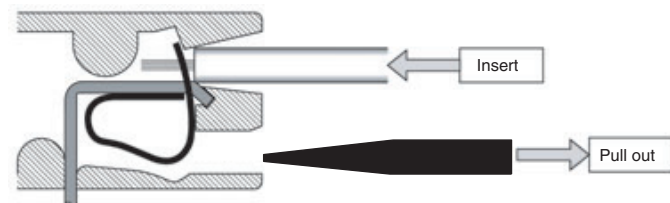
Fig. 3 Section A-A of Fig. 2



2. Insert the exposed conductor into the wire connection hole.

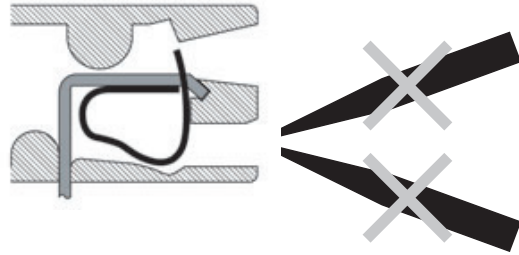


3. Pull out the screwdriver.

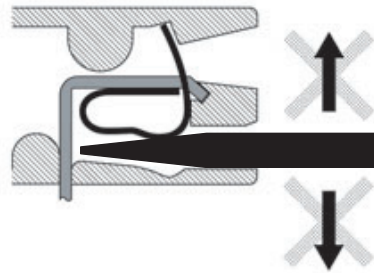


■ Precautions

Always insert the screwdriver straight into the hole, never at an angle. The clamp spring may be deformed if the screwdriver is not straight.



Do not move the screwdriver side to side in the clamp hole. The clamp spring may be deformed if the screwdriver is moved sideways.

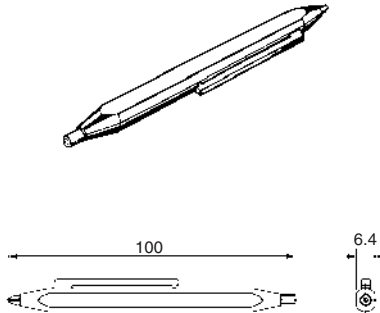


Accessories (Order Separately)

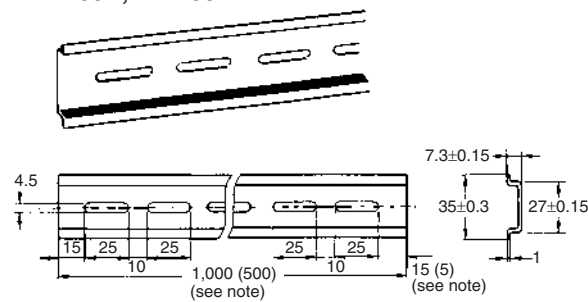
Note: All units are in millimeters unless otherwise indicated.

■ Dimensions

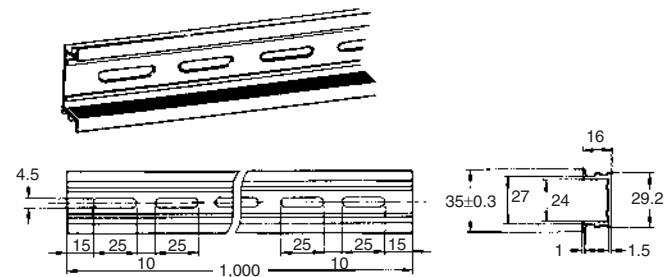
Lock Key
Y92S-38



Mounting Track
PFP-100N, PFP-50N

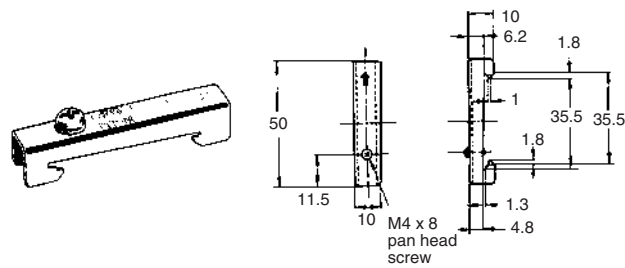


PFP-100N2

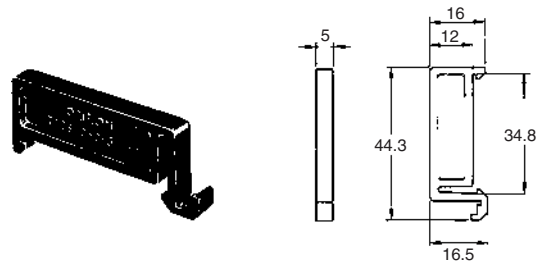


Note: The values shown in parentheses are for the PFP-50N.

End Plate
PFP-M



Spacer
PFP-S



Precautions

Changing of Setting

Caution
Do not change the time scale or operating mode, while the Timer is in operation or malfunction could result.

Power Supplies

The H3DS Series is provided with a transformerless power supply system. An electric shock may be received if the input terminal is touched while power is being supplied.

Use the bar terminal for wiring the H3DS. 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 H3DS only, a DC power supply must be connected to the power input terminals as designated according to the polarity of the terminals.

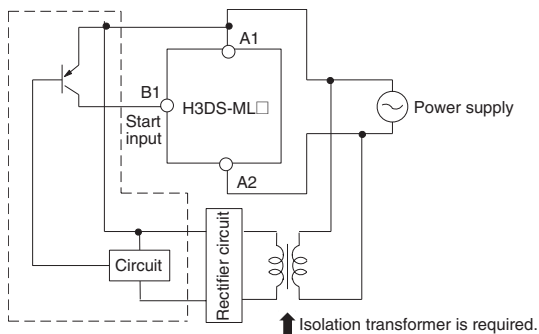
A DC power supply can be connected if its ripple factor is 20% or less and the mean voltage is within the rated operating voltage range of the Timer.

Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

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.

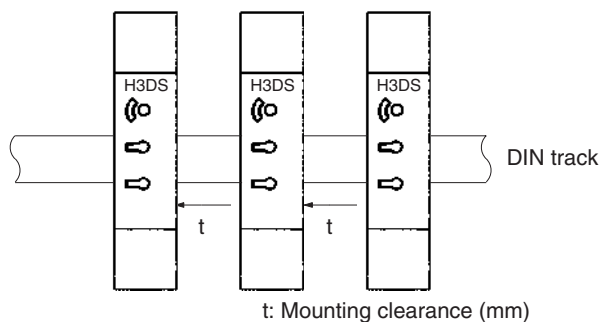
Be sure that the capacity of the power supply is large enough, otherwise the Timer may not start due to inrush current (approx. 3 A) that may flow for an instant when the Timer is turned on.

For the power supply of an input device of the H3DS-ML□, use an isolating transformer, of which the primary and secondary windings are mutually isolated and the secondary winding is not grounded.



Installation

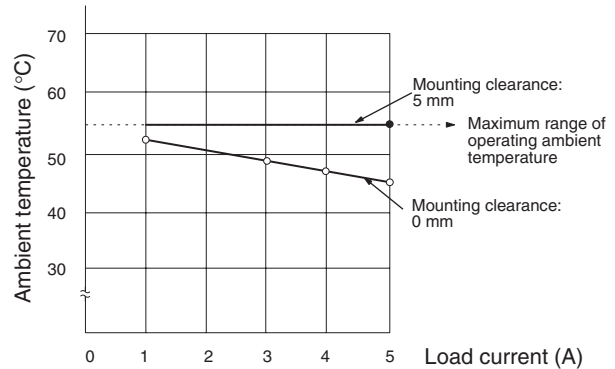
If the load current is continuously being supplied to the Timer for a long period of time, be sure to provide the mounting clearance as shown in the figure below. If used under the conditions other than those specified below (except for the H3DS-XL□), the life of internal components may be shortened due to an excessive rise in the internal temperature.



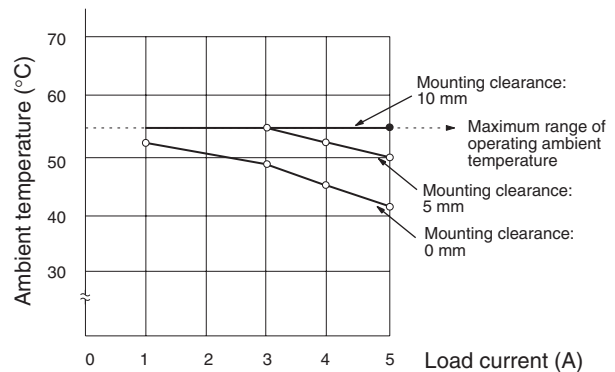
Switching Current vs. Ambient Temperature

(When Mounting Two or More H3DS Units Side-by-Side)

- H3DS-ML□/-SL□/-AL□

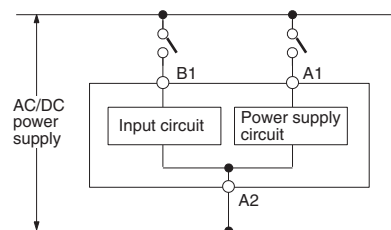


- H3DS-FL□/-GL□



Input/Output

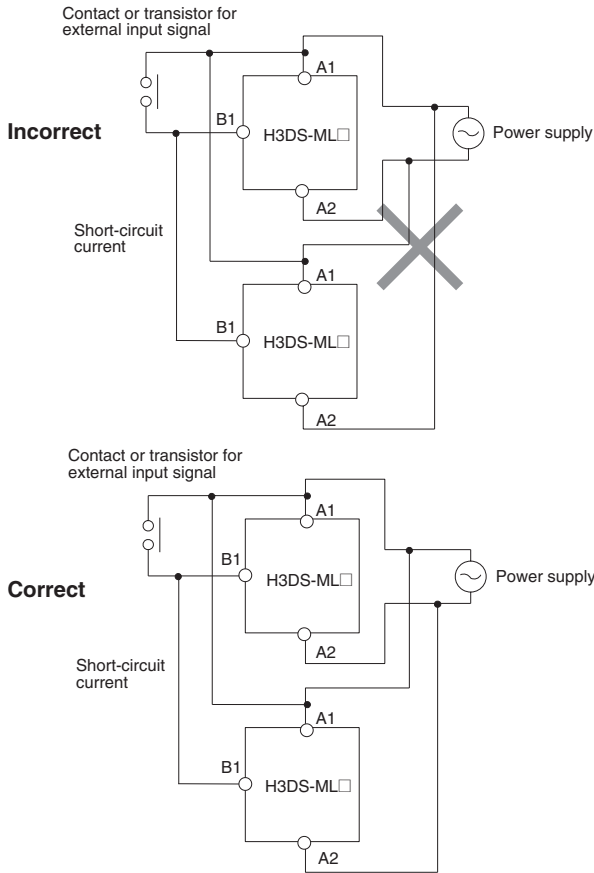
Relationship between Input and Power Supply Circuits (H3DS-ML□)



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 signal 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 H3DS 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.

Precautions for EN61812-1 Conformance

The H3DS as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied:

The output section of the H3DS 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 H3DS 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.

Leaving the Timer with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.

Others

If the Timer is mounted on a control board, dismantle 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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. L098-E1-05

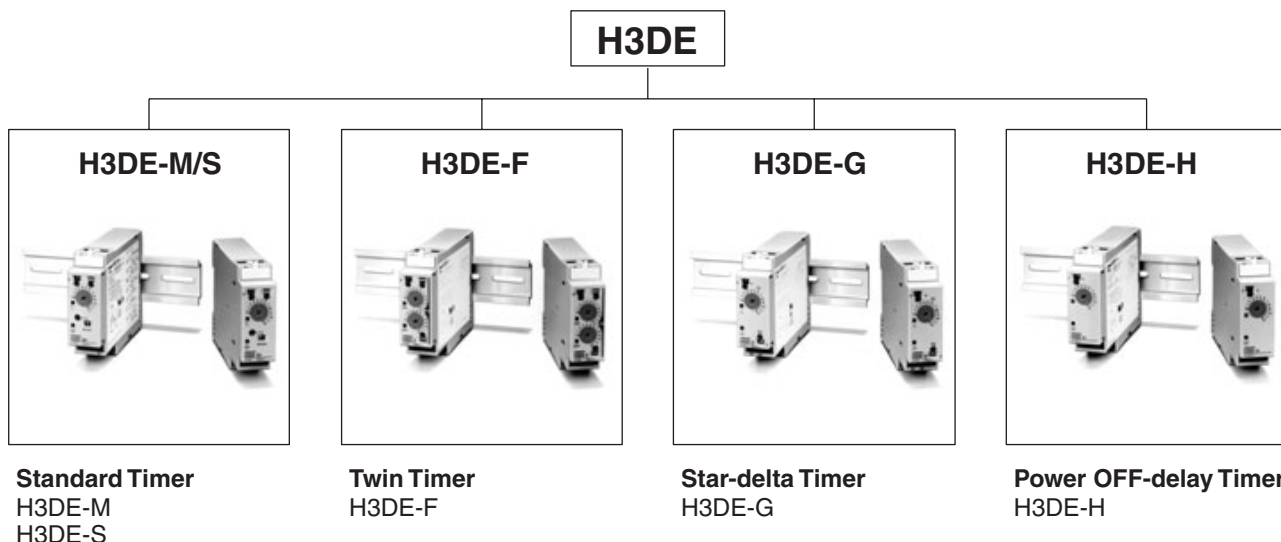
In the interest of product improvement, specifications are subject to change without notice.

Solid-state Timer H3DE

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



Contents

Solid-state Timer

H3DE-M/S.....	B-53
H3DE-F.....	B-63
H3DE-G.....	B-69
H3DE-H.....	B-75

Common to ALL Timers

Accessories.....	B-81
Precautions.....	B-82

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.

- 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.
- 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)	EN61812-1
	Emission Enclosure:	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)	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 (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:

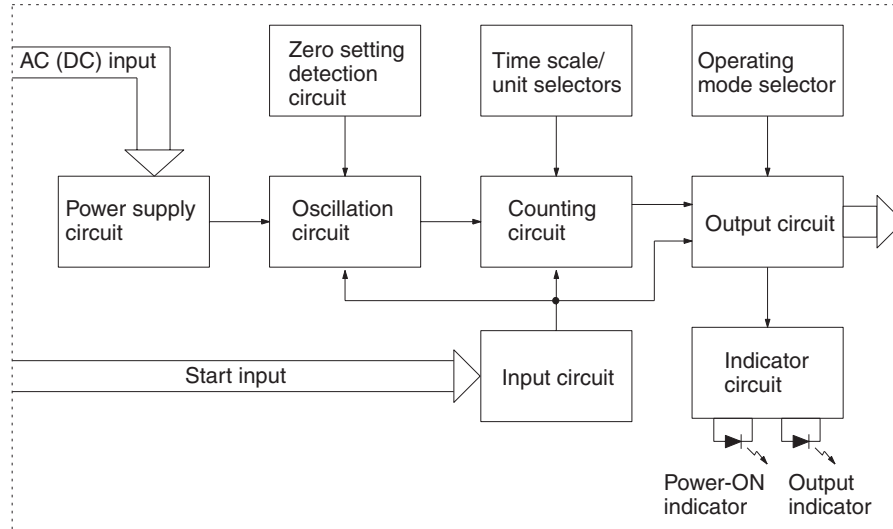
Accuracy of operating time: ±1% ±50 ms max. at 1.2-s range
Setting error: ±10% +100/-50 ms max.
Signal input time: 100 ms min.

- 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).

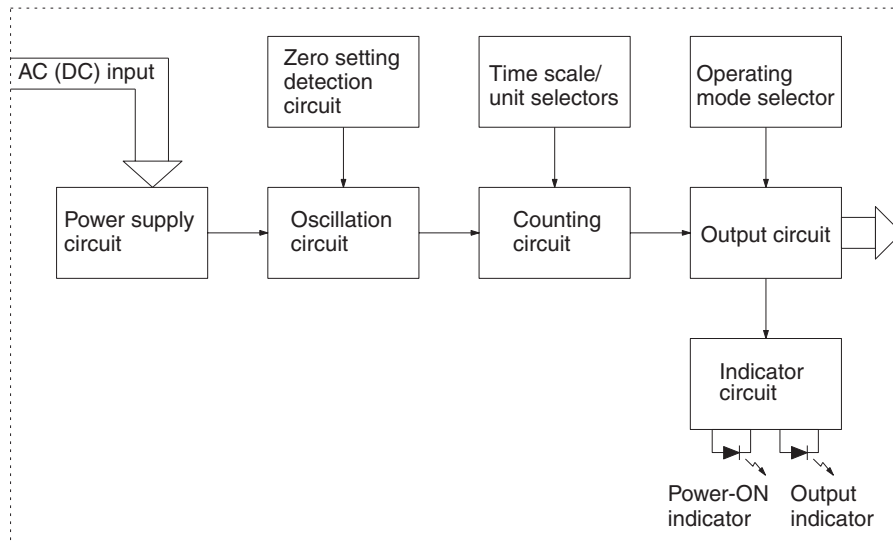
Connections

■ Block Diagram

H3DE-M1/-M2



H3DE-S1/-S2

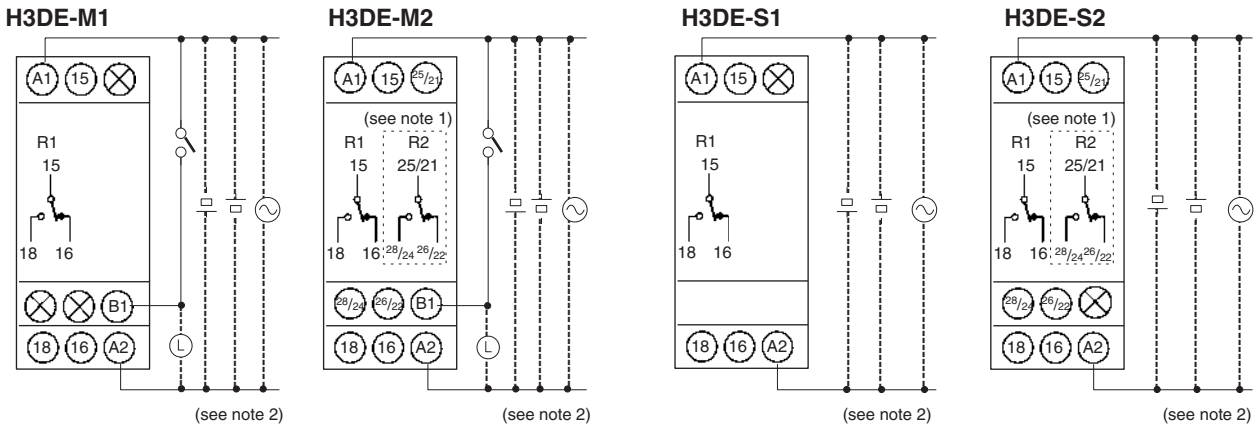


■ I/O Functions

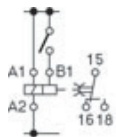
Item		H3DE-M1/-M2	H3DE-S1/-S2
Input	Start	Starts operation.	No input is available.
Output	Control output	Outputs are turned ON according to designated output mode when preset value is reached. (See note.)	Outputs are turned ON according to designated output mode when preset value is reached. (see note.)

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.

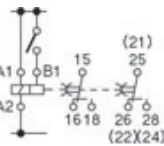
Terminal Arrangement



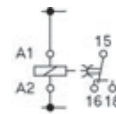
(DIN notation)



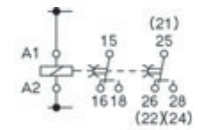
(DIN notation)




(DIN notation)



(DIN notation)



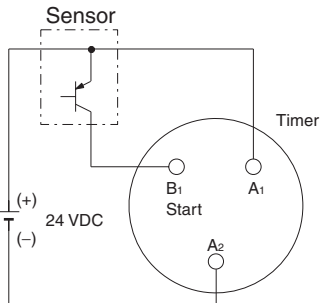
- Note:** 1. The relay R2 can be set to either instantaneous or time-limit contact using the switch located on the bottom of the Timer.
 2. DC supply voltage does not require the designation of polarity.
 3. The contact symbol for the H3DE is indicated with  because it offers multiple operating modes 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

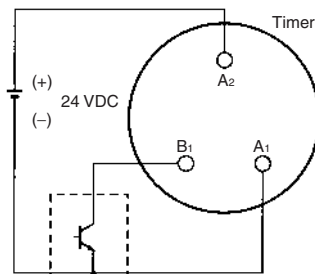
(Connection to PNP output sensor.)



Operates with PNP transistor ON

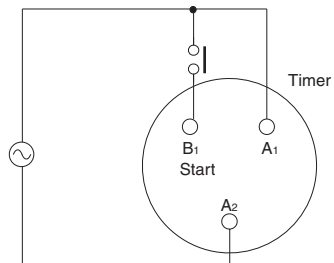
No-contact Input

(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)

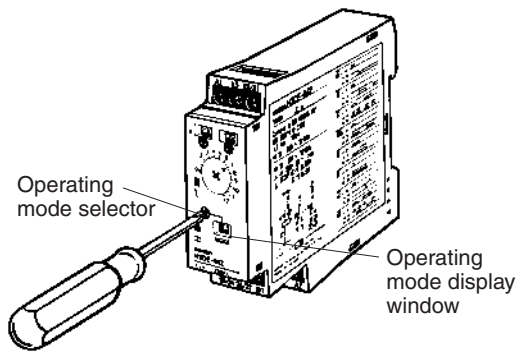
Operation

■ 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.

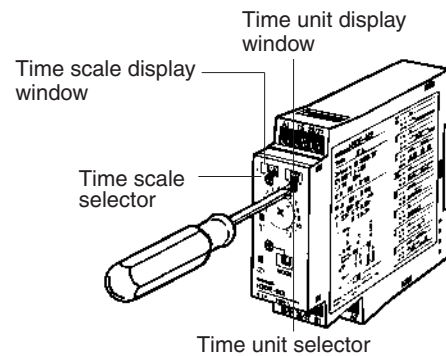


Selection of Operating Mode

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.

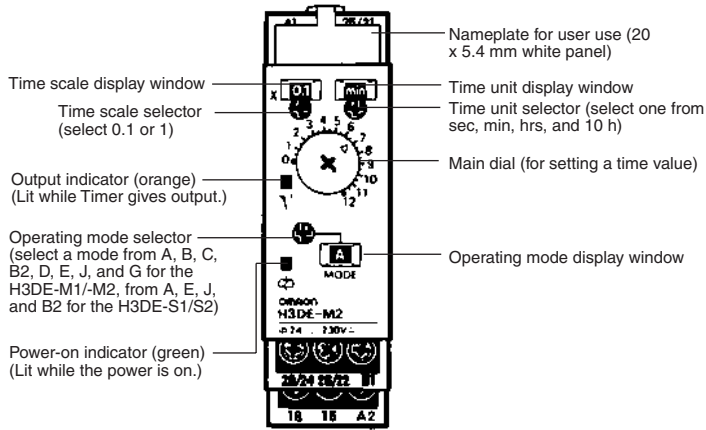
Operating mode	Timing chart	
A: ON-delay	<p>Power (A₁ and A₂)</p> <p>Start (B₁ and A₂) (see note)</p> <p>Time-limit contacts: NC 15 and 16 (25 and 26)</p> <p>Time-limit contacts: NO (output indicator) 15 and 18 (25 and 28)</p> <p>Instantaneous contacts: NC 25 and 26</p> <p>Instantaneous contacts: NO 25 and 28</p> <p>Power indicator</p>	<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.</p> <p>** Start input is invalid while the Timer is in operation.</p>
B: Flicker OFF start	<p>Power (A₁ and A₂)</p> <p>Start (B₁ and A₂) (see note)</p> <p>Output relay: NC 15 and 16 (25 and 26)</p> <p>Output relay: NO (output indicator) 15 and 18 (25 and 28)</p> <p>Instantaneous contacts: NC 25 and 26</p> <p>Instantaneous contacts: NO 25 and 28</p> <p>Power indicator</p>	<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.</p> <p>** Start input is invalid while the Timer is in operation.</p>
B2: Flicker ON start	<p>Power (A₁ and A₂)</p> <p>Start (B₁ and A₂) (see note)</p> <p>Output relay: NC 15 and 16 (25 and 26)</p> <p>Output relay: NO (output indicator) 15 and 18 (25 and 28)</p> <p>Instantaneous contacts: NC 25 and 26</p> <p>Instantaneous contacts: NO 25 and 28</p> <p>Power indicator</p>	<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.</p> <p>** Start input is invalid while the Timer is in operation.</p>
C: Signal ON/OFF-delay	<p>Power (A₁ and A₂)</p> <p>Start (B₁ and A₂) (see note)</p> <p>Output relay: NC 15 and 16 (25 and 26)</p> <p>Output relay: NO (output indicator) 15 and 18 (25 and 28)</p> <p>Instantaneous contacts: NC 25 and 26</p> <p>Instantaneous contacts: NO 25 and 28</p> <p>Power indicator</p>	<p>Basic operation</p> <p>* Start input is valid and re-triggerable 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*)

Operating mode	Timing chart	
D: Signal OFF-delay		<p>Basic operation</p> <p>* Start input is valid and re-triggerable 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 re-triggerable while the Timer is in operation.</p>
G: Signal ON/OFF-delay		<p>Basic operation</p> <p>* Start input is valid and re-triggerable 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 re-triggerable 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*).

Nomenclature



(Front View)



(Bottom View)

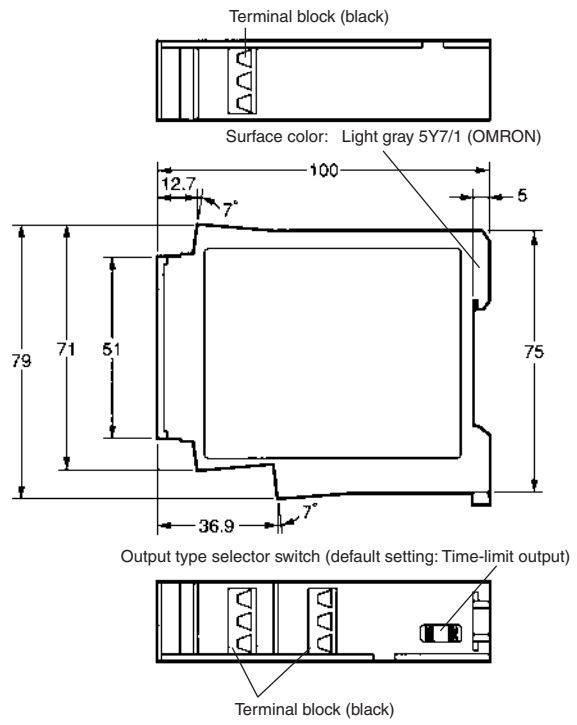
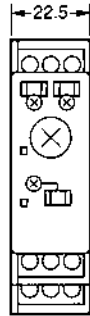
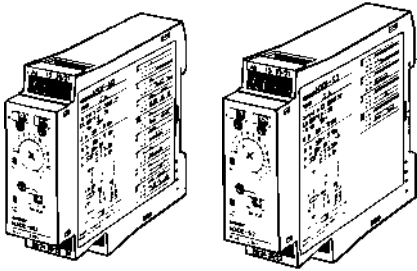
Output Type Selector Switch Settings

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



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.

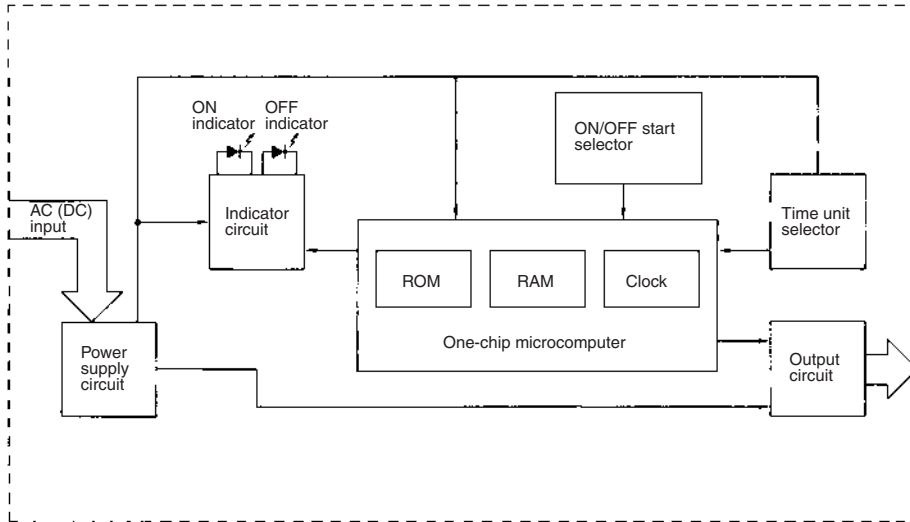
■ Characteristics

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) EN61812-1 Emission Enclosure: 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) 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. 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

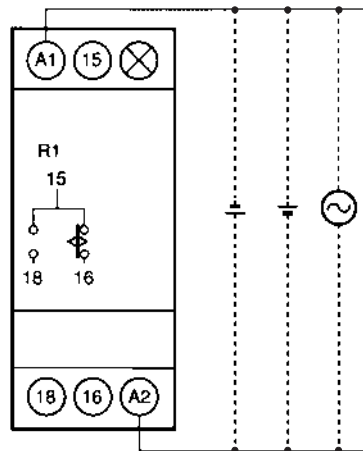
■ Block Diagram



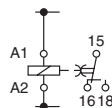
■ I/O Function

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

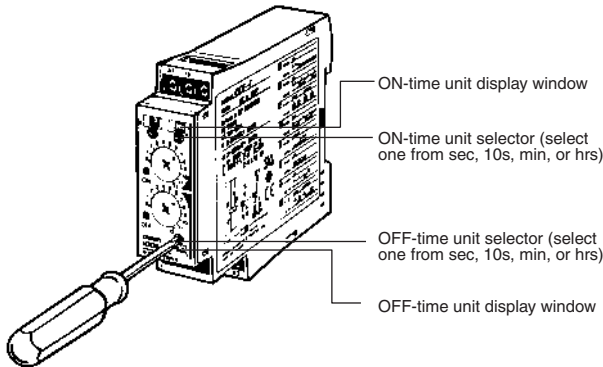
Basic Operation

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.

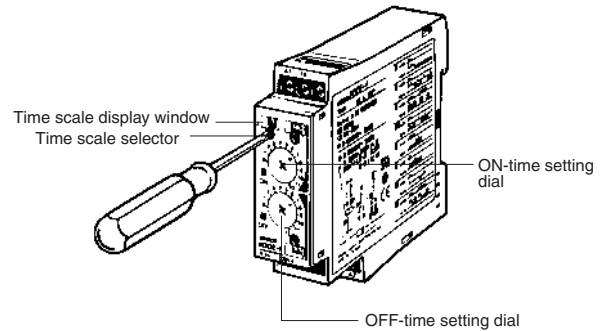
The time unit display window for output OFF is located on the lower-right side of the front panel below the corresponding time unit selector.

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

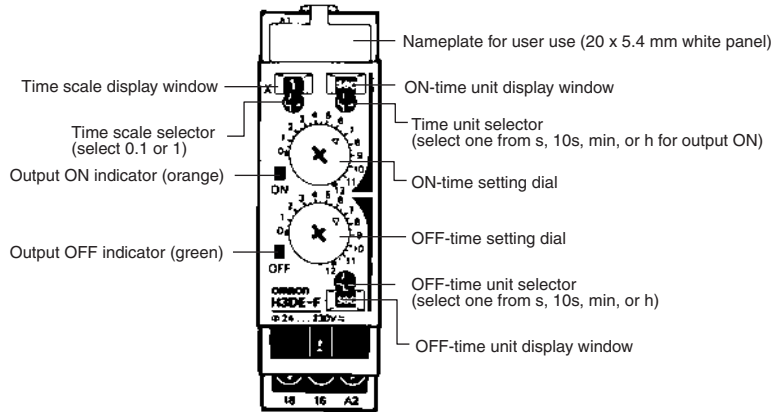
Use the ON/OFF-time setting dial to set the ON/OFF time.

Timing Charts

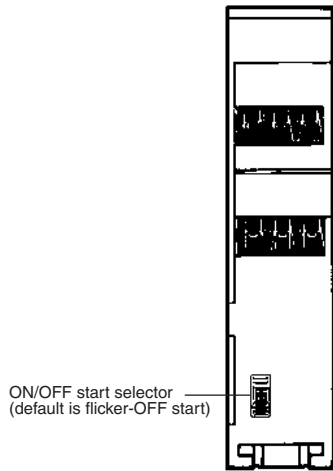
Operating mode	Timing chart	
Flicker-OFF start	<p>Power (A₁ and A₂)</p> <p>Output relay: NO 15 and 18 (ON indicator)</p> <p>Output relay: NC 15 and 16</p> <p>OFF indicator</p>	<p>ton: ON set time toff: OFF set time</p>
Flicker-ON start	<p>Power (A₁ and A₂)</p> <p>Output relay: NO 15 and 18 (ON indicator)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



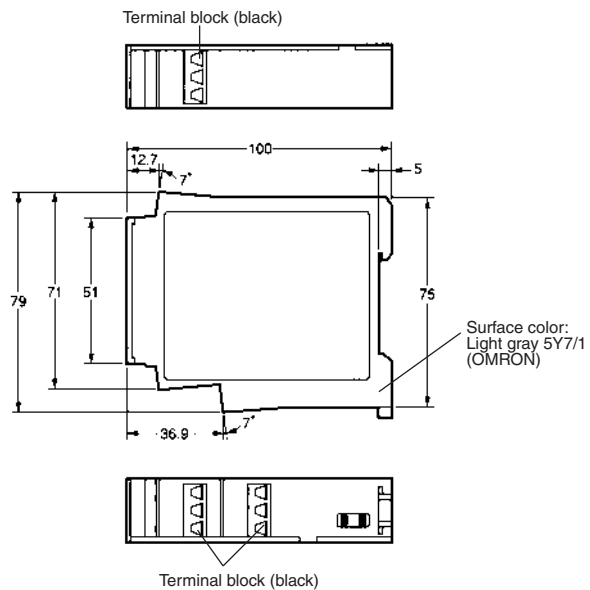
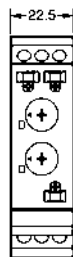
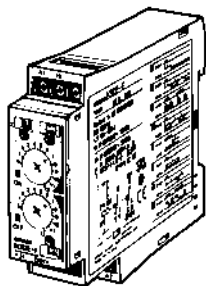
(Bottom View)

ON/OFF Start Selector Switch Settings

Setting	Operating mode
	Flicker-ON start
	Flicker-OFF start

Dimensions

H3DE-F



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 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) EN61812-1 Emission Enclosure: 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) 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).

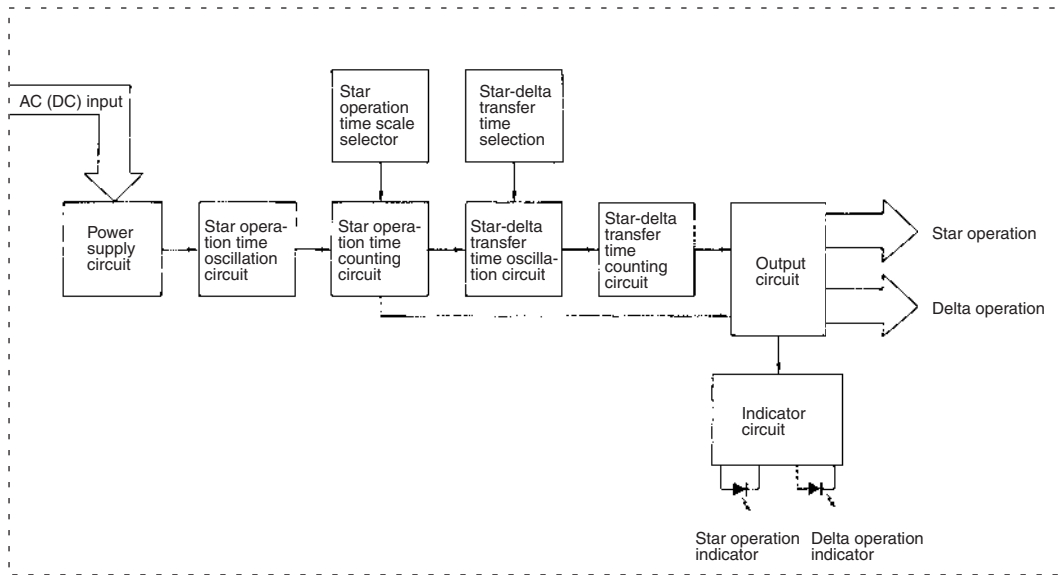
A maximum current of 0.1 A can be switched if L/R is 7 ms.

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

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

Connections

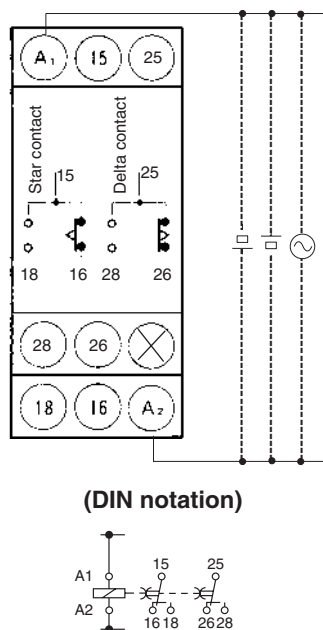
■ Block Diagram



■ 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

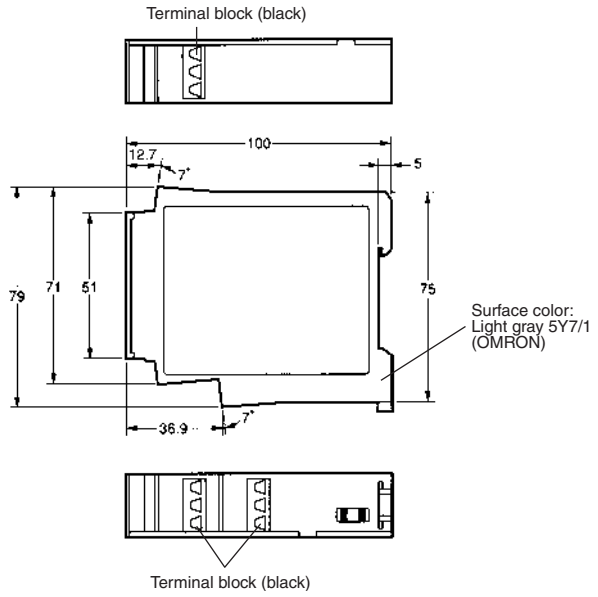
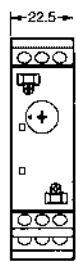
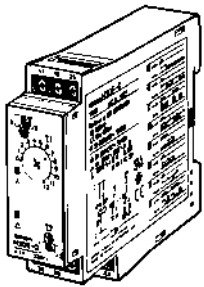
■ Terminal Arrangement



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

Dimensions

H3DE-G



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

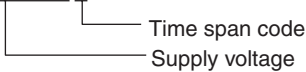
1. H: Power OFF-delay timer

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

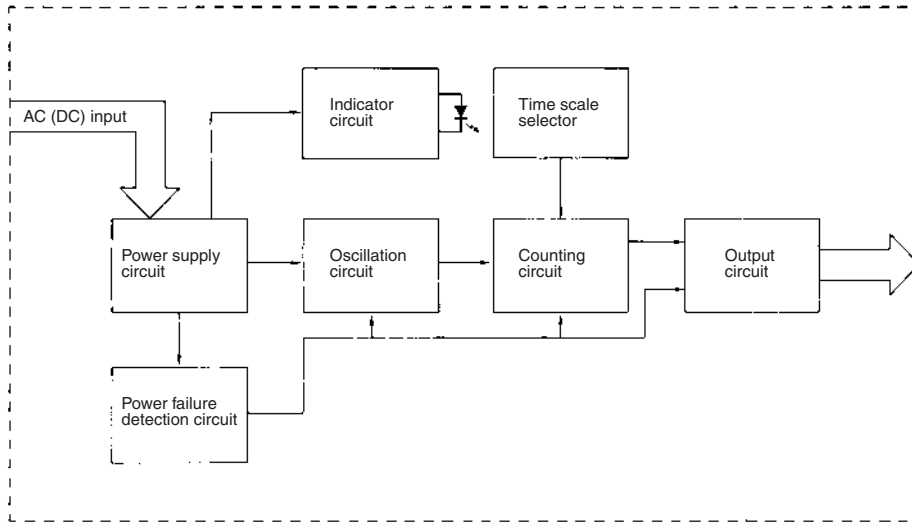
Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 0.05 s max. of FS
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±2% max. of FS (±2% ± 10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 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 μs, 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) Emission Enclosure: EN61812-1 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) 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 (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

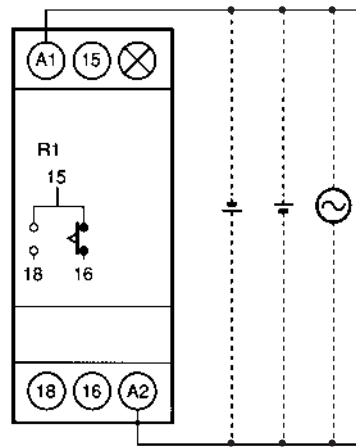
■ Block Diagram



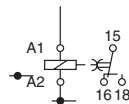
■ I/O Functions

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

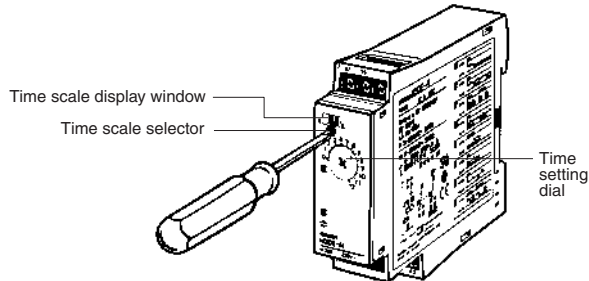
Basic Operation

Time Scale Selection

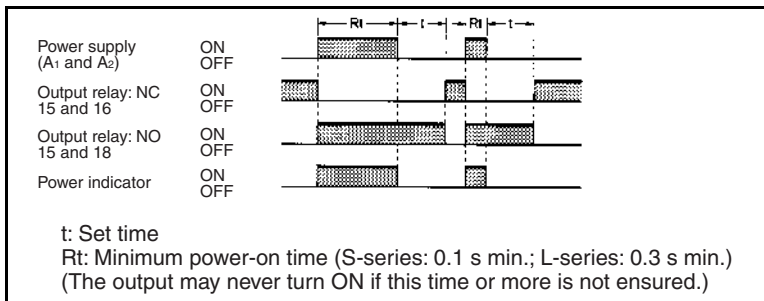
The time scale selector on the upper left-hand side of the front panel of the S Series can be set to 0.1 or 1 and that of the L Series can be set to 1 or 10 as magnification coefficients.

Time Setting

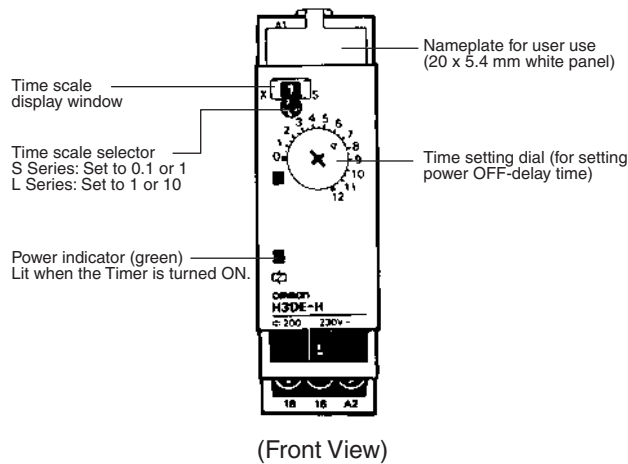
The operating time of the Timer is set with the time setting dial.



Timing Charts

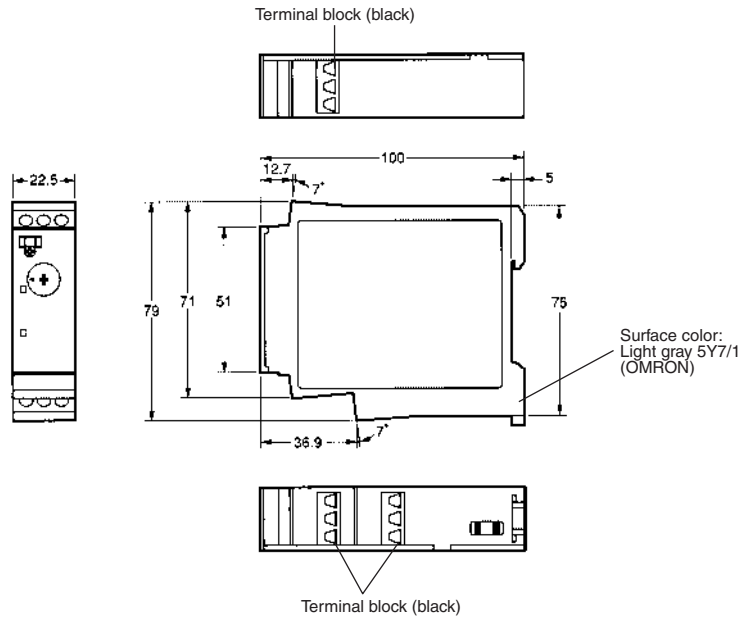
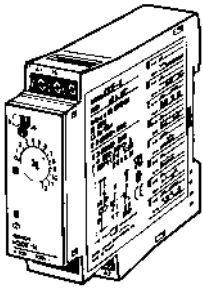


Nomenclature



Dimensions

H3DE-H



Accessories (Order Separately) (Common)

Note: The undermentioned is common for all H3DE models.

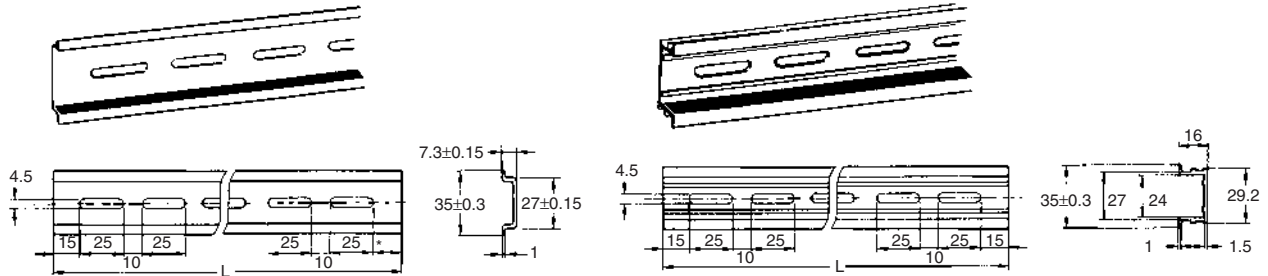
Note: All units are in millimeters unless otherwise indicated.

■ Dimensions

Mounting Track

PFP-100N, PFP-50N

PFP-100N2

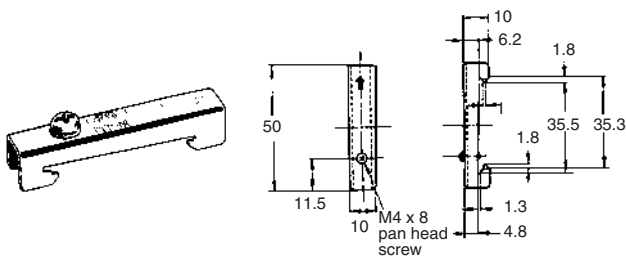


L: Length

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

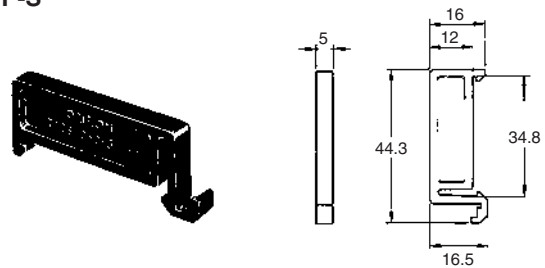
End Plate

PFP-M



Spacer

PFP-S



Precautions (Common)

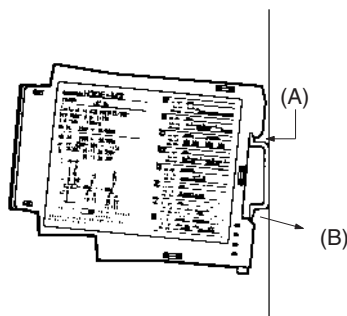
Note: The undermentioned is common for all H3DE models.

■ Changing of Setting

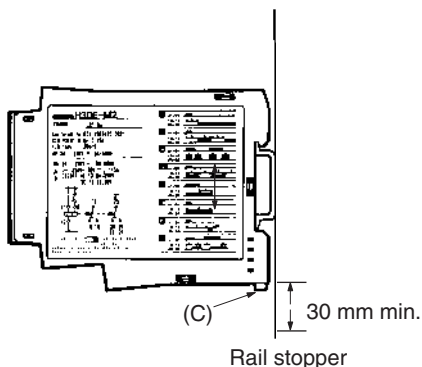
Caution
Do not change the time unit, time scale, operating mode, or output type selector switch while the Timer is in operation or malfunction could result.

■ 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.

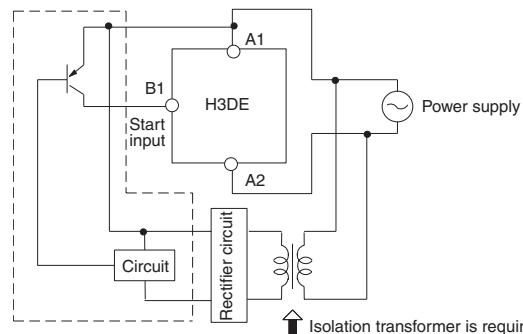
Both AC and DC power supplies can be connected to the power input terminals without regarding polarity.

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.

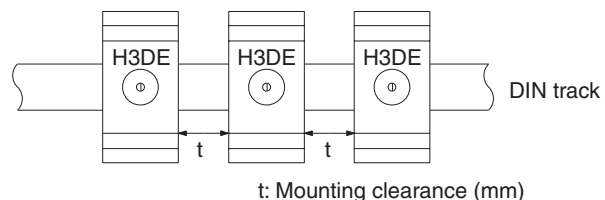
For the power supply of an input device, use an isolating transformer, of which the primary and secondary windings are mutually isolated and the secondary winding is not grounded.



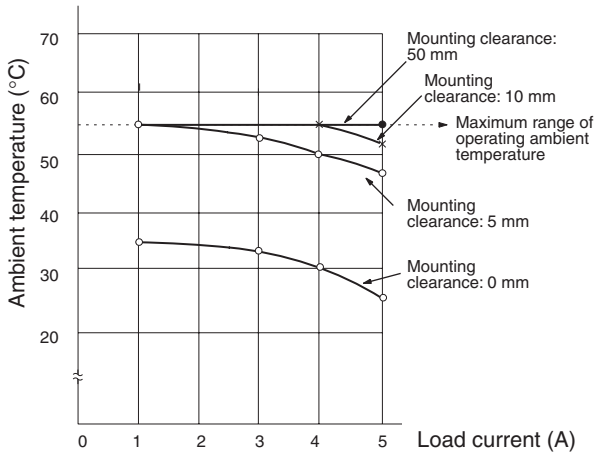
The H3DE-H has a large inrush current; provide sufficient power supply capacity. If the power supply capacity is too small, there may be delays in turning ON the output.

■ 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.

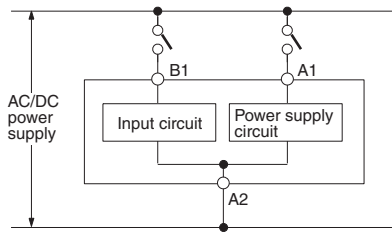


Switching Current vs. Ambient Temperature (When Mounting Two or More H3DE Units Side-by-Side)



Input/Output

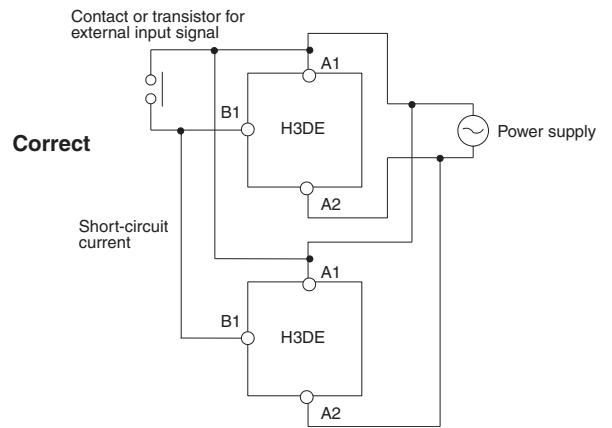
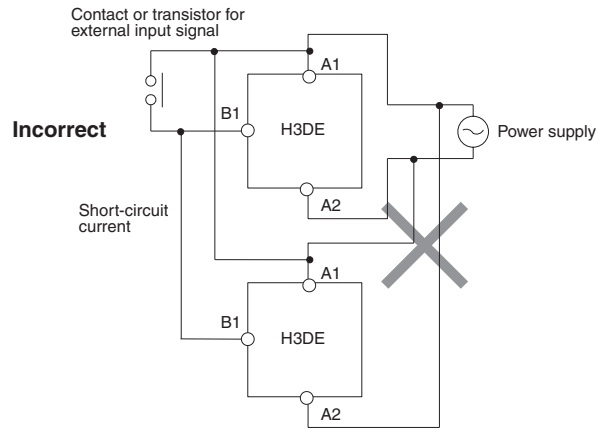
Relationship between Input and Power Supply Circuits



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 signal 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

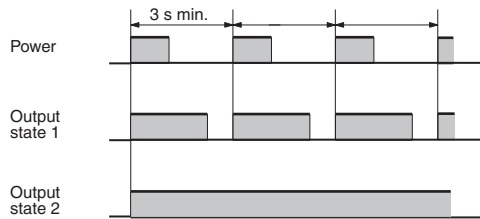
The input wires must be as short as possible. If the floating capacity of wires exceeds 2,000 pF (approx. 17 m for cables with 120 pF/m), the operation will be affected. Pay particular attention when using shielded cables.

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 μF 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, dismantle 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.

Solid-state Timer H3YN

Miniature Timer with Multiple Time Ranges and Multiple Operating Modes

- Minimizes stock.
- Pin configuration compatible with MY Power Relay.
- Standard multiple operating modes and multiple time ranges.
- Conforms to EN61812-1 and IEC60664-1 for Low Voltage, and EMC Directives.



Model Number Structure

Model Number Legend

H3YN-□□-□
1 2 3

1. Output

- 2: DPDT
- 4: 4PDT

2. Time Range

- None: Short-time range (0.1 s to 10 min)
- 1: Long-time range (0.1 min to 10 hrs)

3. Contact Type

- None: Single contact
- Z: Twin contacts

Ordering Information

List of Models

Supply voltage	Time-limit contact	Short-time range model (0.1 s to 10 min)	Long-time range model (0.1 min to 10 h)
24, 100 to 120, 200 to 230 VAC; 12, 24, 48, 100 to 110, 125 VDC	DPDT	H3YN-2	H3YN-21
	4PDT	H3YN-4	H3YN-41
24 VDC	4PDT (Twin contacts)	H3YN-4-Z	H3YN-41-Z

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

Example: H3YN-2 24 VAC



Accessories (Order Separately)

Connecting Socket

Timer	Track mounting/Front Connecting Socket	Back Connecting Socket		
		Solder terminal	Wire-wrap terminal	PC terminal
H3YN-2/-21	PYF08A, PYF08A-N, PYF08A-E	PY08	PY08QN(2)	PY08-02
H3YN-4/-41 H3YN-4-Z/-41-Z	PYF14A, PYF14A-N, PYF14A-E	PY14	PY14QN(2)	PY14-02

Hold-down Clips

Model	Applicable Socket
Y92H-3	PYF08A, PYF08A-N, PYF08A-E PYF14A, PYF14A-N, PYF14A-E
Y92H-4	PY08, PY08QN(2), PY08-02 PY14, PY14QN(2), PY14-02

Specifications

■ Ratings

Item	H3YN-2/-4/-4-Z	H3YN-21/-41/-41-Z
Time ranges	0.1 s to 10 min (1 s, 10 s, 1 min, or 10 min max. selectable)	0.1 min to 10 h (1 min, 10 min, 1 h, or 10 h max. selectable)
Rated supply voltage	24, 100 to 120, 200 to 230 VAC (50/60 Hz) 12, 24, 48, 100 to 110, 125 VDC (see note 1)	
Pin type	Plug-in	
Operating mode	ON-delay, interval, flicker OFF start, or flicker ON start (selectable with DIP switch)	
Operating voltage range	85% to 110% of rated supply voltage (12 VDC: 90% to 110% of rated supply voltage) (see note 2)	
Reset voltage	10% min. of rated supply voltage (see note 3)	
Power consumption	100 to 120 VAC: Relay ON: approx. 1.8 VA (1.6 W) at 120 VAC, 60 Hz Relay OFF: approx. 1 VA (0.6 W) at 120 VAC, 60 Hz 200 to 230 VAC: Relay ON: approx. 2.2 VA (1.8 W) at 230 VAC, 60 Hz Relay OFF: approx. 1.5 VA (1.1 W) at 230 VAC, 60 Hz 24 VAC: Relay ON: approx. 1.8 VA (1.4 W) at 24 VAC, 60 Hz Relay OFF: approx. 0.3 VA (0.2 W) at 24 VAC, 60 Hz 12 VDC: Relay ON: approx. 1.1 W at 12 VDC Relay OFF: approx. 0.1 W at 12 VDC 24 VDC: Relay ON: approx. 1.1 W at 24 VDC Relay OFF: approx. 0.1 W at 24 VDC 48 VDC: Relay ON: approx. 1.2 W at 48 VDC Relay OFF: approx. 0.3 W at 48 VDC 100 to 110 VDC: Relay ON: approx. 1.6 W at 110 VDC Relay OFF: approx. 0.4 W at 110 VDC 125 VDC: Relay ON: approx. 1.6 W at 125 VDC Relay OFF: approx. 0.4 W at 125 VDC	
Control outputs	DPDT: 5 A at 250 VAC, resistive load ($\cos\phi = 1$) 4PDT: 3 A at 250 VAC, resistive load ($\cos\phi = 1$)	

- Note:**
1. Single-phase, full-wave-rectified power supplies can be used.
 2. When using the H3YN continuously in any place where the ambient temperature is in a range of 45°C to 50°C, supply 90% to 110% of the rated supply voltages (supply 95% to 110% with 12 VDC type).
 3. Set the reset voltage as follows to ensure proper resetting.
 - 100 to 120 VAC: 10 VAC max.
 - 200 to 230 VAC: 20 VAC max.
 - 100 to 110 VDC: 10 VDC max.

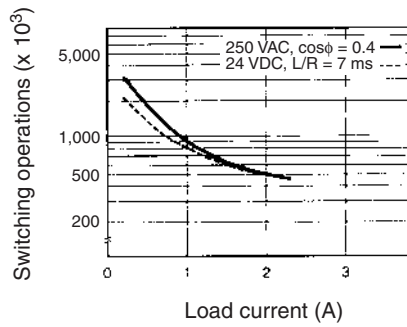
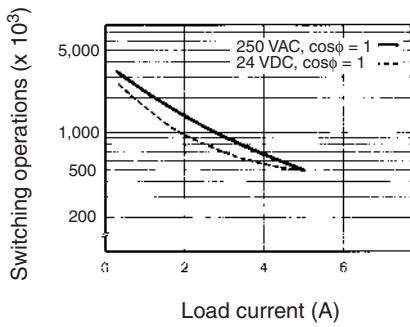
■ Characteristics

Item	H3YN-2/-21/-4/-41
Accuracy of operating time	±1% FS max. (1 s range: ±1%±10 ms max.)
Setting error	±10%±50 ms FS max.
Reset time	Min. power-opening time: 0.1 s max. (including halfway reset)
Influence of voltage	±2% FS max.
Influence of temperature	±2% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between current-carrying terminals and exposed non-current-carrying metal parts) (see note 1) 2,000 VAC, 50/60 Hz for 1 min (between operating power circuit and control output) 2,000 VAC, 50/60 Hz for 1 min (between different pole contacts; 2-pole model) 1,500 VAC, 50/60 Hz for 1 min (between different pole contacts; 4-pole model) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 1 h each in 3 directions Malfunction: 10 to 55 Hz, 0.5-mm single amplitude for 10 min each in 3 directions
Shock resistance	Destruction: 1,000 m/s ² Malfunction: 100 m/s ²
Ambient temperature	Operating: -10°C to 50°C (with no icing) Storage: -25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: DPDT: 500,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) 4PDT: 200,000 operations min. (H3YN-4-Z/-41-Z: 100,000 operations min.) (3 A at 250 VAC, resistive load at 1,800 operations/h) (see note 2)
Impulse withstand voltage	Between power terminals: 3 kV for 100 to 120 VAC, 200 to 230 VAC, 100 to 110 VDC, 125 VDC 1 kV for 12 VDC, 24 VDC, 48 VDC, 24 VAC Between exposed non-current-carrying metal parts: 4.5 kV for 100 to 120 VAC, 200 to 230 VAC, 100 to 110 VDC, 125 VDC 1.5 kV for 12 VDC, 24 VDC, 48 VDC, 24 VAC
Noise immunity	±1.5 kV, square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Destruction: 8 kV Malfunction: 4 kV
Degree of protection	IP40
Weight	Approx. 50 g
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 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-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 2 kV line to ground (level 3) 1 kV line to line (level 3)
Approved standards	UL508, CSA C22.2 No. 14, Lloyds Conforms to EN61812-1 and IEC60664-1. (2.5 kV/2 for H3YN-2/-21, 2.5 kV/1 for H3YN-4/-41, H3YN-4-Z/-41-Z) Output category according to EN60947-5-1.

Note: 1. Terminal screw sections are excluded.
2. Refer to the *Life-test Curve*.

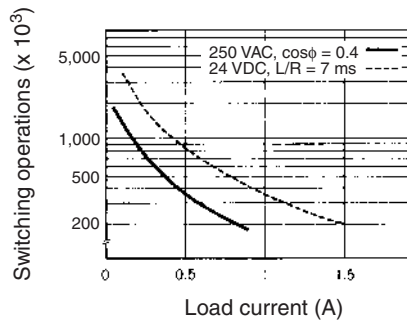
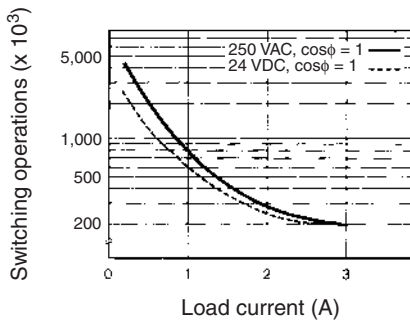
Life-test Curve (Reference Value)

H3YN-2/-21



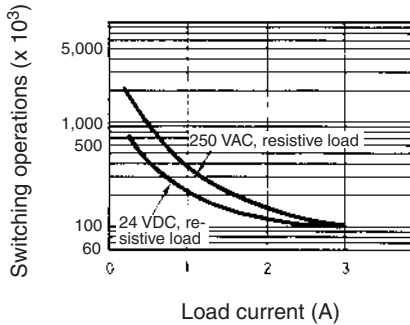
Reference: A maximum current of 0.6 A can be switched at 125 VDC ($\cos\phi = 1$).
 Maximum current of 0.2 A can be switched if L/R is 7 ms. In both cases,
 a life of 100,000 operations can be expected.
 The minimum applicable load is 1 mA at 5 VDC (P reference value).

H3YN-4/-41



Reference: A maximum current of 0.5 A can be switched at 125 VDC ($\cos\phi = 1$).
 Maximum current of 0.2 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 1 mA at 1 VDC (P reference value).

H3YN-4-Z/-41-Z

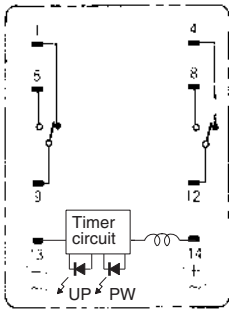


Reference: A maximum current of 0.5 A can be switched at 125 VDC ($\cos\phi = 1$).
 Maximum current of 0.2 A can be switched if L/R is 7 ms. In both cases,
 a life of 100,000 operations can be expected.
 The minimum applicable load is 0.1 mA at 1 VDC (P reference value).

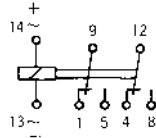
Connections

Connection

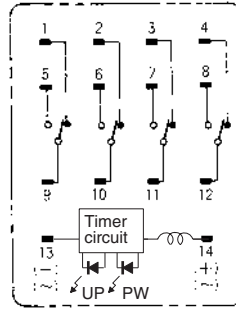
H3YN-2/-21



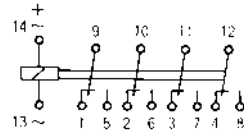
DIN Indication



H3YN-4/-41
H3YN-4-Z/-41-Z



DIN Indication

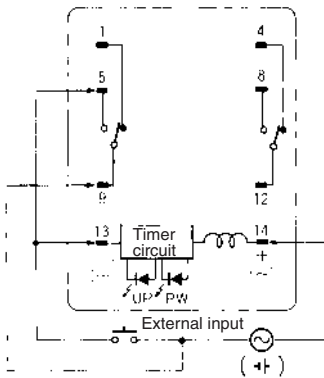


Pulse Operation

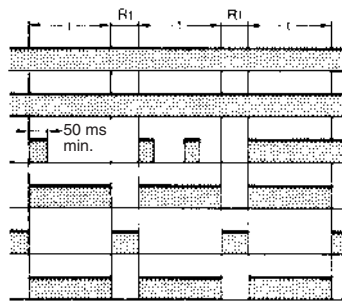
A pulse output for a certain period can be obtained with a random external input signal.

Use the H3YN in interval mode as shown in the following timing charts.

H3YN-2/-21



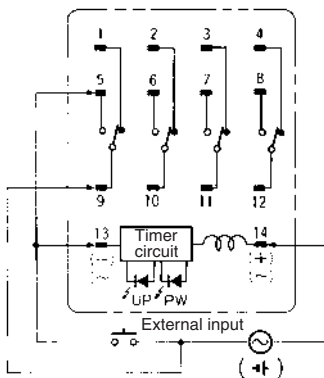
- Power (9-14)
- External short circuit (5-13)
- External input (9-13)
- Time limit contact NO (12-8)
- Time limit contact NC (12-4)
- Run/Power indicator (PW)
- Output indicator (UP)



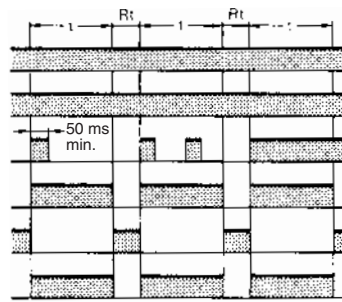
Note: t: Set time
Rt: Reset time

H3YN-4/-41

H3YN-4-Z/-41-Z



- Power (9-14)
- External short circuit (5-13)
- External input (9-13)
- Time limit contact NO (10-6, 11-7, 12-8)
- Time limit contact NC (10-2, 11-3, 12-4)
- Run/Power indicator (PW)
- Output indicator (UP)



Note: t: Set time
Rt: Reset time

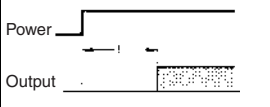
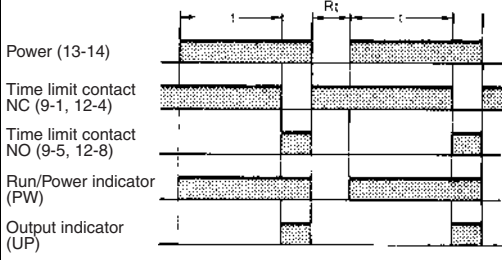
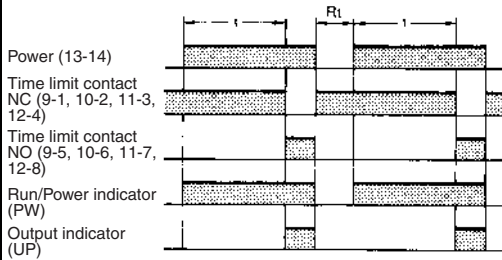
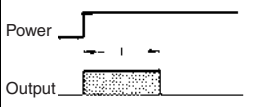
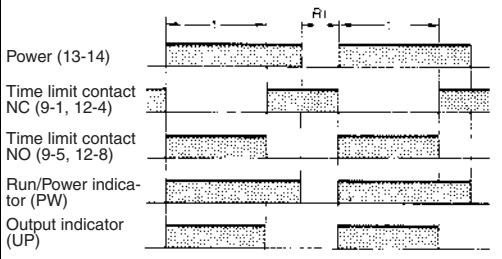
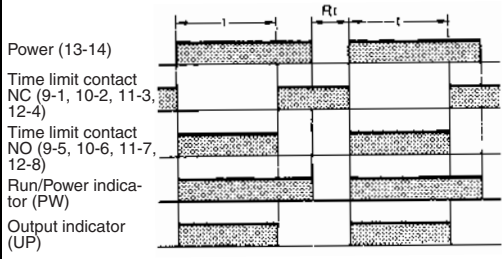
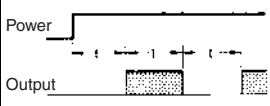
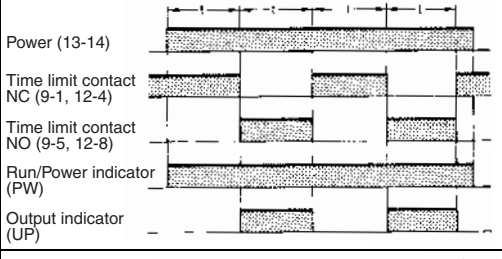
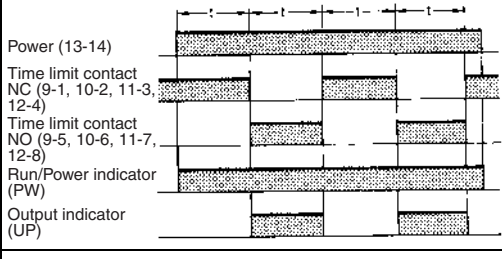

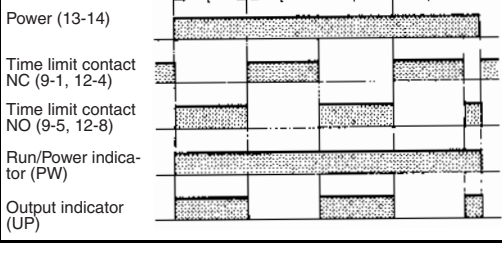
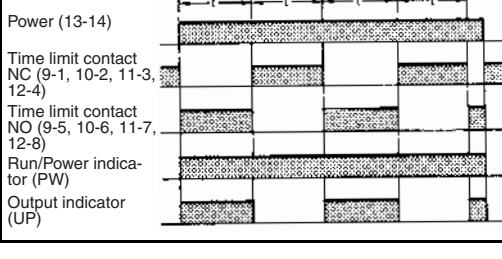
Caution

Be careful when connecting wires.

Mode	Terminals
Pulse operation	Power supply between 9 and 14 Short-circuit between 5 and 13 Input signal between 9 and 13
Operating mode; interval and all other modes	Power supply between 13 and 14

Operation

■ Timing Chart

Operating mode	Timing chart	
	H3YN-2/-21	H3YN-4/-41
ON-delay 		
Interval 		
Flicker OFF-start 		
Flicker ON-start 		

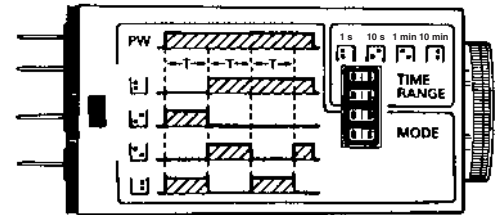
Note: t: Set time
Rt: Reset time

DIP Switch Settings

The 1-s range and ON-delay mode for H3YN-2/-4/-4-Z, the 1-min range and ON-delay mode for H3YN-21/-41/-41-Z are factory-set before shipping.

Time Ranges

Model	Time range	Time setting range	Setting	Factory-set
H3YN-2, H3YN-4 H3YN-4-Z	1 s	0.1 to 1 s		Yes
	10 s	1 to 10 s		No
	1 min	0.1 to 1 min		No
	10 min	1 to 10 min		No
H3YN-21, H3YN-41 H3YN-41-Z	1 min	0.1 to 1 min		Yes
	10 min	1 to 10 min		No
	1 h	0.1 to 1 h		No
	10 h	1 to 10 h		No



Note: The top two DIP switch pins are used to select the time ranges.

Operating Modes

Operating mode	Setting	Factory-set
ON-delay		Yes
Interval		No
Flicker OFF-start		No
Flicker ON-start		No

Note: The bottom two DIP switch pins are used to select the operating mode.

Nomenclature

Output Indicator (Orange)
(Lit: Output ON)

Main Dial
Set the desired time according to time range selectable by DIP switch.



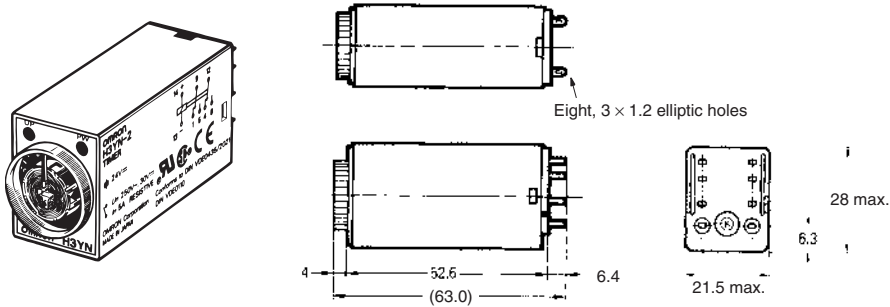
Run/Power Indicator (Green)
(Lit: Power ON)

Dimensions

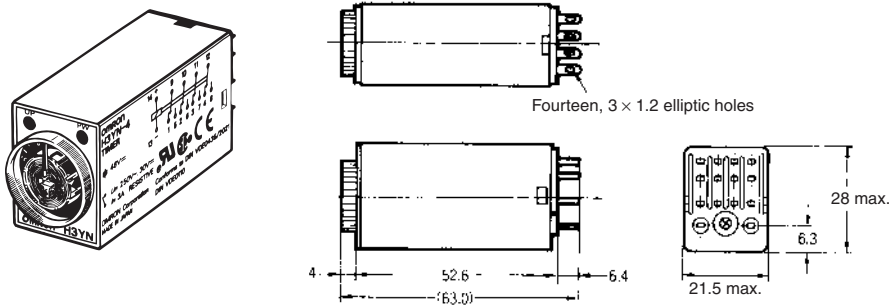
Note: All units are in millimeters unless otherwise indicated.

Timers

H3YN-2/-21 Front Mounting

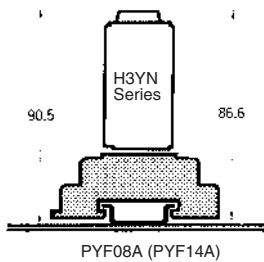


H3YN-4/-41 Front Mounting H3YN-4-Z/-41-Z

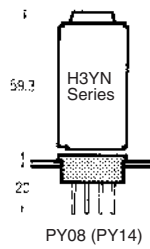


Mounting Height

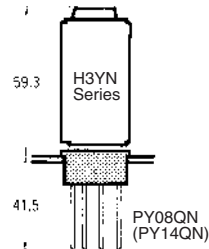
PYF08A/PYF08A-N/PYF08A-E
(PYF14A/PYF14A-N/PYF14A-E
(see note))



PY08 (PY14 (see note))



PY08QN (PY14QN (see note))



Note: Models in parentheses are Connecting Sockets to the H3YN-4/-41 or H3YN-4-Z/-41-Z.

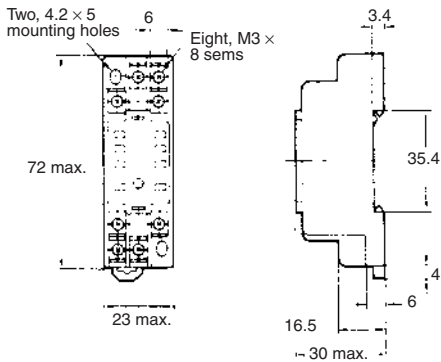
■ Accessories (Order Separately)

Connecting Sockets

Use the PYF□A, PY□, PY□-02, or PY□QN(2) to mount the H3YN. When ordering any one of these Sockets, replace "□" with "08" or "14."

Track Mounting/Front Connecting Sockets

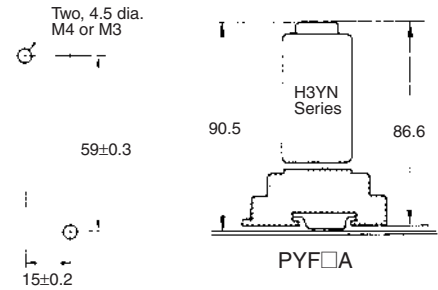
PYF08A



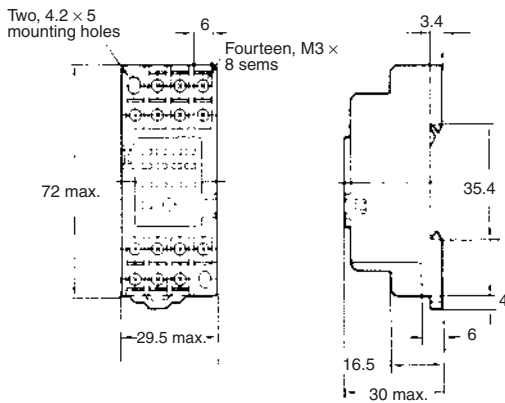
Terminal Arrangement (Top View)



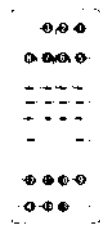
Mounting Holes



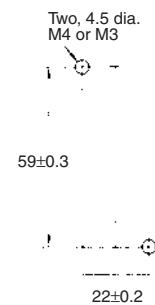
PYF-14A



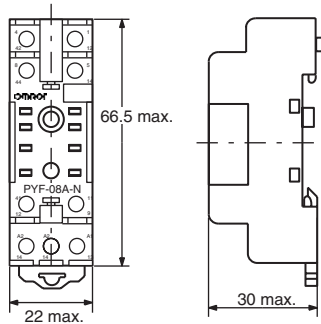
Terminal Arrangement (Top View)



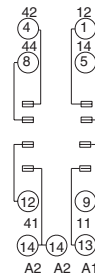
Mounting Holes



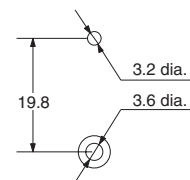
PYF-08A-N



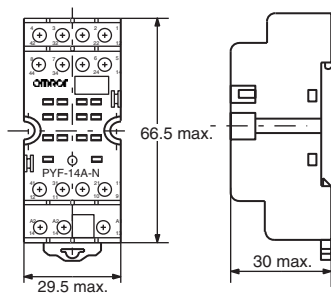
Terminal Arrangement



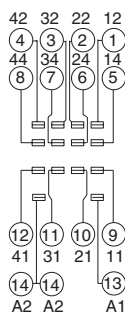
Mounting Holes (for Surface Mounting)



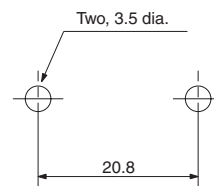
PYF-14A-N



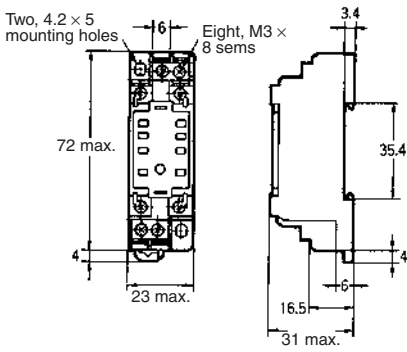
Terminal Arrangement



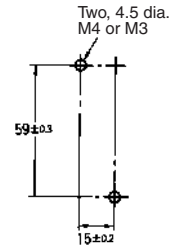
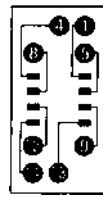
Mounting Holes (for Surface Mounting)



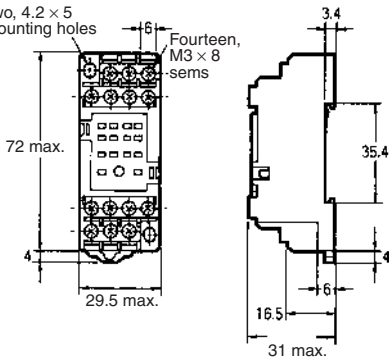
PYF08A-E



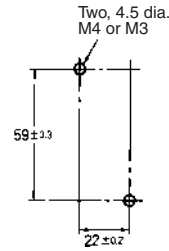
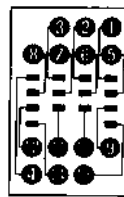
(Top View)



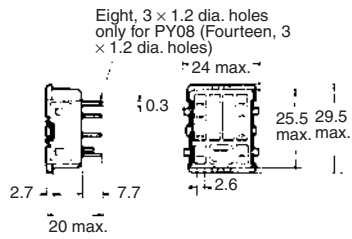
PYF14A-E



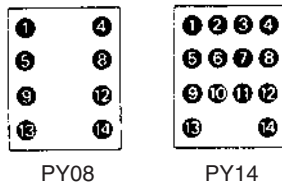
(Top View)



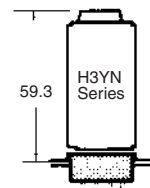
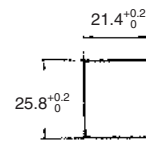
**Back Connecting Sockets
PY08, PY14**



**Terminal Arrangement
(Bottom View)**

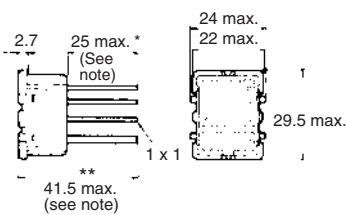


Panel Cutout

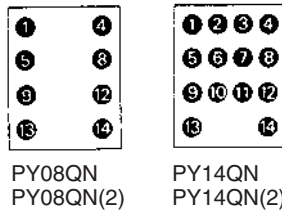


PY□, PY□-02,
PY□QN(2)

**PY08QN, PY14QN
PY08QN(2), PY14QN(2)**

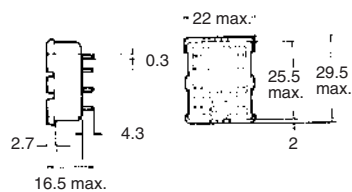


**Terminal Arrangement
(Bottom View)**

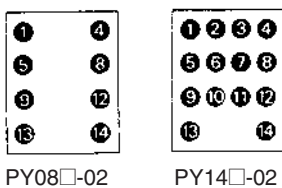


Note: With PY□QN(2)-(3), dimension * should read 20 max. and dimension ** 36.5 max.

PY08-02, PY14-02

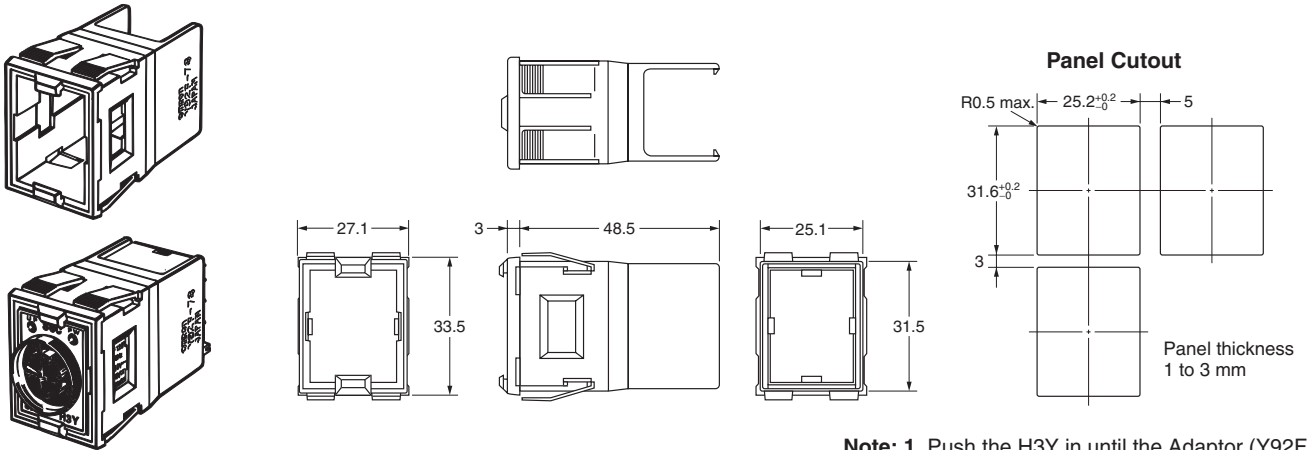


**Terminal Arrangement
(Bottom View)**



Flush Mounting Adapter

Y92F-78

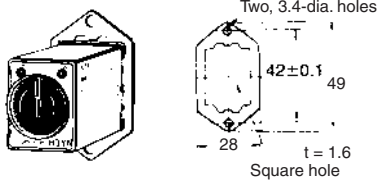


- Note:**
1. Push the H3Y in until the Adaptor (Y92F-78) hooks engage with its rear panel.
 2. Do not round the corners of the cutout on the rear panel surface, otherwise the Adaptor (Y92F-78) tabs may not engage properly.

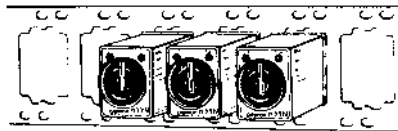
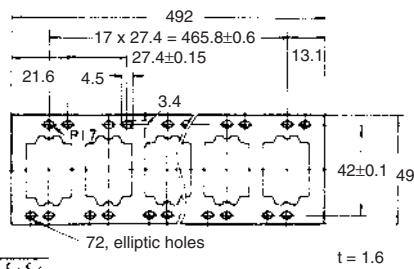
Socket Mounting Plates

The PYP-1 is a Socket Mounting Plate for a single Socket and the PYP-18 is a Socket Mounting Plate for 18 Sockets. The PYP-18 can be cut appropriately according to the number of Sockets to be used.

PYP-1



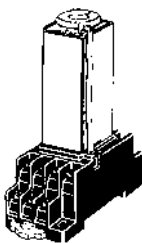
PYP-18



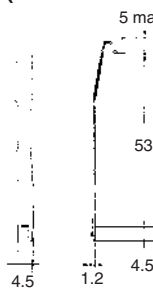
Hold-down Clips

The Hold-down Clip makes it possible to mount the H3YN securely and prevent the H3YN from falling out due to vibration or shock.

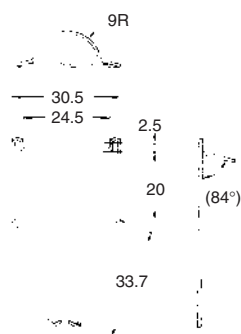
Y92H-3
Y92H-4



Y92H-3 for
PYF□A Socket
(Set of Two Clips)



Y92H-4 for
PY□ Socket

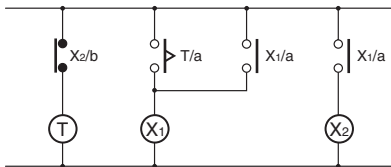


Precautions

■ Correct Use

The operating voltage will increase when using the H3YN continuously in any place where the ambient temperature is in a range of 45°C to 50°C. Supply 90% to 110% of the rated voltages (at 12 VDC: 95% to 110%).

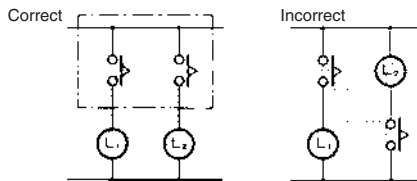
Do not leave the H3YN in time-up condition for a long period of time (for example, more than one month in any place where the ambient temperature is high), otherwise the internal parts (aluminum electrolytic capacitor) may become damaged. Therefore, the use of the H3YN with a relay as shown in the following circuit diagram is recommended to extend the service life of the H3YN.



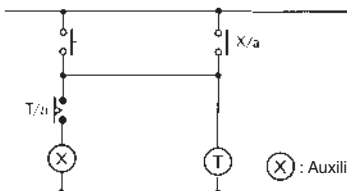
⊗: Auxiliary relay such as MY Relay

The H3YN must be disconnected from the Socket when setting the DIP switch, otherwise the user may touch a terminal imposed with a high voltage and get an electric shock.

Do not connect the H3YN as shown in the following circuit diagram on the right hand side, otherwise the H3YN's internal contacts different from each other in polarity may become short-circuited.



Use the following safety circuit when building a self-holding or self-resetting circuit with the H3YN and an auxiliary relay, such as an MY Relay, in combination.



⊗: Auxiliary relay such as MY Relay

In the case of the above circuit, the H3YN will be in pulse operation. Therefore, if the circuit shown on page 89 is used, no auxiliary relay will be required.

Do not set to the minimum setting in the flicker modes, otherwise the contact may become damaged.

Be careful not to apply any voltage to the terminal screws on the back of the Timer. Mount the product so that the screws will not come in contact with the panel or metal parts.

Do not use the H3YN in places where there is excessive dust, corrosive gas, or direct sunlight.

Do not mount more than one H3YN closely together, otherwise the internal parts may become damaged. Make sure that there is a space of 5 mm or more between any H3YN models next to each other to allow heat radiation.

The internal parts may become damaged if a supply voltage other than the rated ones is imposed on the H3YN.

In order to conform to UL and CSA requirements when using the H3YN-4/-41 or H3YN-4-Z/-41-Z, connect the Unit so that output contacts (contacts of different poles) have the same electric potential.

In cases such as PLC input where the load is extremely small for the control output of a timer containing a power relay (using other than gold-plated contacts), reliability can be increased by using contacts of the same poles (e.g., the H3Y-2) in parallel.

■ Precautions for EN61812-1 Conformance

The H3YN as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied.

Handling

Do not touch the DIP switch while power is supplied to the H3YN. Before dismounting the H3YN from the Socket, make sure that no voltage is imposed on any terminal of the H3YN.

The applicable Socket is the PYF□A.

Only basic insulation is ensured between the Y92H-3 Hold-down Clips and H3YN internal circuits.

Do not allow the Y92H-3 Hold-down Clips to contact other parts.

The insulation test voltage between different pole contacts for the 4-pole model is the impulse voltage of 2.95 kV.

Wiring

The power supply for the H3YN must be protected with equipment such as a breaker approved by VDE.

Basic insulation is ensured between the H3YN's operating circuit and control output.

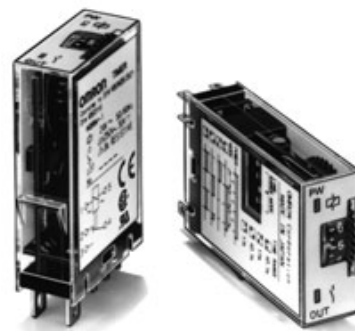
Basic insulation: Overvoltage category II, pollution degree 1 (H3YN-4/-41, H3YN-4-Z/-41-Z), pollution degree 2 (H3YN-2/-21) (with a clearance of 1.5 mm and a creepage distance of 2.5 mm at 240 VAC)

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

Solid-state timer H3RN

Ultra-slim Timer for G2R Relay Socket

- Pin configuration compatible with G2R Relay and mounts to the P2R/P2RF Socket.
- Standard multiple time ranges and multiple operating modes.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.



Model Number Structure

Model Number Legend

H3RN-□□
1 2

1. Output

- 1: SPDT
- 2: DPST-NO

2. Time Range

- None: Short-time range (0.1 s to 10 min)
- 1: Long-time range (0.1 min to 10 hrs)

Ordering Information

List of Models

Supply voltage	Time-limit contact	Short-time range model (0.1 s to 10 min)	Long-time range model (0.1 min to 10 h)
24 VAC; 12, 24 VDC	SPDT	H3RN-1	H3RN-11
	DPST-NO	H3RN-2	H3RN-21

Note: Specify both the model number and supply voltage when ordering.
Example: H3RN-1 24 VAC

□ Supply voltage

Accessories (Order Separately)

Connecting Socket

Timer	Track mounting/Front connecting socket	Back connecting socket
H3RN-1/-11	P2RF-05-E	P2R-057P
H3RN-2/-21	P2RF-08-E	P2R-087P

Specifications

■ Ratings

Item	H3RN-1/H3RN-2	H3RN-11/H3RN-21
Time ranges	0.1 s to 10 min (1 s, 10 s, 1 min, or 10 min max. selectable)	0.1 min to 10 h (1 min, 10 min, 1 h, or 10 hrs max. selectable)
Rated supply voltage	24 VAC (50/60 Hz); 12, 24 VDC	
Pin type	Plug-in	
Operating mode	ON-delay, interval, flicker OFF-start, or flicker-ON start selectable by DIP switch	
Operating voltage range	85% to 110% of rated supply voltage (12 VDC: 90% to 110% of rated supply voltage) (see note)	
Reset voltage	10% max. of rated supply voltage	
Power consumption	24 VAC: Relay ON: approx. 0.8 VA (0.6 W) at 24 VAC, 60 Hz Relay OFF: approx. 0.6 VA (0.4 W) at 24 VAC, 60 Hz 12 VDC: Relay ON: approx. 0.5 W at 12 VDC Relay OFF: approx. 0.2 W at 12 VDC 24 VDC: Relay ON: approx. 0.6 W at 24 VDC Relay OFF: approx. 0.3 W at 24 VDC	
Control outputs	3 A at 250 VAC, resistive load ($\cos\phi = 1$) (G6B-2□14P-FD-US used) The minimum applicable load is 10 mA at 5 VDC (P reference value).	

Note: When using the H3RN in any place where the ambient temperature is more than 50°C, supply 90% to 110% of the rated voltages (12 VDC: 95% to 110% of the rated voltage).

■ Characteristics

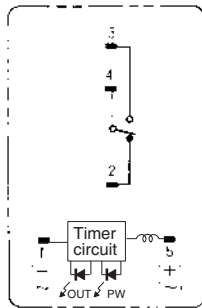
Item	H3RN-1/H3RN-2	H3RN-11/H3RN-21
Accuracy of operating time	±1% FS max. (1 s range: ±1%±10 ms max.)	
Setting error	±15%±50 ms FS max.	
Reset time	Min. power-opening time: 12, 24 VDC: 0.1 s max. (including halfway reset) 24 VAC: 0.5 s max. (including halfway reset)	
Influence of voltage	±2% FS max.	
Influence of temperature	±2% FS max.	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between operating circuit and control output, or contacts of different poles) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)	
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 1 h each in 3 directions Malfunction: 10 to 55 Hz, 0.5-mm single amplitude for 10 min each in 3 directions	
Shock resistance	Destruction: 300 m/s ² Malfunction: 100 m/s ²	
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%	
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (3 A at 250 VAC, resistive load at 1,800 operations/h)	
Impulse withstand voltage	Between power terminals: 1 kV	
Noise immunity	±1.5 kV, square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)	
Static immunity	Destruction: 8 kV Malfunction: 4 kV	
Degree of protection	IP40 (Terminal screw sections are excluded.)	
Weight	Approx. 18 g	

Item	H3RN-1/H3RN-2	H3RN-11/H3RN-21
EMC	(EMI) Emission Enclosure: Emission AC Mains: (EMS) Immunity ESD: Immunity RF-interference from AM Radio Waves: Immunity Burst: Immunity Surge:	EN61812-1 EN55011 Group 1 class A EN55011 Group 1 class A EN61812-1 EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) EN61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) IEC51000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Approved standards	UL508, CSA C22.2 No. 14 Conforms to EN61812-1, IEC60664-1 4 kV/2. Output category according to IEC60947-5-1.	

Connections

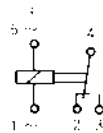
■ Connection

H3RN-1/H3RN-11

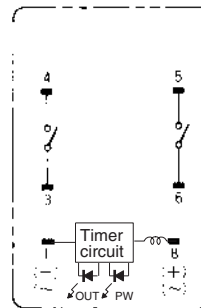


Bottom View

DIN Indication

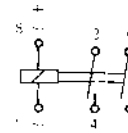


H3RN-2/H3RN-21



Bottom View

DIN Indication

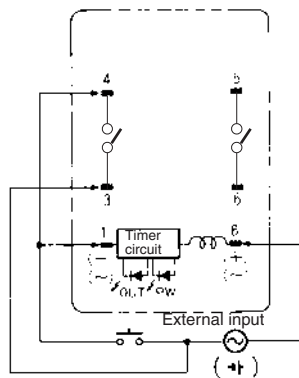


Pulse Operation

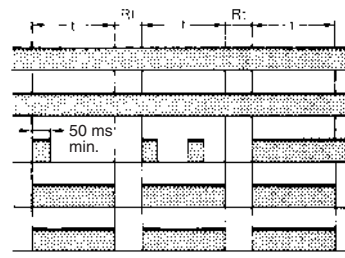
A pulse output for a certain period can be obtained with a random external input signal.

Use the H3RN in interval mode as shown in the following timing charts.

H3RN-2/H3RN-21



- Power (3-8)
- External short circuit (1-4)
- External input (1-3)
- Time limit contact NO (6-5)
- Run/Power indicator (PW)
- Output indicator (OUT)



Note: t: Set time
Rt: Reset time

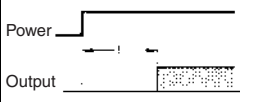
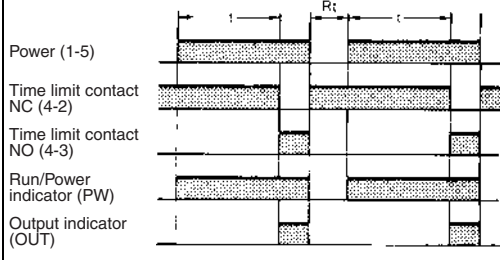
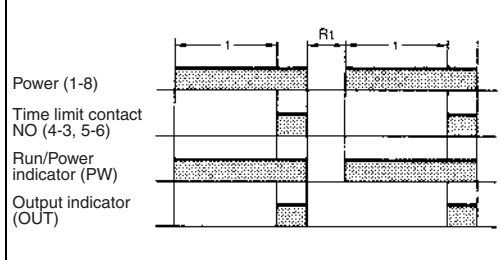
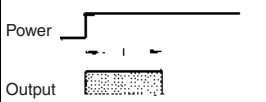
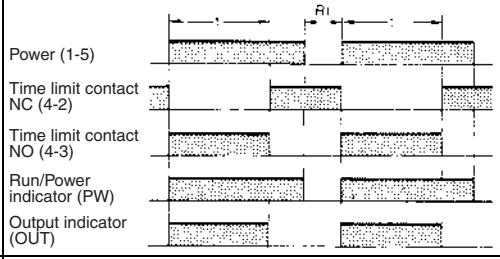
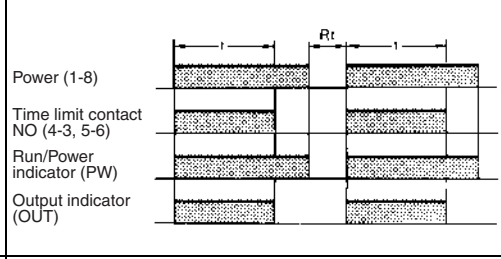
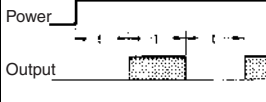
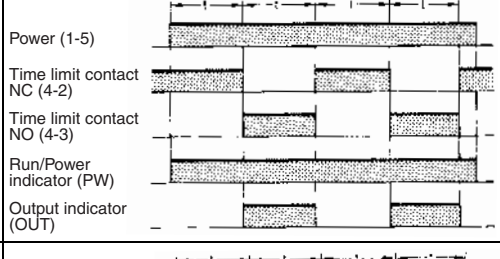
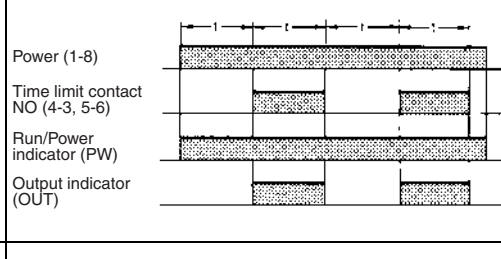
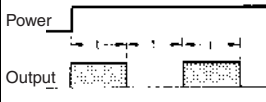
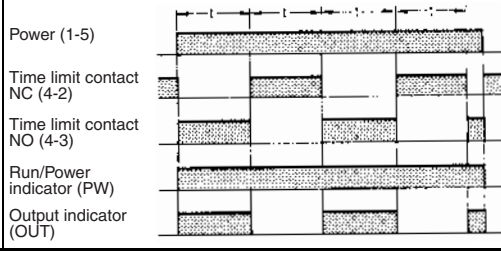
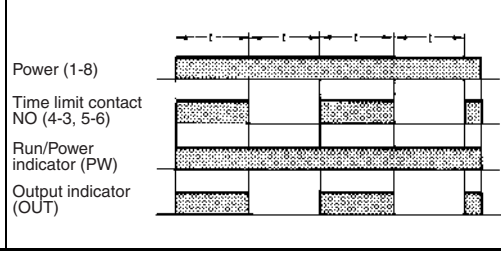
⚠ Caution

Be careful when connecting wires.

Mode	Terminals
Pulse operation	Power supply between 3 and 8 Short-circuit between 4 and 1 Input signal between 3 and 1
Operating mode; interval and all other modes	Power supply between 1 and 8

Operation

■ Timing Chart

Operating mode	Timing chart	
	H3RN-1/H3RN-11	H3RN-2/H3RN-21
ON-delay 		
Interval 		
Flicker OFF-start 		
Flicker ON-start 		

Note: t: Set time
Rt: Reset time

DIP Switch Settings

The 1-s range and ON-delay mode for H3RN-1/-2, 1-min range and ON-delay mode for H3RN-11/-21 are factory-set before shipping.

Time Ranges

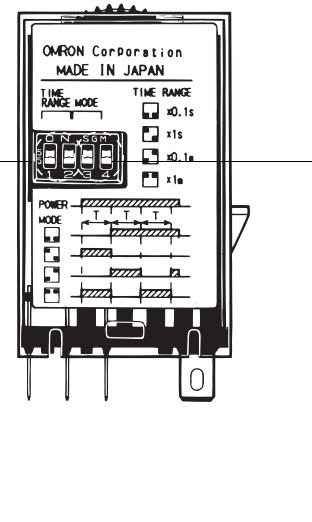
Model	Time range	Time setting range	Setting	Factory-set
H3RN-1, H3RN-2	1 s	0.1 to 1 s		Yes
	10 s	1 to 10 s		No
	1 min	0.1 to 1 min		No
	10 min	1 to 10 min		No
H3RN-11, H3RN-21	1 min	0.1 to 1 min		Yes
	10 min	1 to 10 min		No
	1 h	0.1 to 1 h		No
	10 h	1 to 10 h		No

Note: The left two DIP switch pins are used to select the time ranges.

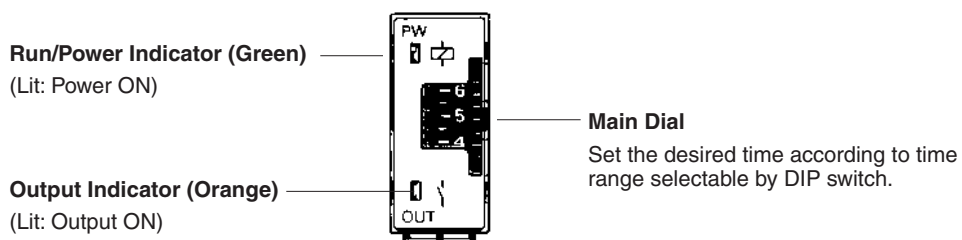
Operating Modes

Operating mode	Setting	Factory-set
ON-delay		Yes
Interval		No
Flicker OFF-start		No
Flicker ON-start		No

Note: The right two DIP switch pins are used to select the operating modes.



Nomenclature

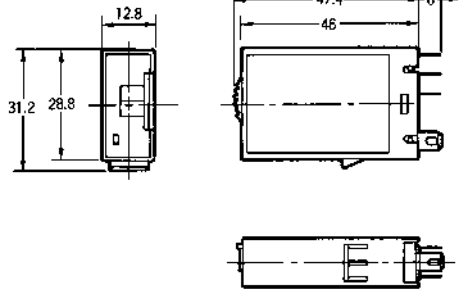
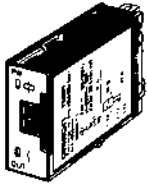


Dimensions

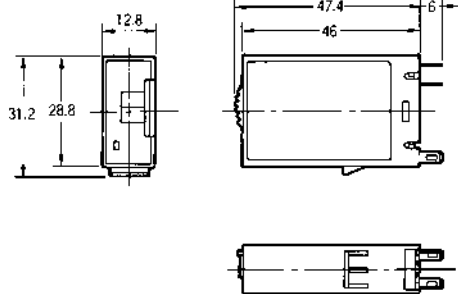
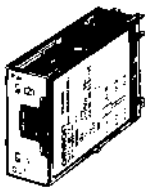
Note: All units are in millimeters unless otherwise indicated.

Timers

H3RN-1/H3RN-11 Front Mounting



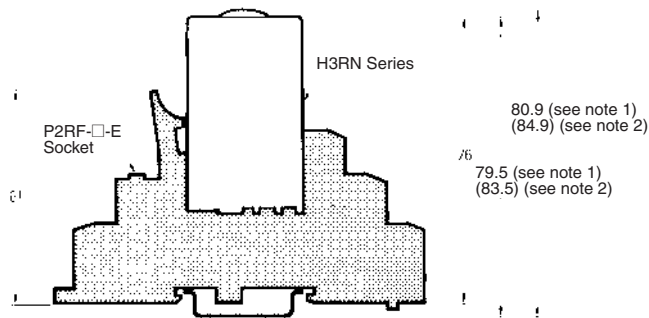
H3RN-2/H3RN-21 Front Mounting



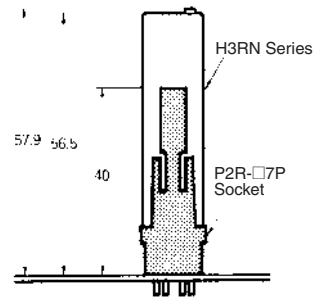
Mounting Height

Use the P2RF-□-E or P2R-□7P to mount the H3RN. When ordering any one of these sockets, replace "□" with "05" for SPDT or "08" for DPST-NO. The P2RF-□ cannot be used because the hook is a different shape.

P2RF-□-E



P2R-□7P



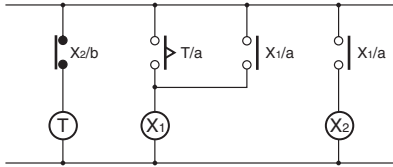
- Note:**
1. The value shown indicates the dimension for the P2RF-05-E with the PFP-□N Mounting Rail. The value is 71.5 mm when using the PFP-N□2.
 2. The value shown in parentheses indicates the dimension for the P2RF-08-E with the PFP-□N Mounting Rail. The value is 75.5 mm when using the PFP-N□2.

Precautions

■ Correct Use

When using the H3RN in any place where the ambient temperature is more than 50°C, supply 90% to 110% of the rated voltages (at 12 VDC: 95% to 110%).

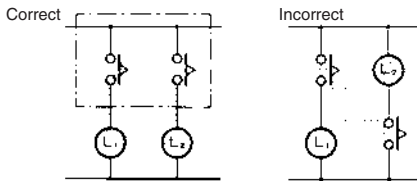
Do not leave the H3RN in time-up condition for a long period of time (for example, more than one month in any place where the ambient temperature is high), otherwise the internal parts may become damaged. Therefore, the use of the H3RN with a relay as shown in the following circuit diagram is recommended.



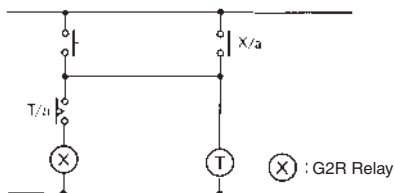
⊗ : Auxiliary relay such as G2R Relay

The H3RN must be disconnected from the socket when setting the DIP switch, otherwise the user may touch a terminal imposed with a high voltage and get an electric shock.

Do not connect the H3RN as shown in the following circuit diagram on the right hand side, otherwise the H3RN's internal contacts different from each other in polarity may become short-circuited.

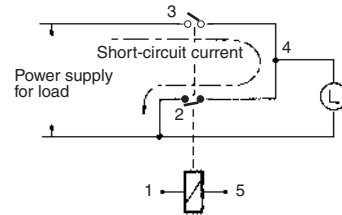


Use the following safety circuit when building a self-holding circuit with the H3RN and an auxiliary relay, such as a G2R Relay, in combination.



In the case of the above circuit, the H3RN will be in pulse operation. Therefore, if the circuit shown on page 99 is used, no auxiliary relay will be required.

Do not use the SPDT contact in a circuit which may cause short-circuiting at three points (otherwise, short-circuiting of the power supply may occur) because the SPDT contact of H3RN-1/-11 is composed of an SPST-NC contact.



Do not set to the minimum setting in the flicker modes, otherwise the contact may be damaged.

Do not use the H3RN in places where there is excessive dust, corrosive gas, or direct sunlight.

Make sure that there is a space of 3 mm or more between any H3RN Models next to each other. (When using the P2RF-□-E Socket, a space of 3 mm or more will be secured.) If a space of 3 mm or more is not secured, the ambient temperature must be less than 50°C.

The internal parts may become damaged if a supply voltage other than the rated ones is imposed on the H3RN.

■ Precautions for EN61812-1 Conformance

The H3RN as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied.

Handling

Do not touch the DIP switch while power is supplied to the H3RN.

Before dismantling the H3RN from the socket, make sure that no voltage is imposed on any terminal of the H3RN.

Wiring

Basic insulation is ensured between the H3RN's operating circuit and control output.

Basic insulation: Overvoltage category III, pollution degree 2 (with a clearance of 3.0 mm and a creepage distance of 3.0 mm at 240 VAC)

The clearance from the edge of the P2R-087P Socket to internal, current-carrying metal parts is 1.3 mm. Position the H3RN to provide the necessary clearance for the voltage used.

When using the P2RF-□-E or P2R-057P Socket, basic insulation is ensured in the mounted condition for a voltage of 250 VAC max.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. L090-E1-02

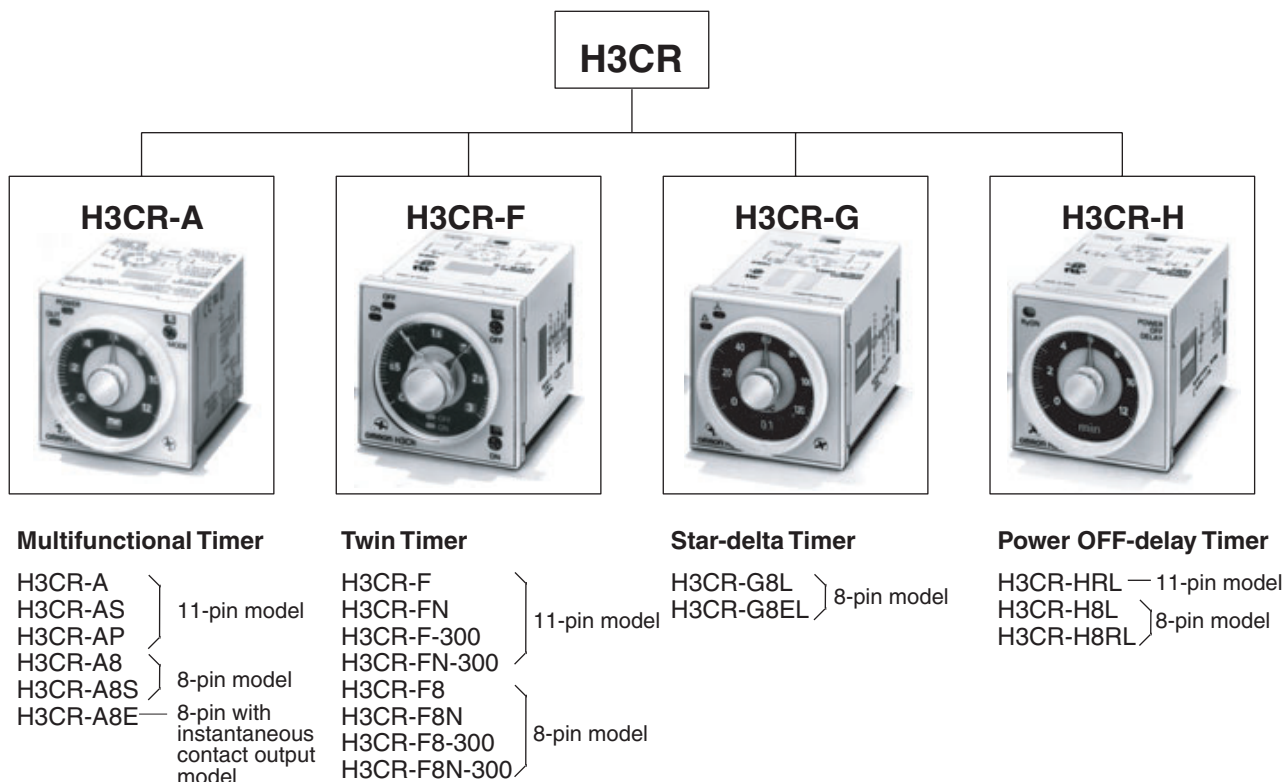
In the interest of product improvement, specifications are subject to change without notice.

Solid-state Timer H3CR

DIN 48 x 48-mm Multifunctional Timer Series

- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.
- Approved by UL and CSA.
- Lloyds/NK approvals.
- Six-language instruction manual provided.

■ Broad Line-up of H3CR Series



Note: H3CR-AS, H3CR-A8S: Transistor output models

Contents

Solid-state Timer

H3CR-A.....	B-107
H3CR-F.....	B-129
H3CR-G.....	B-135
H3CR-H.....	B-143

Common to ALL Timers

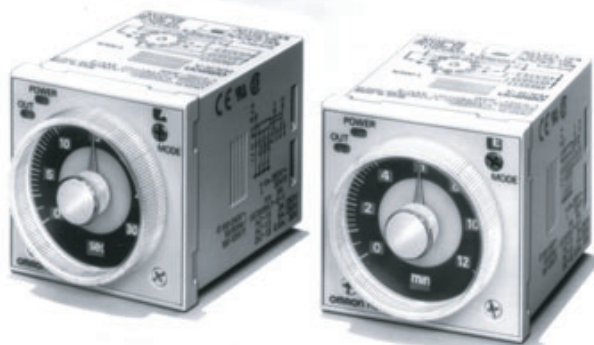
Operation.....	B-151
Accessories.....	B-153
Precautions.....	B-157

Solid-state Multi-functional Timer

H3CR-A

DIN 48 x 48-mm State-of-the-art Multifunctional Timer

- A wider power supply range reduces the number of timer models kept in stock.
- A wide range of applications through six or four operating modes.
- Reduced power consumption. (Except for H3CR-A8E)
- Enables easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Length, when panel-mounted with a Socket, of 80 mm or less.
- Time Setting Rings enable consistent settings and limit the setting range.
- Panel Covers enable various panel designs.
- PNP input models available.
- Rich variety of inputs: Start, reset, and gate functions (11-pin models and -AP models)



Model Number Structure

Model Number Legend

H3CR-A -

1 2 3 4

1. Number of Pins

- None: 11-pin models
- 8: 8-pin models

2. Input Type for 11-pin Models

- None: No-voltage input (NPN type)
- P: Voltage input (PNP type)

3. Output

- None: Relay output (DPDT)
- S: Transistor output (NPN/PNP universal use)
- E: Relay output (SPDT) with instantaneous relay output (SP-DT)

4. Suffix

- 300: Dual mode models (signal ON/OFF-delay and one-shot)
- 301: Double time scale (range) models (0.1 s to 600 h)

Ordering Information

■ List of Models

11-pin Models

Output	Supply voltage	Input type	Time range	Operating mode (see note 2)	Model	
Contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-voltage input	0.05 s to 300 h	Six multi-modes: A, B, B2, C, D, E	H3CR-A	
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC					
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	Voltage input	0.1 s to 600 h	Six multi-modes: A, B, B2, C, D, E	H3CR-AP	
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC					
	Transistor (Photocoupler)	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-voltage input	0.05 s to 300 h		H3CR-A-300
		24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
Transistor (Photocoupler)	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-voltage input	0.1 s to 600 h		H3CR-A-301	
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC					
Transistor (Photocoupler)	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC		0.05 s to 300 h		H3CR-AS	

8-pin Models

Output	Supply voltage	Input type	Time range	Operating mode (see note 2)	Model
Contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-input available	0.05 s to 300 h	Four multi-modes: A, B2, E, J (Power supply start)	H3CR-A8
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC		0.1 s to 600 h		
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC		0.05 s to 300 h		
Transistor (Photocoupler)	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC		0.05 s to 300 h		H3CR-A8S
Time-limit contact and instantaneous contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC				H3CR-A8E
	24 to 48 VDC/VAC (50/60 Hz)				

Note: 1. Specify both the model number and supply voltage when ordering.
Example: H3CR-A 100 to 240 VAC (50/60 Hz)/100 to 125 VDC

└── Supply voltage

2. The operating modes are as follows

- | | |
|------------------------|------------------------|
| A: ON-delay | D: Signal OFF-delay |
| B: Flicker OFF start | E: Interval |
| B2: Flicker ON start | G: Signal ON/OFF-delay |
| C: Signal ON/OFF-delay | J: One-shot |

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30 Y92F-73 Y92F-74
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
Protective Cover		Y92A-48B
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (see note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (see note 1)
Time Setting Ring	Setting a specific time	Y92S-27
	Limiting the setting range	Y92S-28
Panel Cover (see note 2)	Light gray (5Y7/1)	Y92P-48GL
	Black (N1.5)	Y92P-48GB
	Medium gray (5Y5/1)	Y92P-48GM
Hold-down Clip (see note 3)	For PL08 and PL11 Sockets	Y92H-7
	For PF085A Socket	Y92H-8

- Note:** 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.
 2. The Time Setting Ring and Panel Cover are sold together.
 3. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-A/-AS	H3CR-AP	H3CR-A8/-A8S	H3CR-A8E
Operating mode	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 (Only for H3CR-A-300) J: One-shot (Only for H3CR-A-300)		A: ON-delay (power supply start) B2: Flicker ON start (power supply start) E: Interval (power supply start) J: One-shot (power supply start)	
Pin type	11-pin		8-pin	
Input type	No-voltage input	Voltage input	---	
Time-limit output type	H3CR-A/-A8/-AP: Relay output (DPDT) H3CR-AS/-A8S: Transistor output (NPN/PNP universal)*			Relay output (SPDT)
Instantaneous output type	---			Relay output (SPDT)
Mounting method	DIN track mounting, surface mounting, and flush mounting			
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1 for Timers with Contact Outputs. Output category according to EN60947-5-2 for Timers with Transistor Outputs.			

*The internal circuits are optically isolated from the output. This enables universal application as NPN or PNP transistor.

■ Time Ranges

Note: When the time setting knob is turned below "0" until the point where the time setting knob stops, the output will operate instantaneously at all time range settings.

Standard (0.05-s to 300-h) Models

Time unit	s (sec)	min (min)	h (hrs)	x10 h (10 h)
Full scale setting	1.2	0.05 to 1.2	0.12 to 1.2	1.2 to 12
	3	0.3 to 3		3 to 30
	12	1.2 to 12		12 to 120
	30	3 to 30		30 to 300

Double (0.1-s to 600-h) Models

Time unit	s (sec)	min (min)	h (hrs)	x10 h (10 h)
Full scale setting	2.4	0.1 to 2.4	0.24 to 2.4	2.4 to 24
	6	0.6 to 6		6 to 60
	24	2.4 to 24		24 to 240
	60	6 to 60		60 to 600

■ Ratings

Rated supply voltage (see note 1)	100 to 240 VAC (50/60 Hz)/100 to 125 VDC, 24 to 48 VAC (50/60 Hz)/12 to 48 VDC (24 to 48 VAC/VDC for H3CR-A8E) (see note 2)		
Operating voltage range	85% to 110% of rated supply voltage (90% to 110% at 12 VDC)		
Power reset	Minimum power-opening time: 0.1 s		
Input	<p>No-voltage Input ON impedance: 1 kΩ max. ON residual voltage: 1 V max. OFF impedance: 100 kΩ min.</p> <p>Voltage Input Max. permissible capacitance between inputs lines (terminals 6 and 7): 1,200 pF Load connectable in parallel with inputs (terminals 6 and 7).</p> <ul style="list-style-type: none"> 100 to 240 VAC/100 to 125 VDC High (logic) level: 85 to 264 VAC/85 to 137.5 VDC Low (logic) level: 0 to 10 VAC/0 to 10 VDC 24 to 48 VAC/12 to 48 VDC High (logic) level: 20.4 to 52.8 VAC/10.8 to 52.8 VDC Low (logic) level: 0 to 2.4 VAC/0 to 1.2 VDC 		
Power consumption	<p>H3CR-A/-A8</p> <ul style="list-style-type: none"> 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON: approx. 2.0 VA (1.6 W) Relay OFF: approx. 1.3 VA (1.1 W) 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Relay ON: approx. 0.8 W Relay OFF: approx. 0.2 W <p>H3CR-AP (see note 3)</p> <ul style="list-style-type: none"> 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON: approx. 2.5 VA (2.2 W) Relay OFF: approx. 1.8 VA (1.7 W) 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Relay ON: approx. 0.9 W Relay OFF: approx. 0.3 W <p>H3CR-A8E</p> <ul style="list-style-type: none"> 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON/OFF: approx. 2 VA (0.9 W) 24 to 48 VAC/VDC (When at 24 VDC) Relay ON/OFF: approx. 0.9 W <p>H3CR-AS/-A8S</p> <ul style="list-style-type: none"> 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Output ON: 0.3 W Output OFF: 0.2 W 		
Control outputs	<p>Time limit contacts: 5 A at 250 VAC/30 VDC, 0.15 A at 125 VDC, resistive load (cosφ = 1)</p> <p>Transistor output: Open collector (NPN/PNP), 100 mA max. at 30 VDC max., residual voltage: 2 V max.</p> <p>Instantaneous contact: 5 A at 250 VAC/30 VDC, 0.15 A at 125 VDC, resistive load (cosφ = 1)</p>		

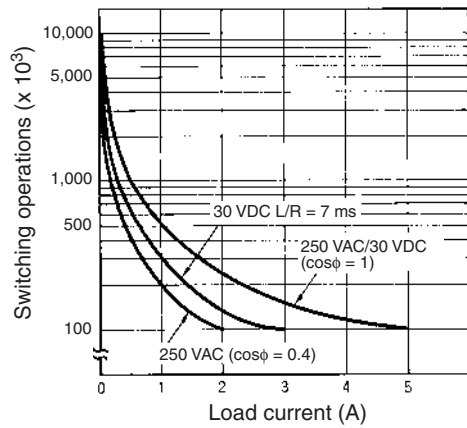
- Note:**
- DC ripple rate: 20% max. if the power supply incorporates a single-phase, full-wave rectifier.
 - Each 24-to-48-VAC/12-to-48-VDC model causes an inrush current of approximately 0.85 A. Pay careful attention when attempting to turn ON power to such a model with non-contact output from a device such as a sensor.
 - The values are for when the terminals 2 and 7 and terminals 10 and 6 are short-circuited, and include the consumption current of the input circuit.

■ Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2%±10 ms max. in a range of 1.2 s)
Setting error	±5% FS ±50 ms (see note 1)
Reset time	Min. power-opening time: 0.1 s max. Min. pulse width: 0.05 s (H3CR-A/-AS)
Reset voltage	10% max. of rated supply voltage
Influence of voltage	±0.2% FS max. (±0.2%±10 ms max. in a range of 1.2 s)
Influence of temperature	±1% FS max. (±1%±10 ms max. in a range of 1.2 s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC (1,000 VAC for H3CR-A□S), 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC (1,000 VAC for H3CR-A□S), 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other) 2,000 VAC, 50/60 Hz for 1 min (between input and control output terminals and operation circuit) for H3CR-AP
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC/100 to 125 VDC, 1 kV for 24 to 48 VAC/12 to 48 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC/100 to 125 VDC, 1.5 kV for 24 to 48 VAC/12 to 48 VDC and 24 to 48 VAC/VDC
Noise immunity	±1.5 kV (between power terminals) and ±600 V (between no-voltage input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude each in 3 directions for 2 hours each Malfunction: 10 to 55 Hz with 0.5-mm single amplitude each in 3 directions for 10 minutes each
Shock resistance	Destruction: 1,000 m/s ² 3 times each in 6 directions Malfunction: 100 m/s ² 3 times each in 6 directions
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%
Life expectancy	Mechanical: 20,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (see note 2)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3:10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 90 g

Note: 1. The value is ±5% FS +100 ms to -0 ms max. when the C, D, or G mode signal of the H3CR-AP is OFF.
2. Refer to the *Life-test Curve*.

Life-test Curve

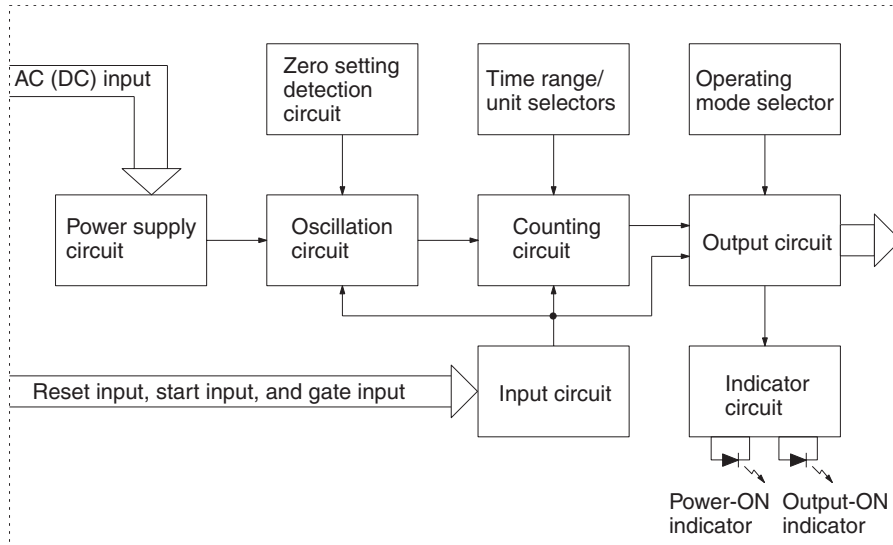


Reference: A maximum current of 0.15 A can be switched at 125 VDC ($\cos\phi = 1$) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA (100 mA for H3CR-A8E) at 5 VDC (failure level: P).

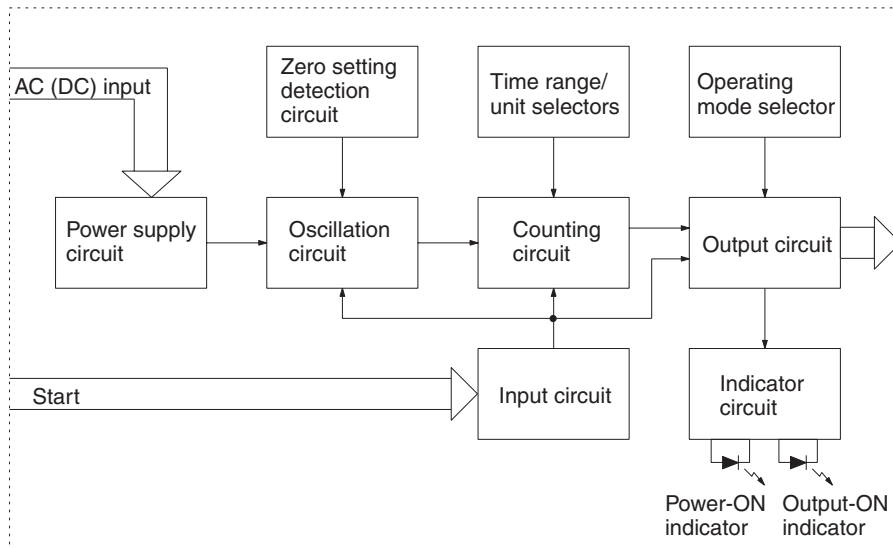
Connections

Block Diagrams

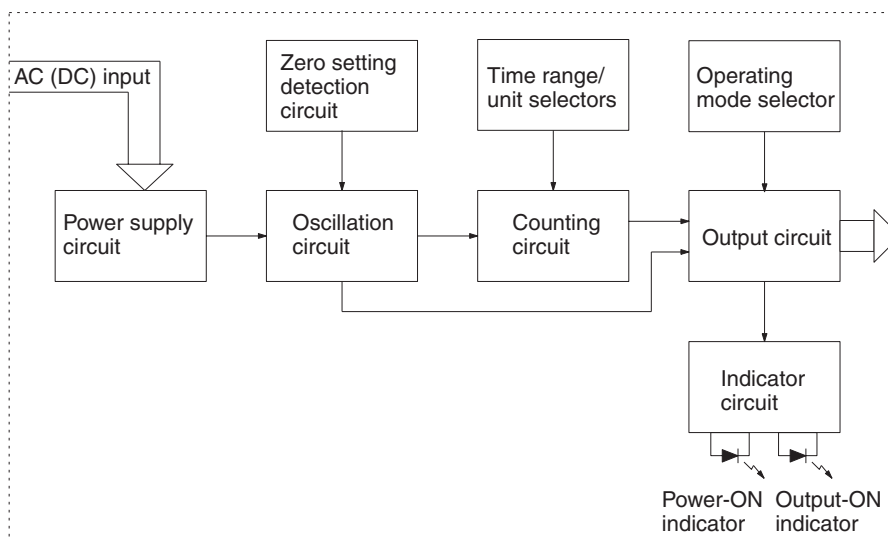
H3CR-A/AS



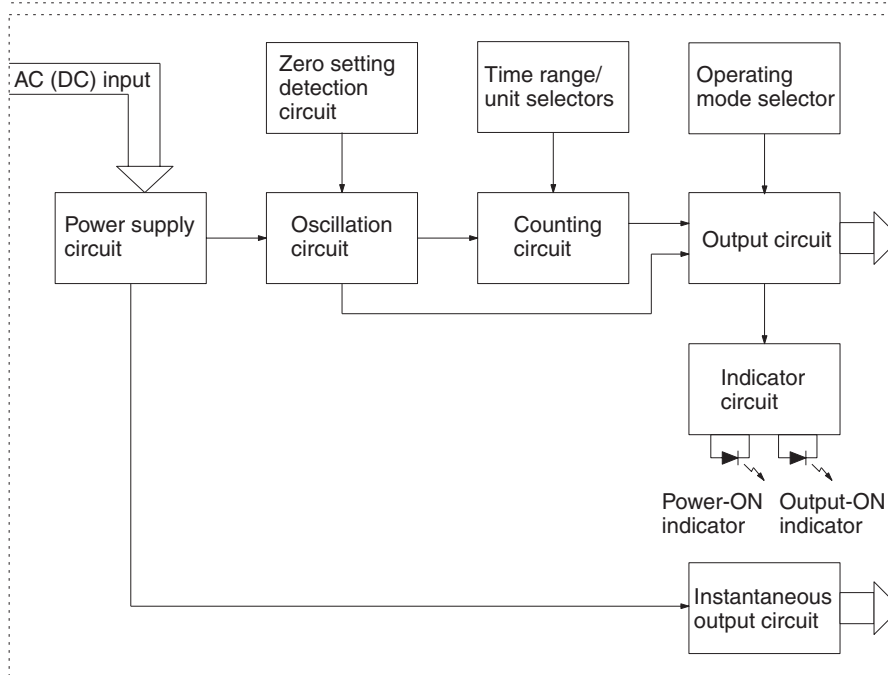
H3CR-AP



H3CR-A8/A8S



H3CR-A8E




■ I/O Functions

Inputs (for -A/ -AS models)	Start	Starts time-measurement.
	Reset	Interrupts time-measurement and resets time-measurement value. No time-measurement is made and control output is OFF while the reset input is ON.
	Gate	Prohibits time-measurement.
Outputs	Control output	Outputs are turned ON according to designated output mode when preset value is reached.

Note: H3CR-AP incorporates start input only.

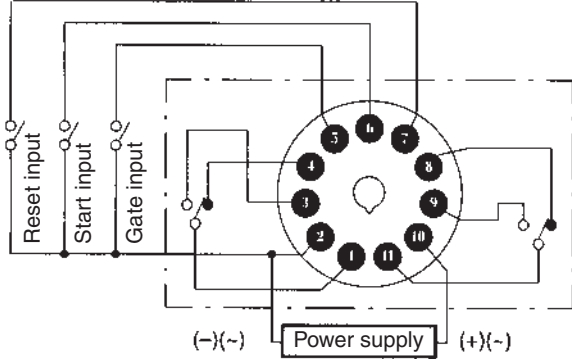
Terminal Arrangement

Note: The delayed contact of conventional Timers was indicated as 

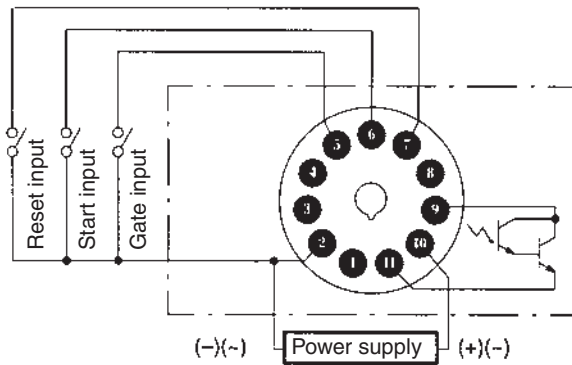
The contact symbol of the H3CR-A is indicated as  because its operating mode is six multi-modes (four multi-modes for the H3CR-A8).

11-pin Models

H3CR-A/A-300/A-301 (Contact Output)

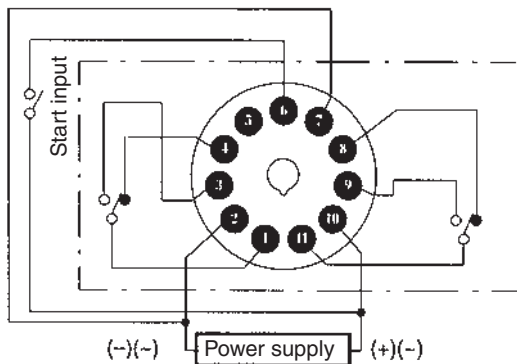


H3CR-AS (Transistor Output)



Note: Terminals 1, 3, 4, and 8 are empty. Terminals 2, 5, 6, 7, and 10 are the same as for the H3CR-A.

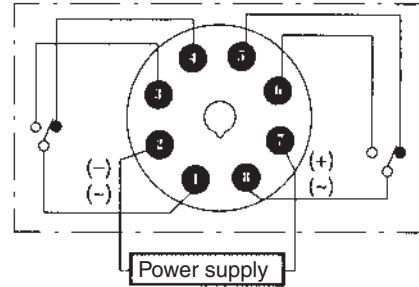
H3CR-AP (Contact Output)



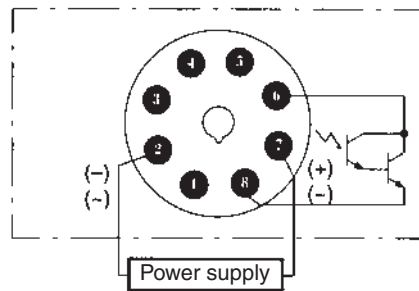
Note: Terminal 5 is empty.

8-pin Models

H3CR-A8/A8-301 (Contact Output)

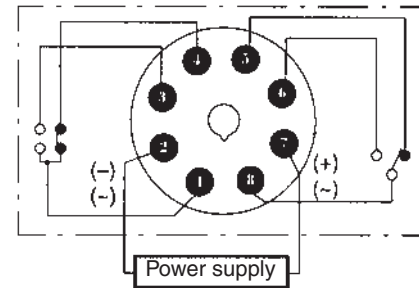


H3CR-A8S (Transistor Output)



Note: Terminals 1, 3, 4, and 5 are empty. Terminals 2 and 7 are the same as for the H3CR-A8.

H3CR-A8E (Contact Output)



Input Connections

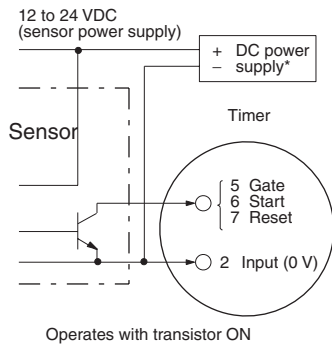
H3CR-A/-AS

The inputs of the H3CR-A/-AS are no-voltage (short-circuit or open) inputs.

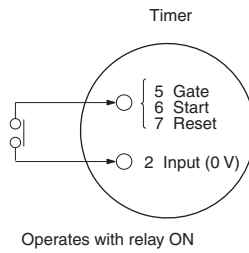
No-voltage Inputs

No-contact Input

(Connection to NPN open collector output sensor.)

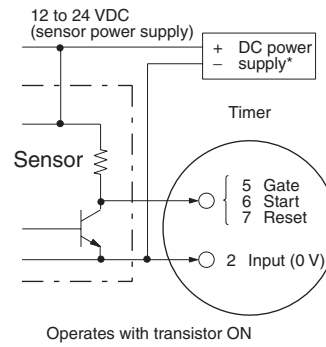


Contact Input



No-contact Input

(Connection to a voltage output sensor.)



*An external 24VDC power supply can be used, eg. OMRON S8VS

No-voltage Input Signal Levels

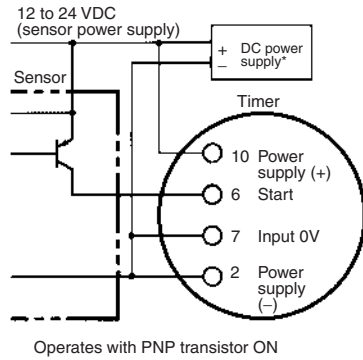
No-contact input	1. Short-circuit level Transistor ON Residual voltage: 1 V max. Impedance when ON: 1 kΩ max.
	2. Open level Transistor OFF Impedance when OFF: 100 kΩ min.
Contact input	Use contacts which can adequately switch 0.1 mA at 5 V

H3CR-AP

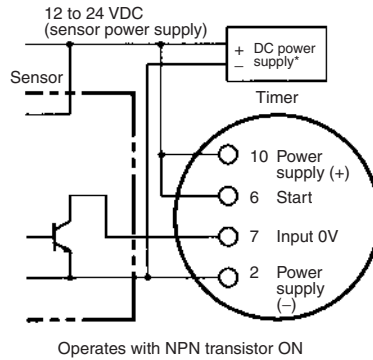
The start input of the H3CR-AP is voltage input. (Voltage imposition or open)

Voltage Inputs

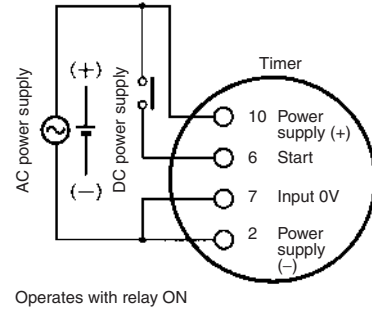
No-contact Input
(Connection to PNP open collector output sensor)



No-contact Input
(Connection to NPN open collector output sensor)



Contact Input



Note: The input circuit is isolated from the power supply circuit. Thus, an NPN transistor can be connected.

Note: Refer to the signal levels in the following table and be aware of the minimum applicable load of the relay.

*An external 24VDC power supply can be used, eg. OMRON S8VS

Voltage Input Signal Levels

No-contact input	1. Transistor ON Residual voltage: 1 V max. The voltage between terminals 6 and 7 must be 10.8 VDC min.
	2. Transistor OFF Leakage current: 0.01 mA max. The voltage between terminals 6 and 7 must be 1.2 VDC max.
Contact input	Use contacts that can adequately switch 0.1 mA at each operating voltage. The voltage between terminals 6 and 7 with contacts ON or OFF must satisfy the specified value. Contacts ON 100-to-240-VAC and 100-to-125-VDC models: 85 to 264 VAC or 85 to 137.5 VDC 24-to-48-VAC and 12-to-48-VDC models: 20.4 to 52.8 VAC or 10.8 to 52.8 VDC Contacts OFF 100-to-240-VAC and 100-to-125-VDC models: 0 to 10 VAC or 0 to 10 VDC 24-to-48-VAC and 12-to-48-VDC models: 0 to 2.4 VAC or 0 to 1.2 VDC

Operation

■ Timing Chart

- Note:**
1. The minimum power-opening time ("Rt") is 0.1 s.
 2. The minimum input pulse width (for start, reset) is 0.05 s.
 3. 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.
 4. Power supply start in mode J is also possible for H3CR-A8/-A8E/-A8S/-A8-301 models.

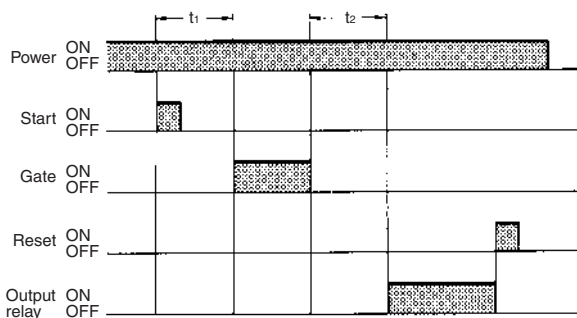
H3CR-A/-AS/-AP*

*H3CR-AP model incorporates start input only.

Operating mode	Timing chart	
A: ON-delay		<p>Basic operation</p> <p>Note: Start input is invalid while the Timer is in operation.</p>
B: Flicker OFF start		<p>Basic operation</p> <p>Note: Start input is invalid while the Timer is in operation.</p>
B2: Flicker ON start		<p>Basic operation</p> <p>Note: Start input is invalid while the Timer is in operation.</p>
C: Signal ON/OFF-delay		<p>Basic operation</p> <p>Note: Start input is valid and re-triggerable while the Timer is in operation.</p>

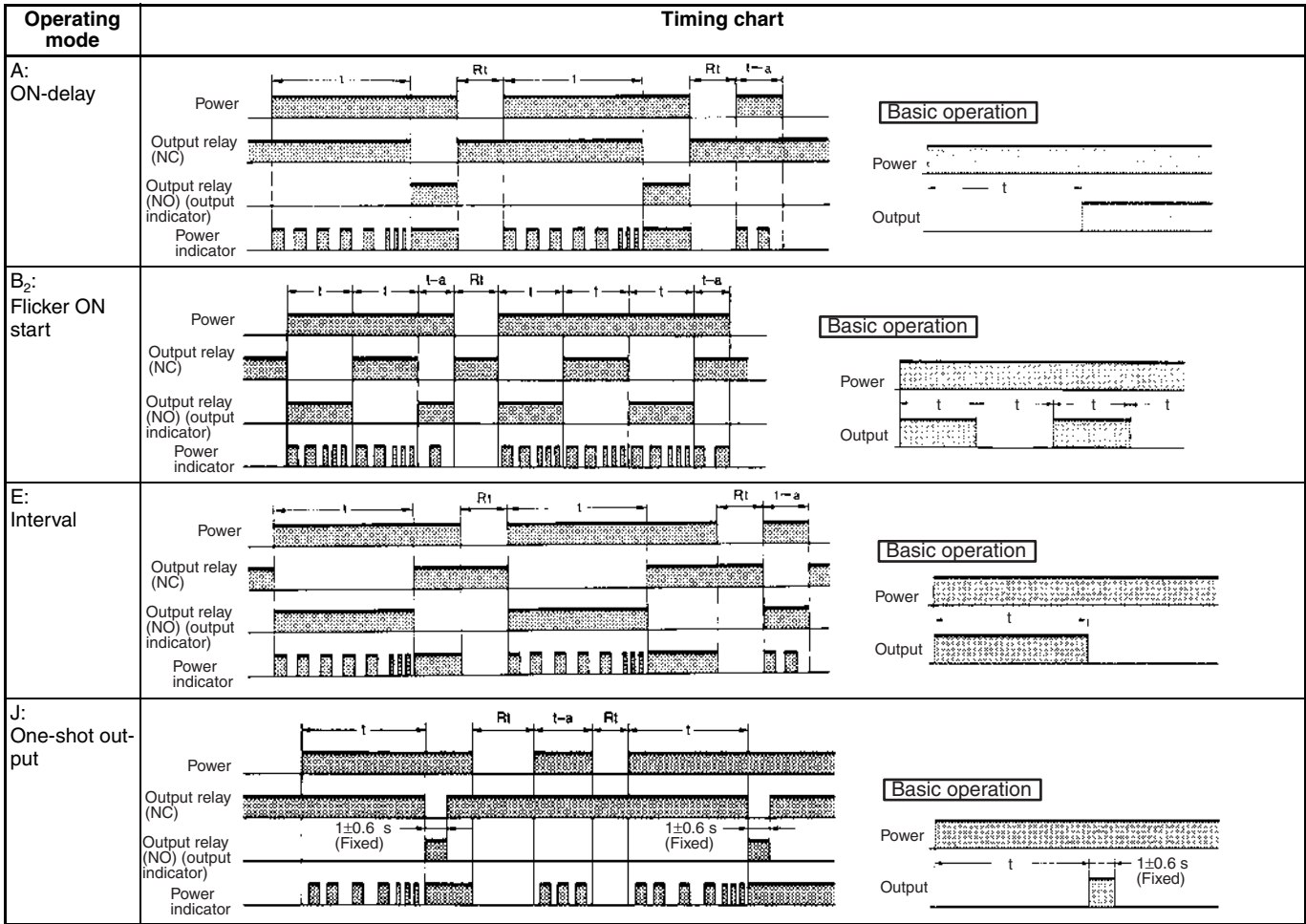
Operating mode	Timing chart	
D: Signal OFF-delay		<p>Basic operation</p> <p>Note: Start input is valid and re-triggerable while the Timer is in operation.</p>
E: Interval		<p>Basic operation</p> <p>Note: Start input is valid and re-triggerable while the Timer is in operation.</p>
G: Signal ON/OFF-delay		<p>Basic operation</p> <p>Note: Start input is valid and re-triggerable while the Timer is in operation.</p>
J: One-shot output		<p>Basic operation</p> <p>Note: Start input is valid and re-triggerable while the Timer is in operation.</p>

Gate Signal Input



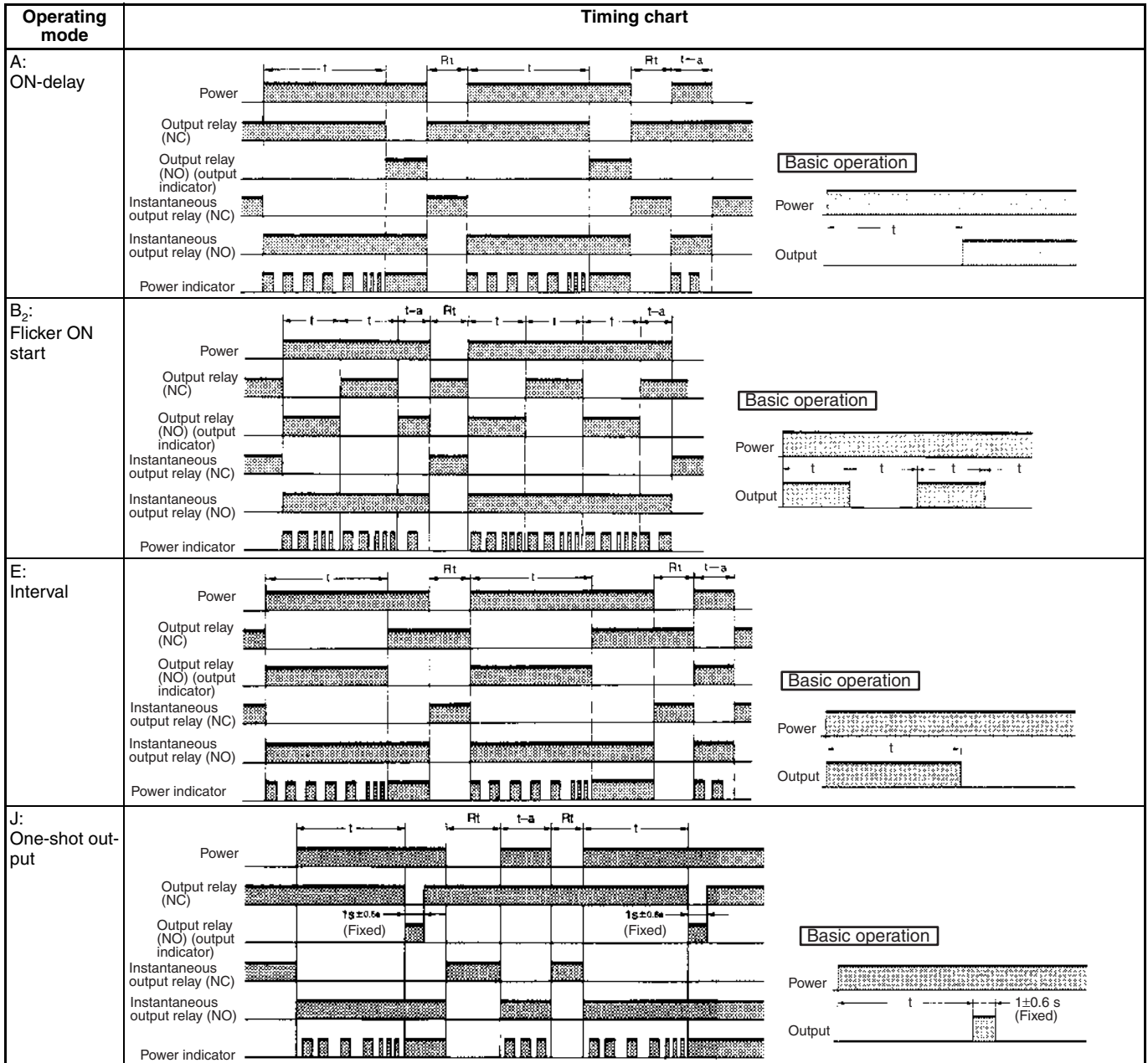
- Note:**
1. This timing chart indicates the gate input in operating mode A (ON-delay operation).
 2. The set time is the sum of t_1 and t_2 .
 3. H3CR-AP model incorporates start input only.

H3CR-A8/-A8S



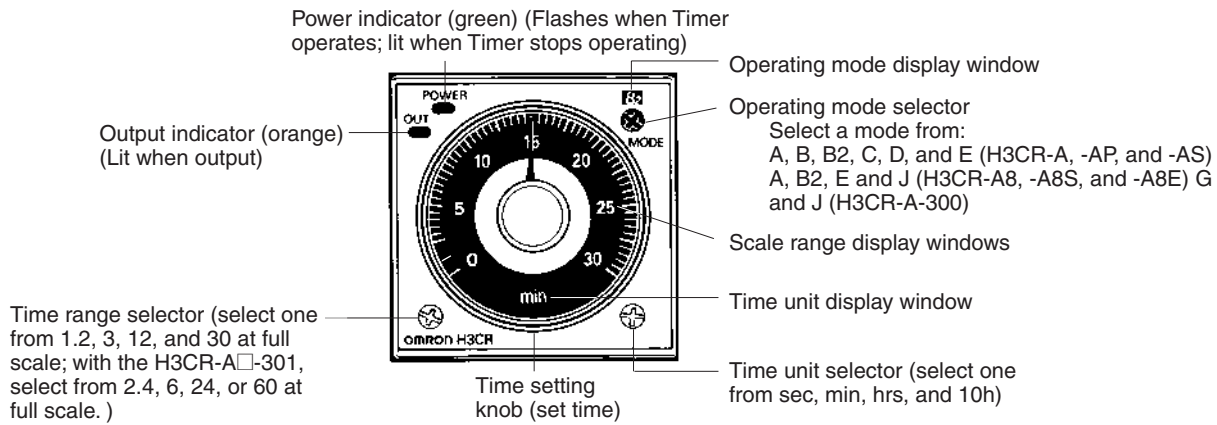
- Note:**
1. The minimum power-opening time ("Rt") is 0.1 s.
 2. The letter "t" in the timing charts stands for the set time and "t-a" means that the period is less than the time set.

H3CR-A8E



- Note:**
1. The minimum power-opening time ("Rt") is 0.1 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.

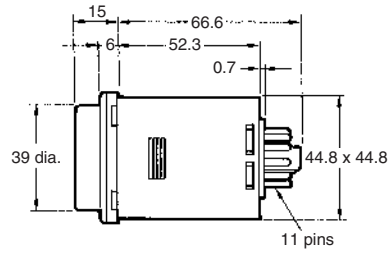
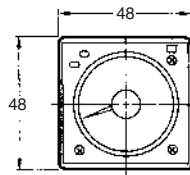
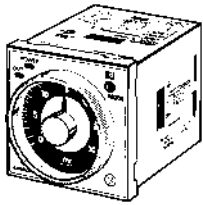
Nomenclature



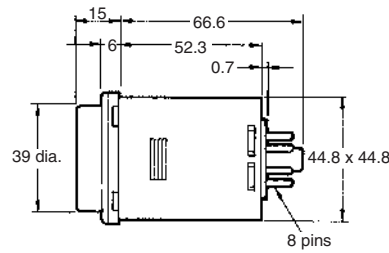
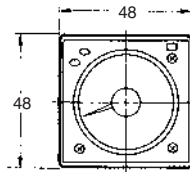
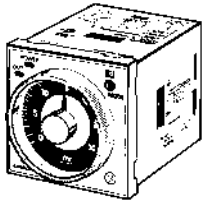
Dimensions

Note: All units are in millimeters unless otherwise indicated.

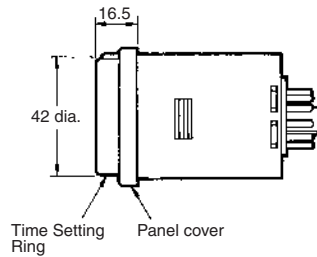
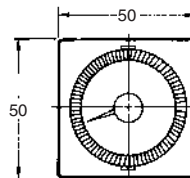
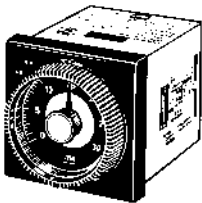
H3CR-A
H3CR-AP
H3CR-AS



H3CR-A8
H3CR-A8S
H3CR-A8E

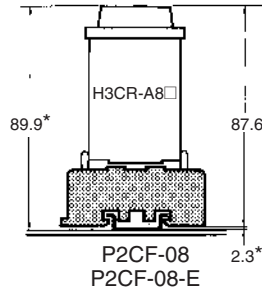
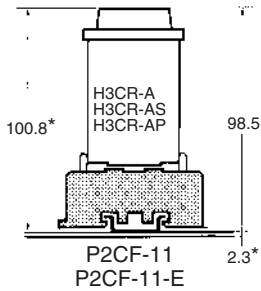


Dimensions with Set Ring



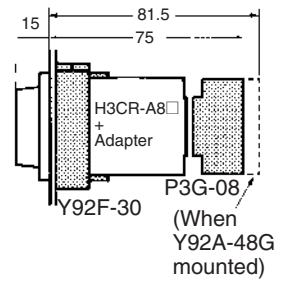
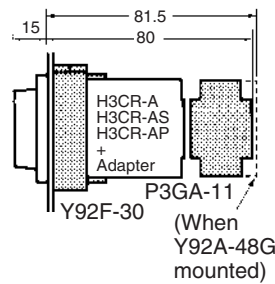
Dimensions with Front Connecting Socket

P2CF-08-□/ P2CF-11-□



Dimensions with Back Connecting Socket

P3G-08/ P3GA-11



*These dimensions vary with the kind of DIN track (reference value).

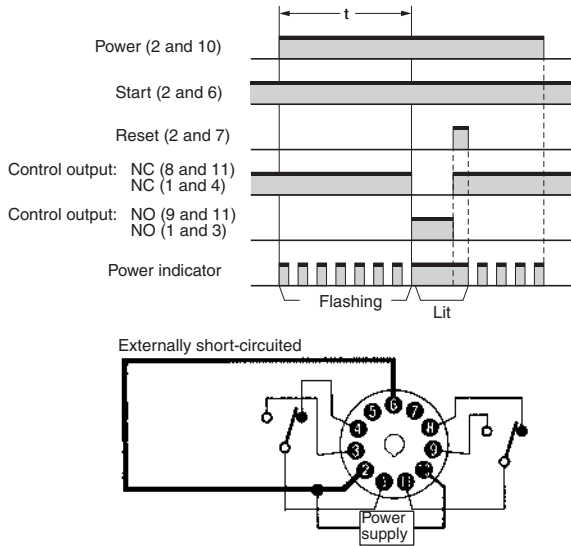
Application Examples (H3CR-A)

A Mode: ON-delay

ON-delay operation (A mode) is a basic mode.

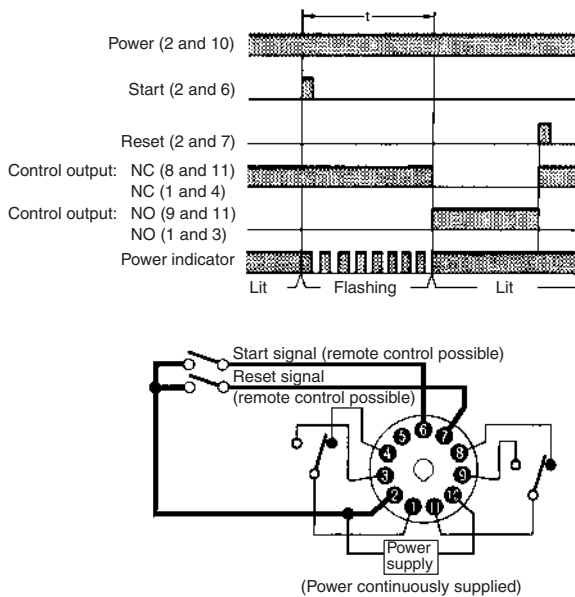
1. Power-ON Start/Power-OFF Reset

The Power-ON start/Power-OFF reset operation is a standard operating method.



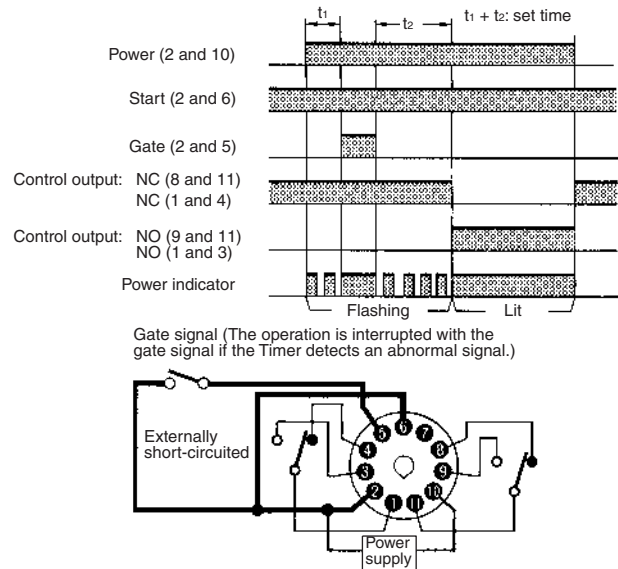
2. Signal Start/Signal Reset

The Signal start/Signal reset operation is useful for remote control of the Timer.



3. Control of Integrated Time with Gate Signal

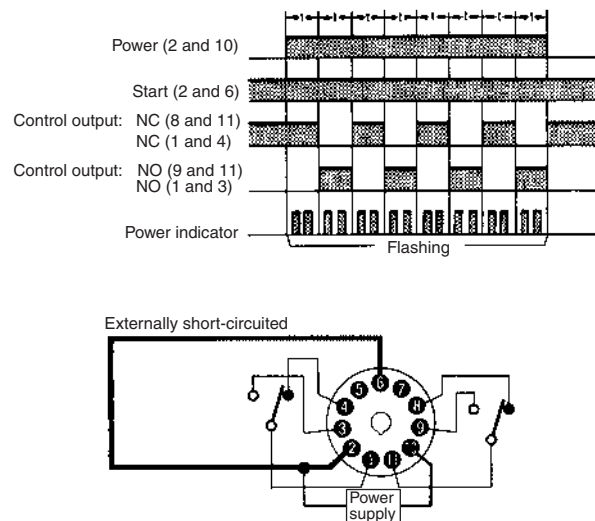
With a gate signal, the Power-ON start operation and Signal start operation can be controlled (the operation can be interrupted).



B/B2 Mode: Flicker

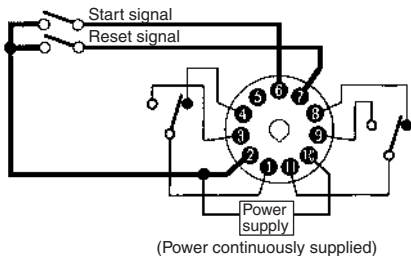
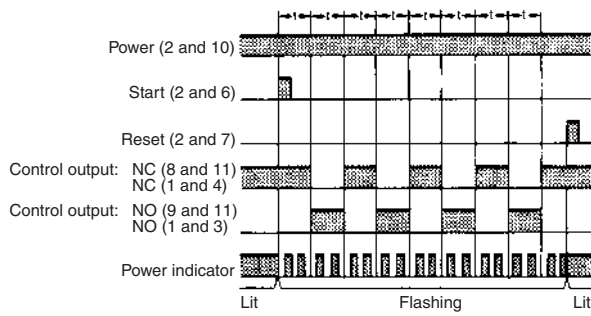
The flicker operation in the B and B2 modes can be effectively applied to lamp or buzzer (ON and OFF) alarms or the monitoring of an intermittent operation with a display.

1. Power-ON Start/Power-OFF Reset (in B Mode)



2. Signal Start/Signal Reset (in B Mode)

If there is an abnormal signal, flashing starts. When the abnormal condition is restored, a reset signal stops the display flashing.

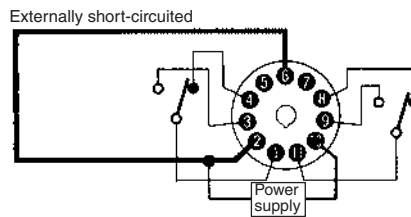
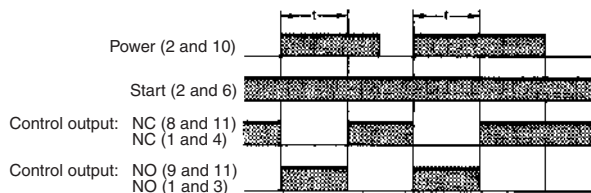


C Mode: Signal ON/OFF-delay

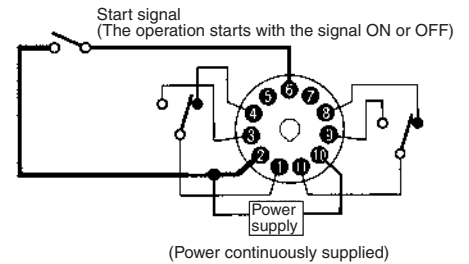
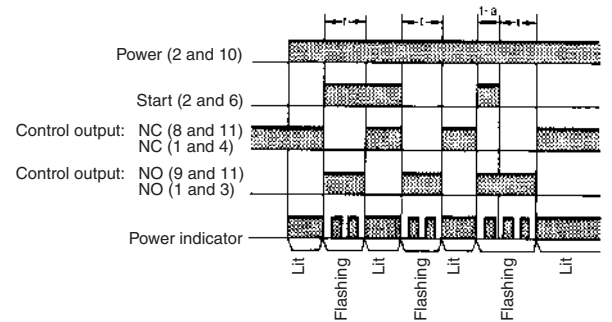
The Signal ON/OFF-delay operation (C mode) is useful for the control of distribution of products on a production line into boxes by the specified number or time.

1. Power-ON Start/Instantaneous Operation/Time-limit Reset

A set of these functions is useful for the operation of a machine for a specified period when power is ON.



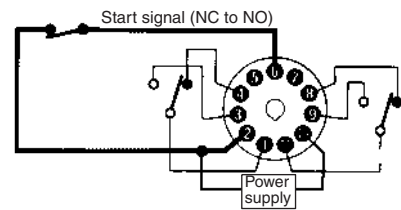
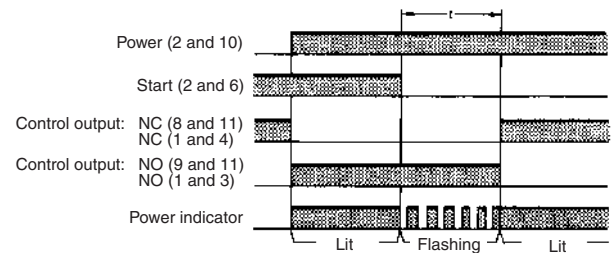
2. Signal-ON-OFF Start/Instantaneous Operation/Time-limit Reset



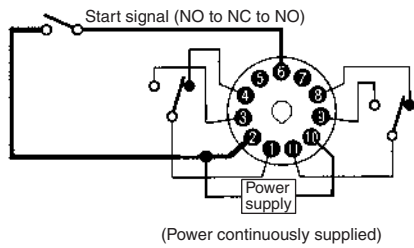
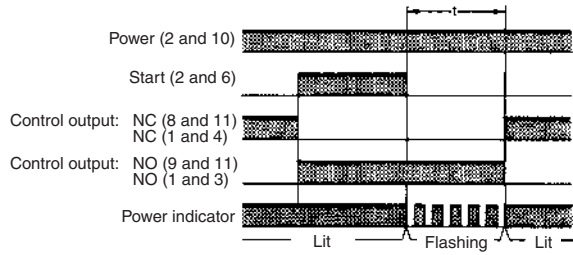
D Mode: Signal OFF-delay

Signal OFF-delay operation (D mode) can be effectively used to keep a load operating for a certain period. For example, this function enables the cooling fan for a lamp or heater to operate for a certain period after the lamp or heater is switched OFF.

1. Power-ON Start/Instantaneous Operation/Time-limit Reset

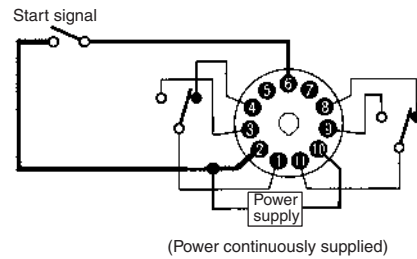
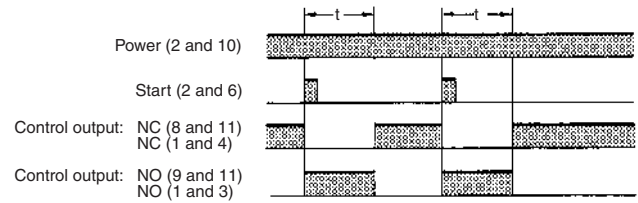


2. Signal Start/Instantaneous Operation/ Time-limit Reset



2. Signal Start/Instantaneous Operation/ Time-limit Reset

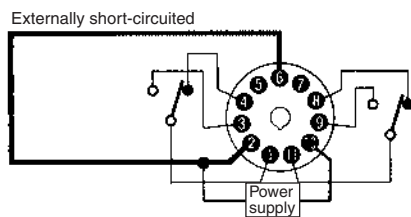
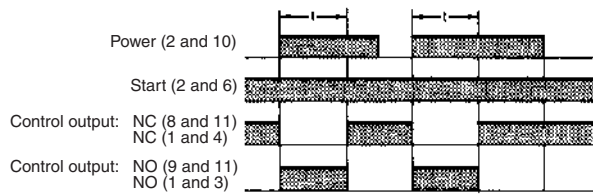
This function is useful for the repetitive control such as the filling of liquid for a specified period after each Signal start input.



E Mode: Interval

1. Power-ON Start/Instantaneous Operation/ Time-limit Reset

This function is useful for the operation of a machine for a specified period after power is ON.



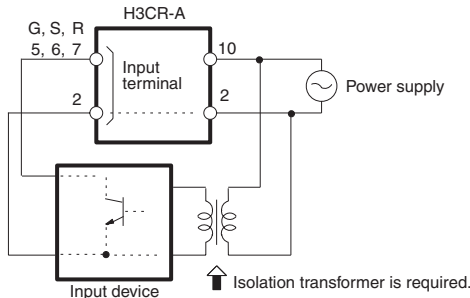
Precautions (H3CR-A)

Note: The undermentioned is common for all H3CR-A models.

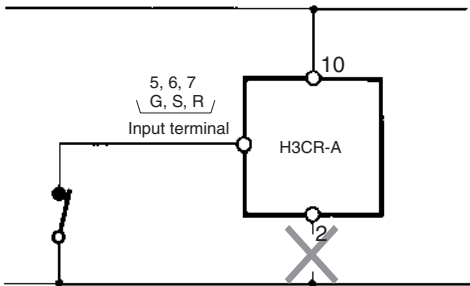
Power Supplies

For the power supply of an input device of the H3CR-A□/-A□S/-AP, use an isolating transformer with the primary and secondary windings mutually isolated and the secondary winding not grounded.

Example: H3CR-A



The H3CR-A□/-A□S/AP's power supply terminal 2 is a common terminal for input signals to the Timer. Do not disconnect the wires on terminal 2, otherwise the internal circuitry of the Timer will be damaged.

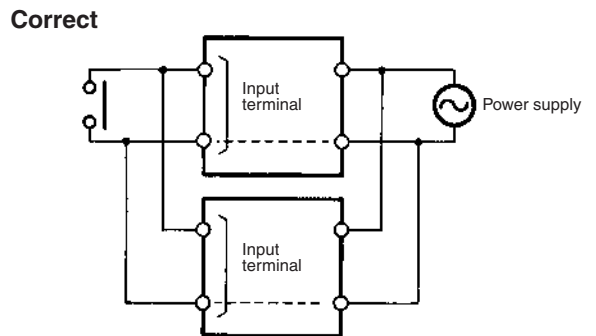
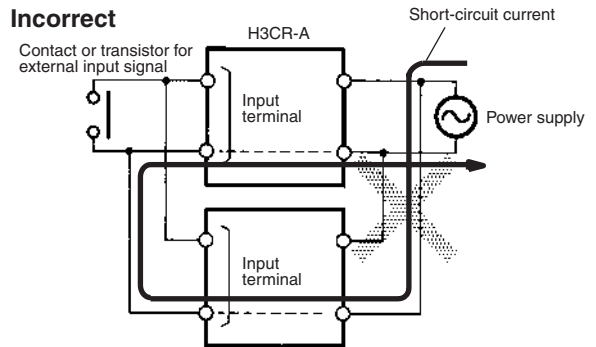


Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

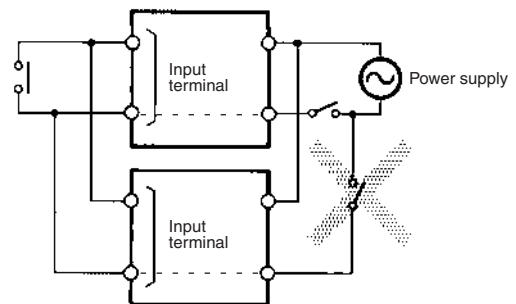
Input/Output

Relationship between Input and Power Supply Circuits (except for H3CR-A8E)

The H3CR-A (except for H3CR-A8E) uses transformerless power supply. When connecting a relay or 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 differ in phase, otherwise the terminals will be short-circuited to one another.



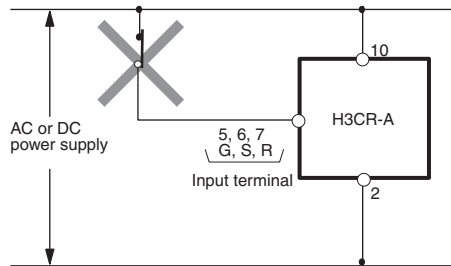
It is impossible to provide two independent power switches as shown below regardless of whether or not the Timers are different in phase.



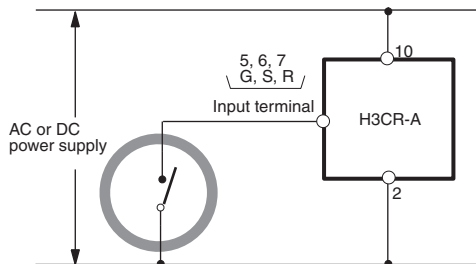
Relationship between Input and Power Supply Circuits (H3CR-A□/-A□S)

An appropriate input is applied to the input signal terminals of the H3CR-A□/-A□S when one of the input terminals is short-circuited with the common terminal (terminal 2) for the input signals. Never use terminal 10 as the common terminal for this purpose, otherwise the internal circuit of the Timer will be damaged.

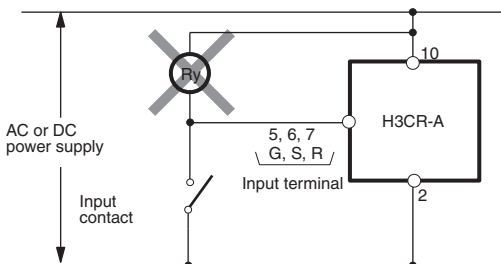
Incorrect



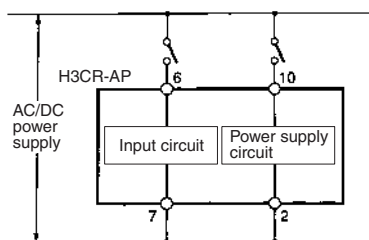
Correct



Do not connect a relay or any other load between input terminals, otherwise the internal circuit of the Timer will be damaged due to the high-tension voltage applied to the input terminals.



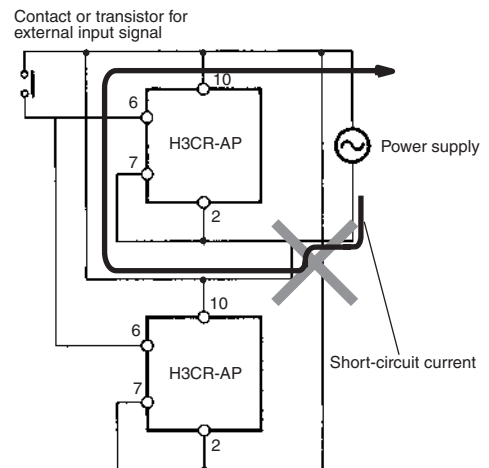
Relationship between Input and Power Supply Circuits (H3CR-AP)



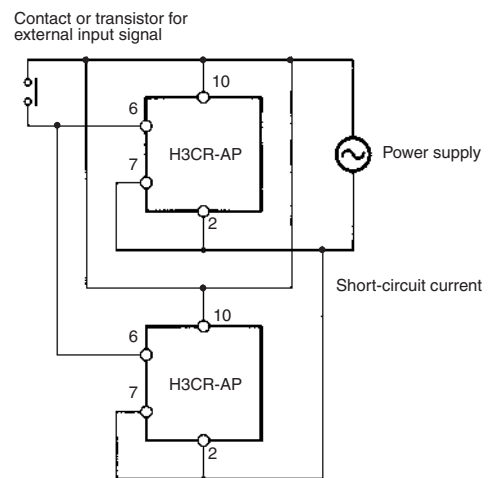
Since the input circuit and the power supply circuit are configured independently, the input circuit can be turned ON or OFF irrespective of the ON/OFF state of the power supply. It must be noted that a voltage equivalent to the power supply voltage is applied to the input circuit.

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).

Incorrect



Correct



Common to All H3CR-A Models

With the H3CR-AP, input wires must be as short as possible. If the floating capacity of wires exceeds 1,200 pF (approx. 10 m for cables with 120 pF/m), the operation will be affected. Pay particular attention when using shielded cables.

The H3CR-A□S transistor output is isolated from the internal circuitry by a photocoupler. Therefore, either NPN or PNP output is possible.

Solid-state Twin Timers H3CR-F

DIN 48 x 48-mm Twin Timers

- Wide power supply ranges of 100 to 240 VAC and 48 to 125 VDC respectively.
- ON- and OFF-times can be set independently and so combinations of long ON- or OFF-time and short OFF- or ON-time settings are possible.
- Fourteen time ranges from 0.05 s to 30 h or from 1.2 s to 300 h depending on the model to be used.
- Models with a flicker ON start or flicker OFF start are available.
- Easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Length, when panel-mounted with a Socket, of 80 mm or less.
- 11-pin and 8-pin models are available.



Model Number Structure

Model Number Legend

H3CR - -
 1 2 3 4

1. Classification

F: Twin timers

2. Configuration

None: 11-pin socket

8: 8-pin socket

3. Twin Timer Mode

None: Flicker OFF start

N: Flicker ON start

4. Time Range

None: 0.05 s to 30 h models

300: 1.2 s to 300 h models

Ordering Information

List of Models

Operating modes	Supply voltage	0.05 s to 30 h models		1.2 s to 300 h models	
		11-pin models	8-pin models	11-pin models	8-pin models
Flicker OFF start	100 to 240 VAC	H3CR-F	H3CR-F8	H3CR-F-300	H3CR-F8-300
	24 VAC/DC				
	12 VDC				
	48 to 125 VDC				
Flicker ON start	100 to 240 VAC	H3CR-FN	H3CR-F8N	H3CR-FN-300	H3CR-F8N-300
	24 VAC/DC				
	12 VDC				
	48 to 125 VDC				

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

Example: H3CR-F 24 VAC/DC

└── Supply voltage

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-73
		Y92F-74
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
Protective Cover		Y92A-48B
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (see note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (see note 1)
Hold-down Clip (see note 2)	For PL08 and PL11 Sockets	Y92H-7
	For PF085A Socket	Y92H-8

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.

2. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-F	H3CR-F8	H3CR-FN	H3CR-F8N
Operating mode	Flicker OFF start		Flicker ON start	
Pin type	11-pin	8-pin	11-pin	8-pin
Operating/Reset method	Time-limit operation/Time-limit reset or self-reset			
Output type	Relay output (DPDT)			
Mounting method	DIN track mounting, surface mounting, and flush mounting			
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.			

■ Time Ranges

0.05 s to 30 h Models

Time unit	s (sec)	x10 s (10 s)	min (min)	h (hrs)
Setting	1.2	0.05 to 1.2	1.2 to 12	0.12 to 1.2
	3	0.3 to 3	3 to 30	0.3 to 3
	12	1.2 to 12	12 to 120	1.2 to 12
	30	3 to 30	30 to 300	3 to 30

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

1.2 s to 300 h Models

Time unit	x10 s (10 s)	x10 min (10 min)	h (hrs)	x10 h (10 h)
Setting	1.2	1.2 to 12	1.2 to 12	1.2 to 12
	3	3 to 30	3 to 30	3 to 30
	12	12 to 120	12 to 120	12 to 120
	30	30 to 300	30 to 300	3 to 30

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

■ Ratings

Rated supply voltage (see note)	100 to 240 VAC (50/60 Hz), 12 VDC, 24 VAC/DC (50/60 Hz), 48 to 125 VDC
Operating voltage range	85% to 110% of rated supply voltage; 90% to 110% with 12-VDC models
Power reset	Minimum power-opening time: 0.1 s
Power consumption	100 to 240 VAC: approx. 10 VA (2.1 W) at 240 VAC 24 VAC/VDC: approx. 2 VA (1.7 W) at 24 VAC approx. 1 W at 24 VDC 48 to 125 VDC: approx. 1.5 W at 125 VDC 12 VDC: approx. 1 W at 12 VDC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load (cosφ = 1)

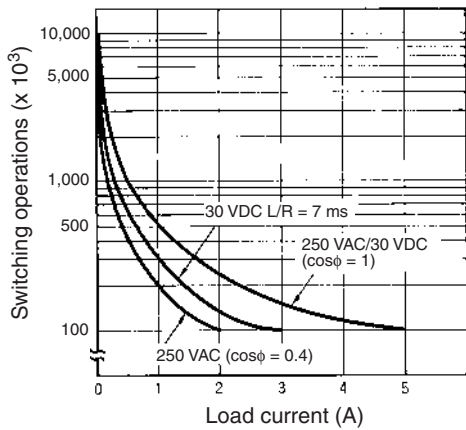
Note: A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC Model.

■ Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)
Setting error	±5% FS ±50 ms max.
Reset time	0.1 s max.
Reset voltage	10% max. of rated voltage
Influence of voltage	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)
Influence of temperature	±1% FS max. (±1% FS ±10 ms max. in ranges of 1.2 and 3s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (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 of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC, 48 to 125 VDC 1 kV for 12 VDC, 24 VAC/DC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC, 48 to 125 VDC 1.5 kV for 12 VDC, 24 VAC/DC
Noise immunity	±1.5 kV (between power terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±400 V for 12 VDC
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s ² three times each in six directions Malfunction: 98 m/s ² three times each in six directions
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%
Life expectancy	Mechanical: 20 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3:10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 100 g

Note: Refer to the *Life-test Curve*.

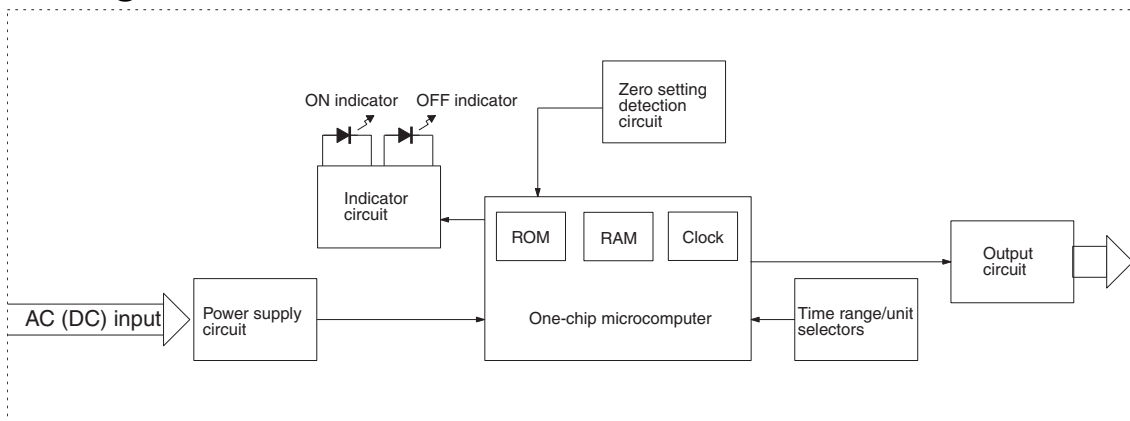
Life-test Curve



Reference: A maximum current of 0.15 A can be switched at 125 VDC ($\cos\phi = 1$) and 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 Diagrams

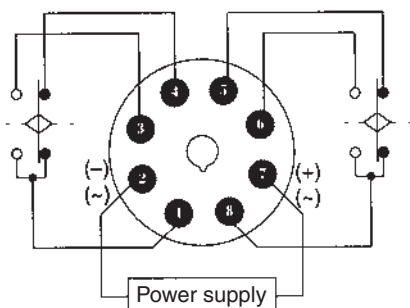


I/O Functions

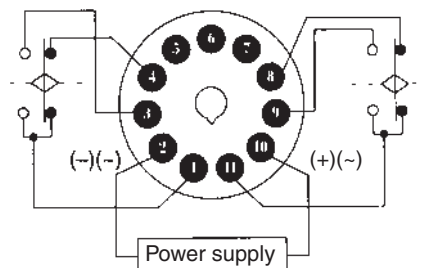
Inputs	---
Outputs	Control output Outputs are turned ON/OFF according to the time set by the ON- and OFF-time setting knob.

Terminal Arrangement

H3CR-F8
H3CR-F8
NH3CR-F8-300
H3CR-F8N-300



H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300

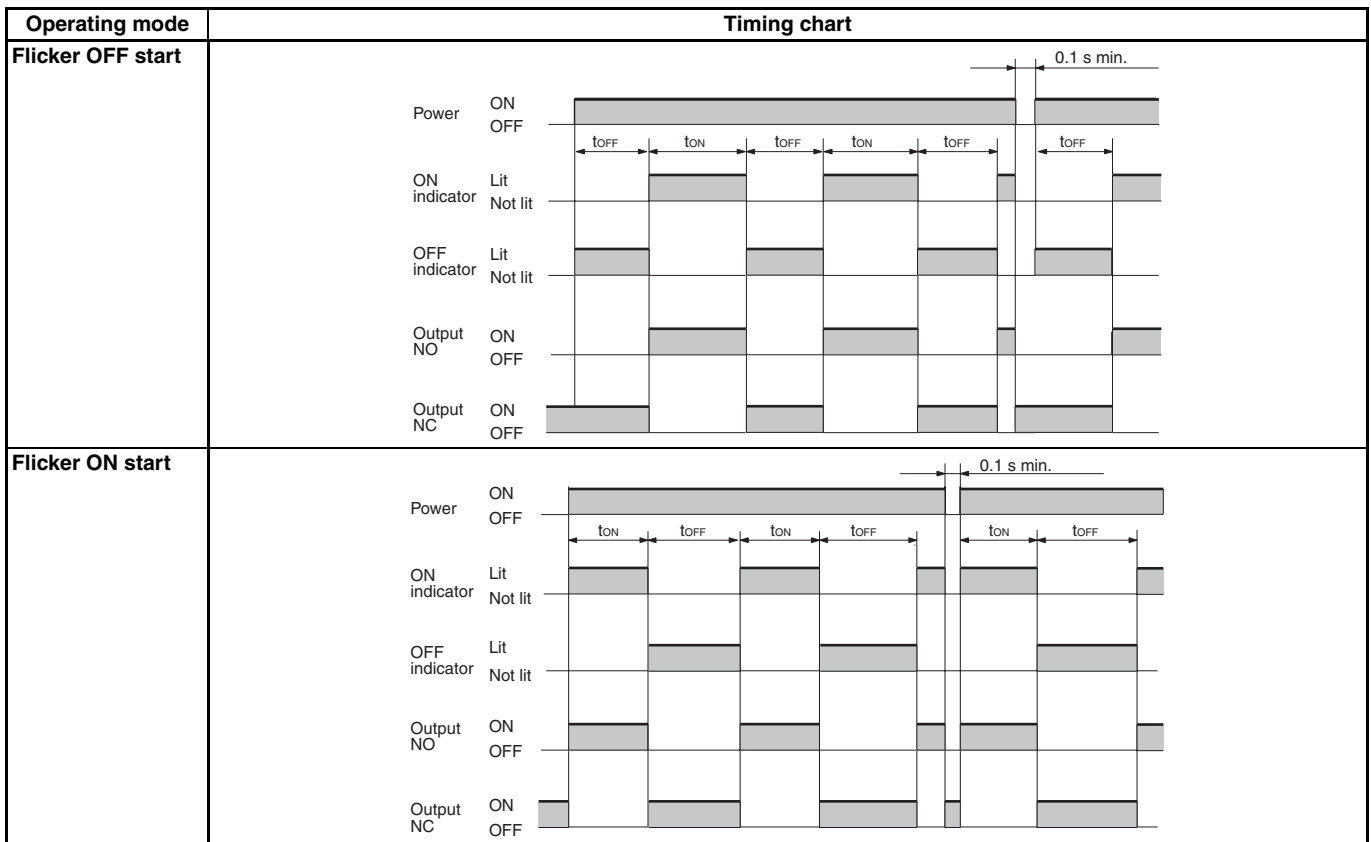


Note: Leave terminals 5, 6, and 7 open. Do not use them as relay terminals.

Operation

■ Timing Chart

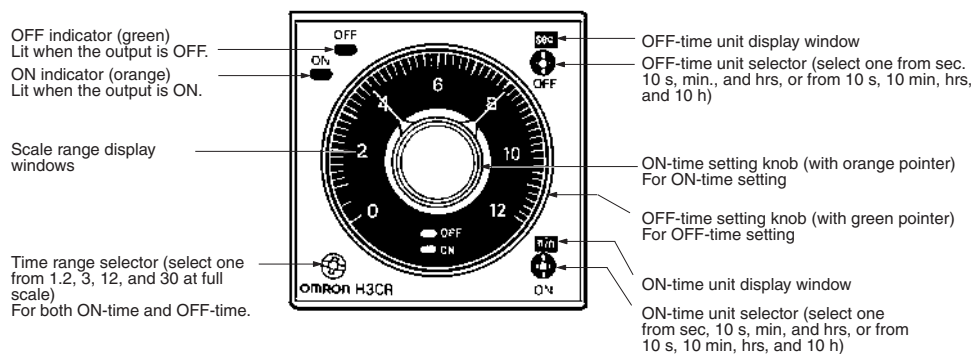
t_{ON} : ON set time
 t_{OFF} : OFF set time



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.

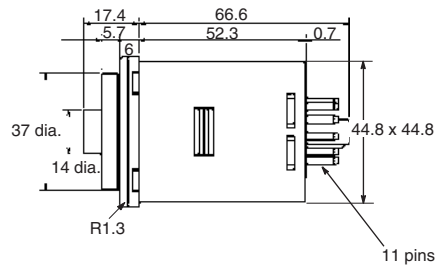
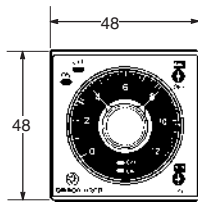
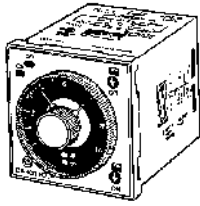
Nomenclature



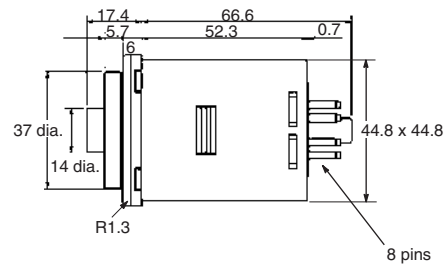
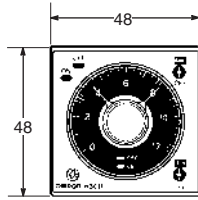
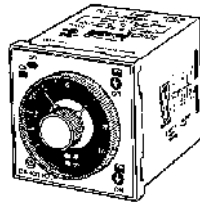
Dimensions

Note: All units are in millimeters unless otherwise indicated.

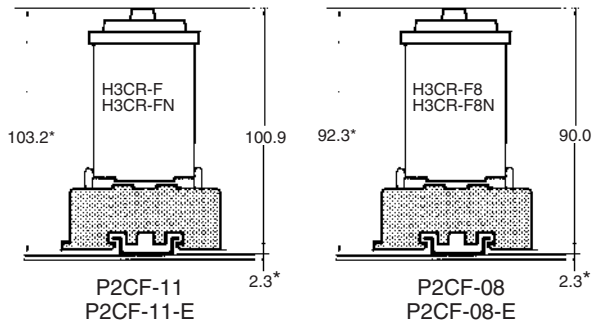
H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300



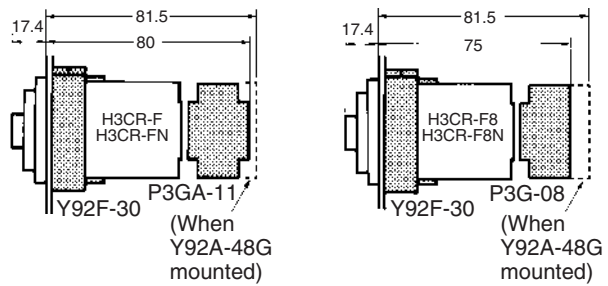
H3CR-F8
H3CR-F8N
H3CR-F8-300
H3CR-F8N-300



Dimensions with Front Connecting Socket P2CF-08-□/P2CF-11-□



Dimensions with Back Connecting Socket P3G-08/P3GA-11



*These dimensions vary with the kind of DIN track (reference value).

Solid-state Star-delta Timer H3CR-G

DIN 48 x 48-mm Star-delta Timer

- 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

H3CR -

1	2	3	4

1. Classification

G: Star-delta timer

2. Configuration

8: 8-pin socket

3. Outputs

None: Star-delta operation contact

E: Star-delta operation contact and instantaneous contact

4. Dimensions

L: Long-body model

Ordering Information

List of Models

Outputs	Supply voltage	8-pin models
Time-limit contact	100 to 120 VAC	H3CR-G8L
	200 to 240 VAC	
Time-limit contact and instantaneous contact	100 to 120 VAC	H3CR-G8EL
	200 to 240 VAC	

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

Example: H3CR-G8L 100 to 120 VAC



■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30 Y92F-70 Y92F-71
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
Protective Cover		Y92A-48B
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (see note 1)
Time Setting Ring	Setting a specific time	Y92S-27
	Limiting the setting range	Y92S-28
Panel Cover (see note 2)	Light gray (5Y7/1)	Y92P-48GL
	Black (N1.5)	Y92P-48GB
	Medium gray (5Y5/1)	Y92P-48GM
Hold-down Clip (see note 3)	For PL08 and PL11 Sockets	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 Socket.

2. The Time Setting Ring and Panel Cover are sold together.

3. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-G8L	H3CR-G8EL
Functions	Star-delta timer	Star-delta timer with instantaneous output
Pin type	8-pin	
Operating/Reset method	Time-limit operation/Self-reset	
Output type	Time-limit: SPST-NO (star operation circuit) SPST-NO (delta operation circuit)	Time-limit: SPST-NO (star operation circuit) SPST-NO (delta operation circuit) Instantaneous: SPST-NO
Mounting method	DIN track mounting, surface mounting, and flush mounting	
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.	

■ Time Ranges

Time unit	Star operation time ranges	
Full scale setting	6	0.5 to 6 s
	12	1 to 12 s
	60	5 to 60 s
	120	10 to 120 s

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

■ Ratings

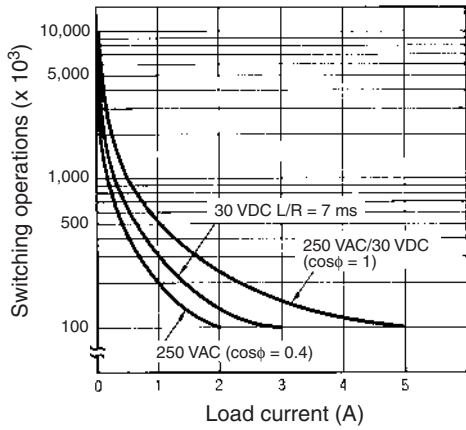
Rated supply voltage	100 to 120 VAC (50/60 Hz), 200 to 240 VAC (50/60 Hz)
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-opening time: 0.5 s
Power consumption	100 to 120 VAC: approx. 6 VA (2.6 W) at 120 VAC 200 to 240 VAC: approx. 12 VA (3.0 W) at 240 VAC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load ($\cos\phi = 1$)

■ Characteristics

Accuracy of operating time	±0.2% FS max.
Setting error	±5% FS ±50 ms max.
Accuracy of Star-delta transfer time	±25% FS + 5 ms max.
Reset voltage	10% max. of rated voltage
Influence of voltage	±0.2% FS max.
Influence of temperature	±1% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (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 of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts)
Noise immunity	±1.5 kV (between power terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s ² three times each in six directions Malfunction: 294 m/s ² three times each in six directions
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%
Life expectancy	Mechanical: 20 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3:10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	H3CR-G8L: approx. 110 g; H3CR-G8EL: approx. 130 g

Note: Refer to the *Life-test Curve*.

Life-test Curve

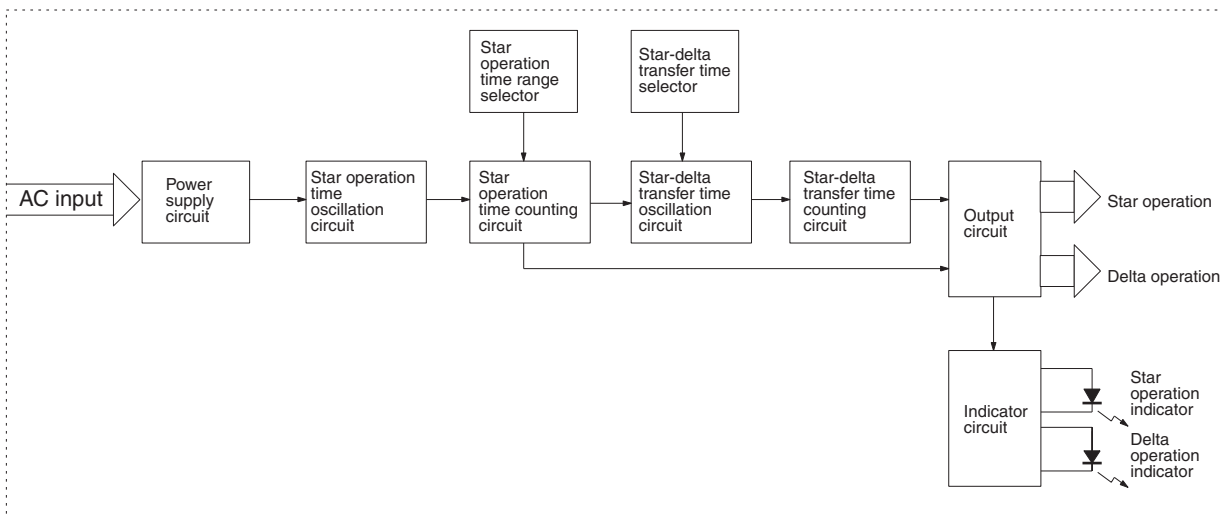


Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

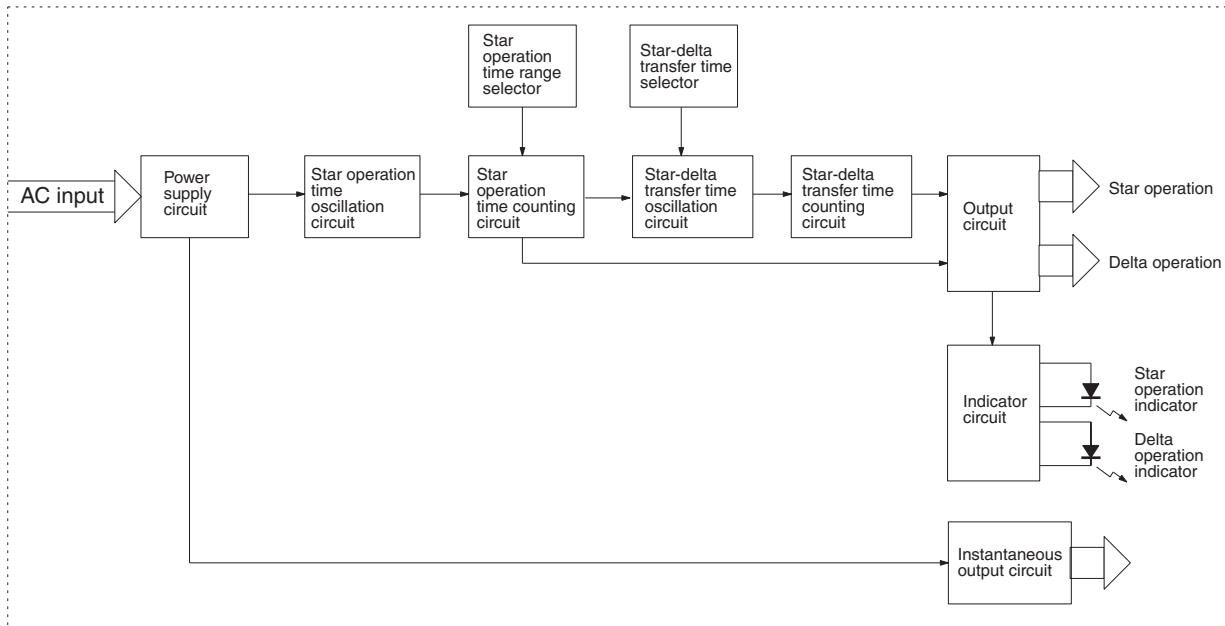
Connections

Block Diagrams

H3CR-G8L



H3CR-G8EL

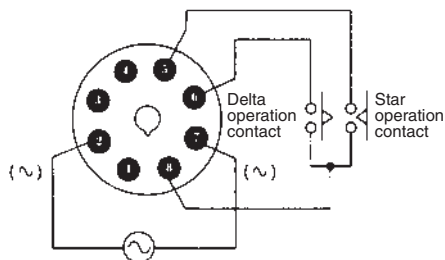


■ I/O Functions

Inputs	---
Outputs	Control output
If the time reaches the value set with the time setting knob, the star operation output will be turned OFF and there will be delta operation output after the set star-delta transfer time has elapsed.	

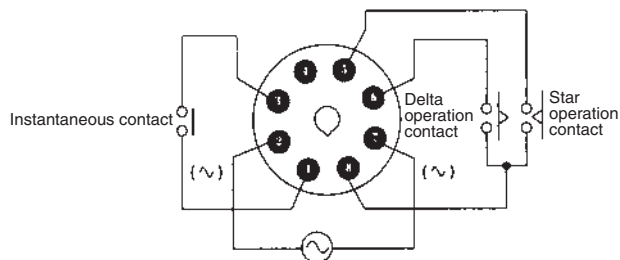
■ Terminal Arrangement

H3CR-G8L



Note: Leave terminals 1, 3, and 4 open. Do not use them as relay terminals.

H3CR-G8EL

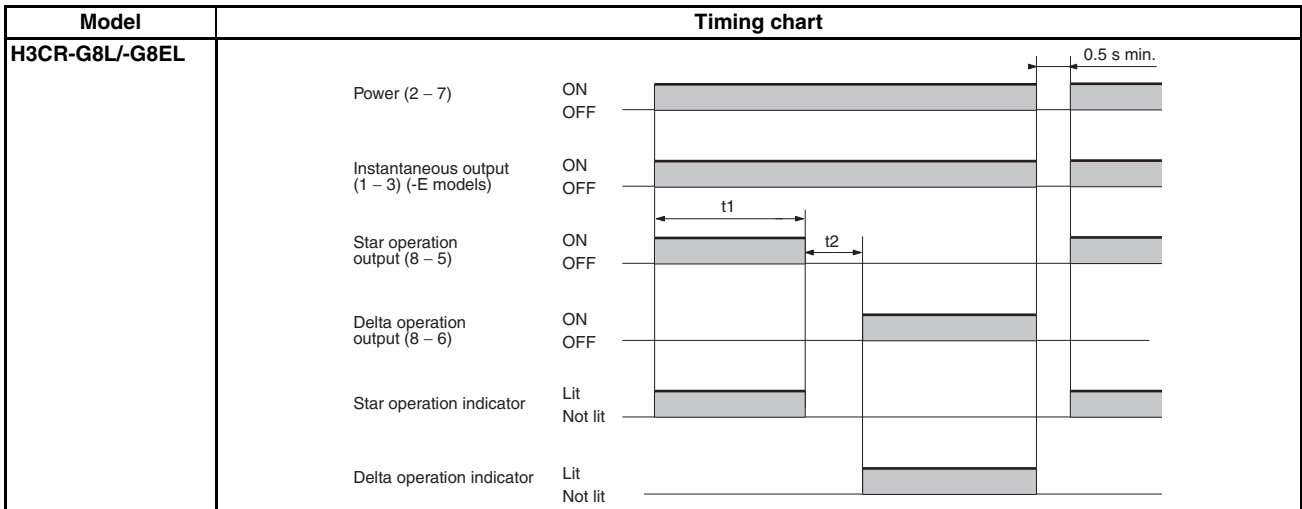


Note: Leave terminal 4 open. Do not use them as relay terminals.

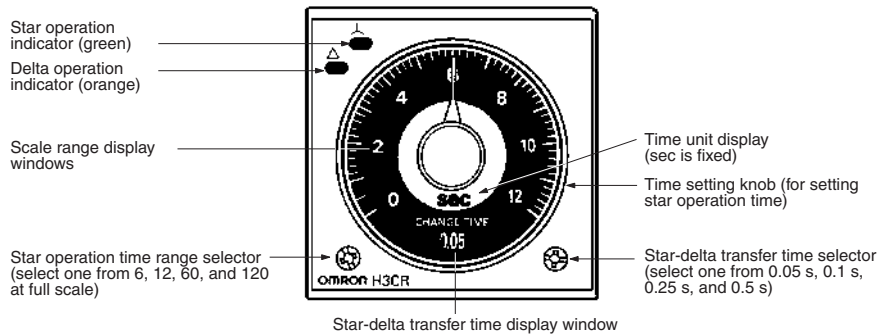
Operation

■ Timing Chart

t1: Star operation time setting
 t2: Star-delta transfer time

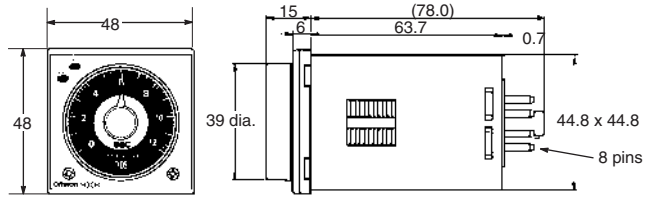
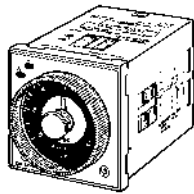


Nomenclature

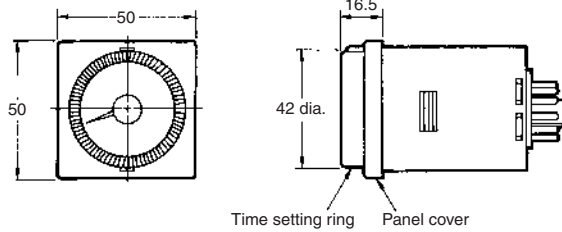
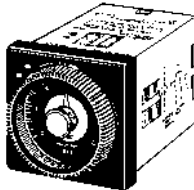


Dimensions

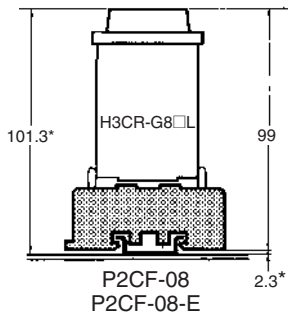
Note: All units are in millimeters unless otherwise indicated.



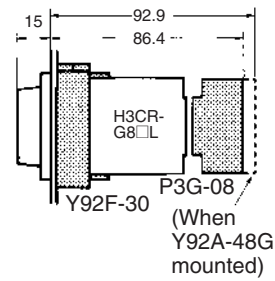
Dimensions with Set Ring



Dimensions with Front Connecting Socket P2CF-08-□



Dimensions with Back Connecting Socket P3G-08



*These dimensions vary with the kind of DIN track (reference value).

Solid-state Power OFF-delay Timer H3CR-H

DIN 48 x 48-mm Power OFF-delay Timer

- Long power OFF-delay times;
S-series: up to 12 seconds,
M-series: up to 12 minutes.
- Models with forced-reset input are available.
- 11-pin and 8-pin models are available.



Model Number Structure

Model Number Legend

H3CR -
1 2 3 4

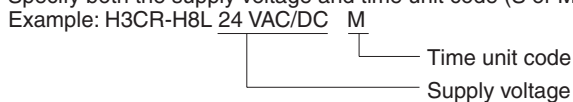
- | | |
|--------------------------|---------------------------|
| 1. Classification | 3. Input |
| H: Power OFF-delay timer | None: Without reset input |
| 2. Configuration | R: With reset input |
| None: 11-pin socket | 4. Dimensions |
| 8: 8-pin socket | L: Long-body model |

Ordering Information

List of Models

Input	Output	Supply voltage	S-series		M-series	
			11-pin models	8-pin models	11-pin models	8-pin models
---	DPDT	100 to 120 VAC	---	H3CR-H8L	---	H3CR-H8L
		200 to 240 VAC				
		24 VAC/DC				
		48 VDC				
		100 to 125 VDC				
With reset input	DPDT	100 to 120 VAC	H3CR-HRL	---	H3CR-HRL	---
		200 to 240 VAC				
		24 VAC/DC				
		48 VDC				
		100 to 125 VDC				
	SPDT	100 to 120 VAC	---	H3CR-H8RL	---	H3CR-H8RL
		200 to 240 VAC				
		24 VAC/DC				
		48 VDC				
		100 to 125 VDC				

Note: Specify both the supply voltage and time unit code (S or M) in addition to the model number when ordering.



■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-70
		Y92F-71
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
Protective Cover		Y92A-48B
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (see note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (see note 1)
Hold-down Clip (see note 2)	For PL08 and PL11 Sockets	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.

2. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-H8L	H3CR-H8RL	H3CR-H8L
Operating/Reset method	Instantaneous operation/Time-limit reset	Instantaneous operation/Time-limit reset/Forced reset	
Pin type	8-pin		11-pin
Input type	---		No-voltage
Output type	Relay output (DPDT)	Relay output (SPDT)	Relay output (DPDT)
Mounting method	DIN track mounting, surface mounting, and flush mounting		
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.		

■ Time Ranges

Time unit	S-series		M-series
	s (sec)		min (min)
Setting	0.6	0.05 to 0.6	
	1.2	0.12 to 1.2	
	6	0.6 to 6	
	12	1.2 to 12	
Min. power ON time	0.1 s min.		2 s min.
Time-up operation repeat period	3 s min.		
Forced-reset repeat period	3 s min.		

Note: 1. If the above minimum power ON time is not secured, the H3CR may not operate. Be sure to secure the above minimum power ON time.

2. Do not use the Timer with a repeat period of less than 3 s. Doing so may result in abnormal heating or burning. Refer to *Precautions (H3CR-H)* on page 150 for details.

■ Ratings

Rated supply voltage (see note 1)	100 to 120 VAC (50/60 Hz), 200 to 240 VAC (50/60 Hz), 24 VAC/VDC (50/60 Hz), 48 VDC, 100 to 125 VDC
Operating voltage range	85% to 110% of rated supply voltage
No-voltage input (see note 2)	ON-impedance: 1 kΩ max. ON residual voltage: 1 V max. OFF impedance: 500 kΩ min.
Power consumption	100 to 120 VAC: approx. 0.23 VA (0.22 W) at 120 VAC 200 to 240 VAC: approx. 0.35 VA (0.3 W) at 240 VAC 24 VAC/DC: approx. 0.17 VA (0.15 W) at 24 VAC approx. 0.1 W at 24 VDC 48 VDC: approx. 0.18 W at 48 VDC 100 to 125 VDC: approx. 0.5 W at 125 VDC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load (cosφ = 1)

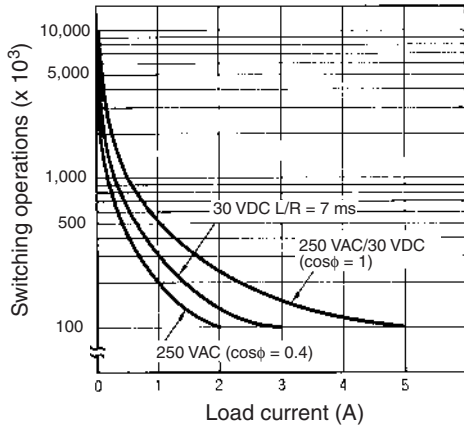
Note: 1. A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC Model.
2. For contact input, use contacts which can adequately switch 1 mA at 5 V.

■ Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Setting error	±5% FS ±50 ms max.
Operation start voltage	30% max. of rated voltage
Influence of voltage	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Influence of temperature	±1% FS max. (±1% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (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 of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) for 100 to 120 VAC, 200 to 240 VAC, 100 to 125 VDC; 1 kV for 24 VAC/DC, 48 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 120 VAC, 200 to 240 VAC, 100 to 125 VDC; 1.5 kV for 24 VAC/DC, 48 VDC
Noise immunity	±1.5 kV (between power terminals) and ±600 V (between input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise); ±1 kV (between power terminals) for 48 VDC
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s ² three times each in six directions Malfunction: 98 m/s ² three times each in six directions
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%
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) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3:10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 120 g

Note: Refer to the *Life-test Curve*.

Life-test Curve

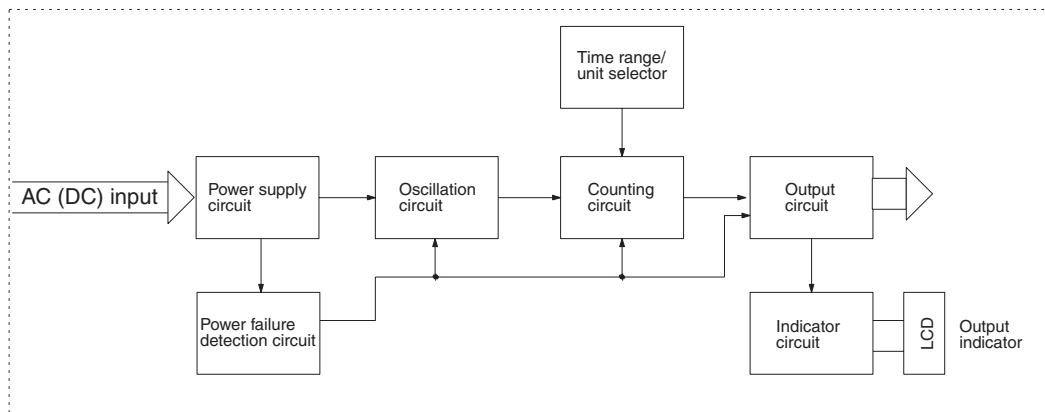


Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC for H3CR-H8L/-HRL and 100 mA at 5 VDC for H3CR-H8RL (failure level: P).

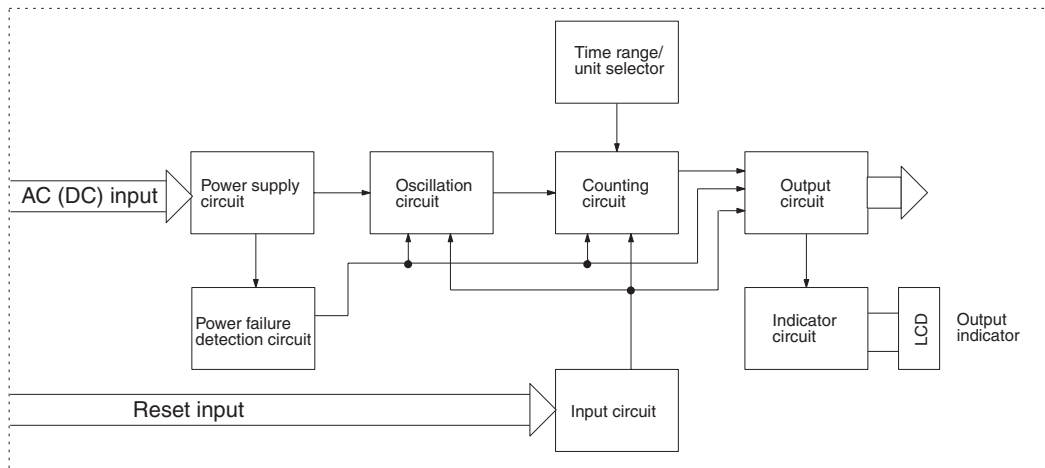
Connections

Block Diagrams

Without Reset Input (H3CR-H8L)



With Reset Input (H3CR-H8RL/-HRL)



I/O Functions

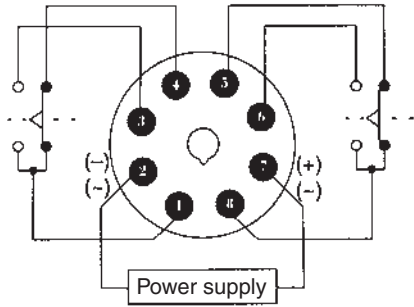
Inputs	Reset	Turns off the control output and resets the elapsed time.
Outputs	Control output	Operates instantaneously when the power is turned on and time-limit resets when the set time is up after the power is turned off.

Terminal Arrangement

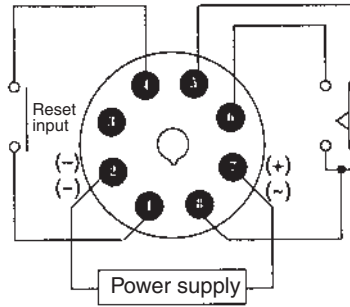
Note: DC models, including 24 VAC/DC models, have polarity.

8-pin Models

Without Reset Input (H3CR-H8L)



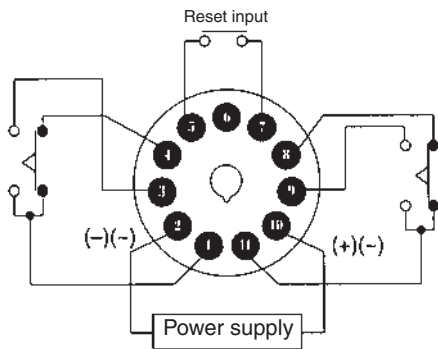
With Reset Input (H3CR-H8RL)



Note: Leave terminal 3 open. Do not use them as relay terminals.

11-pin Model

With Reset Input (H3CR-HRL)



Note: Leave terminal 6 open. Do not use them as relay terminals.

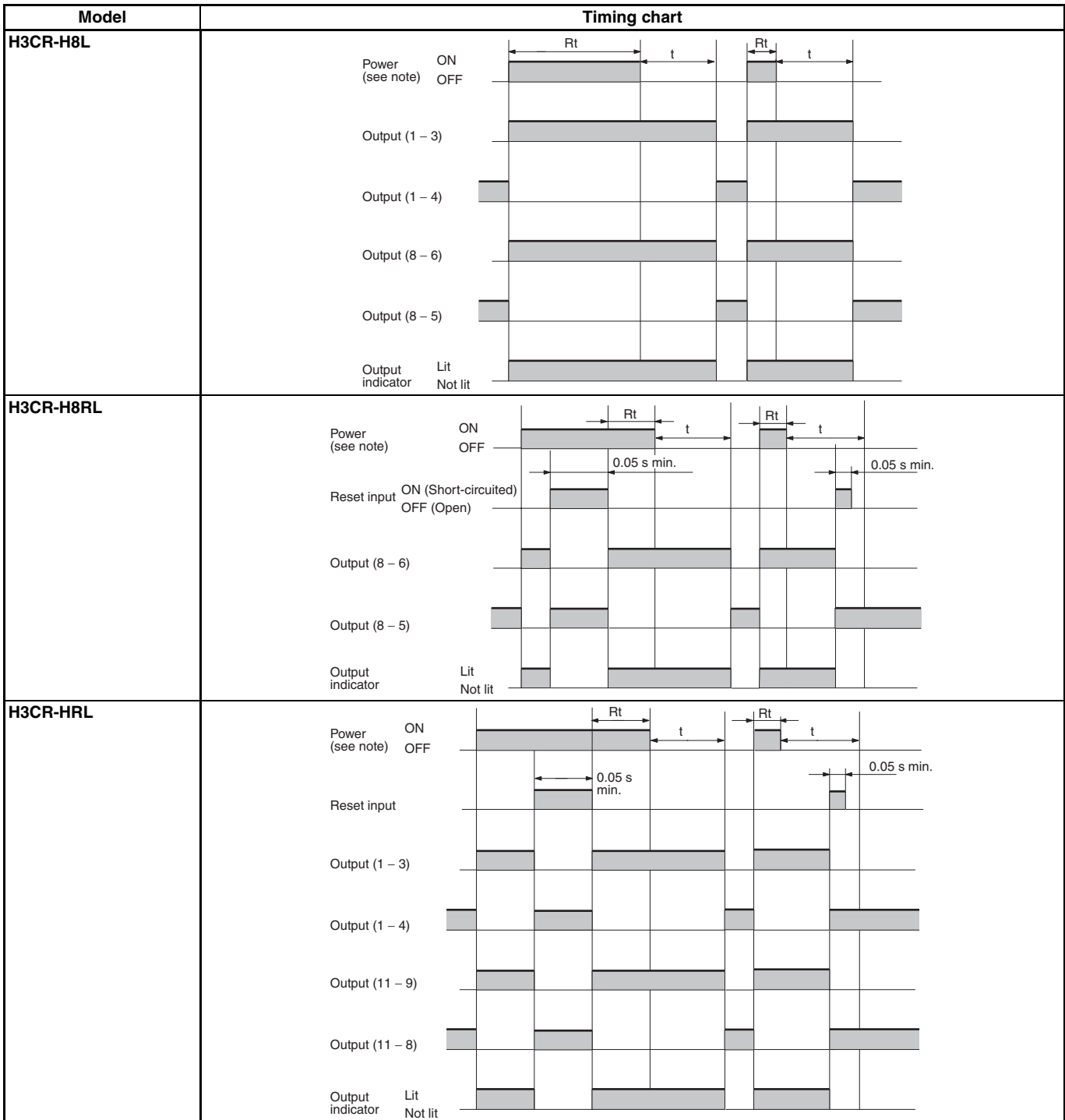
Operation

■ Timing Chart

t: Set time

Rt: Minimum power ON time (S-series: 0.1 s min.; M-series: 2 s min.)

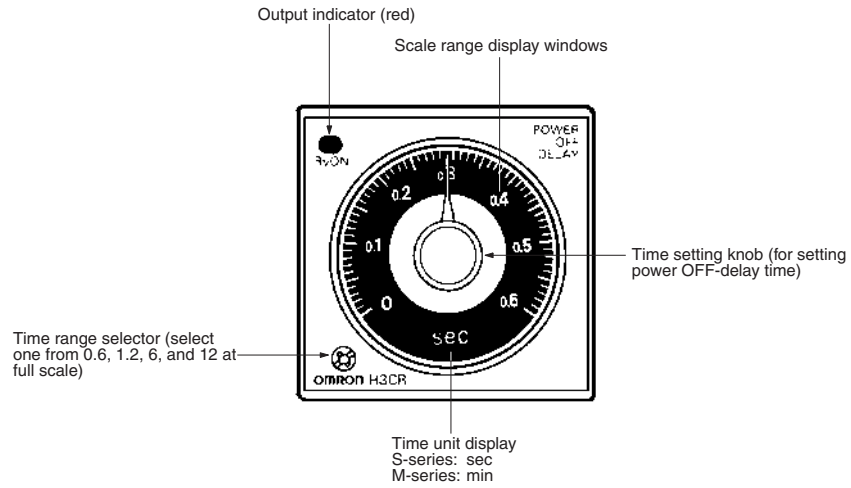
If the power ON time is less than this value, the Timer may not operate (i.e., output may not turn ON).



Note: If the power is turned ON until the set time is up, the timer will be retriggered.

Nomenclature

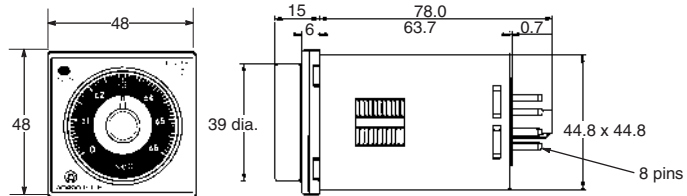
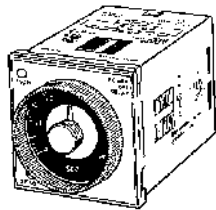
Timers



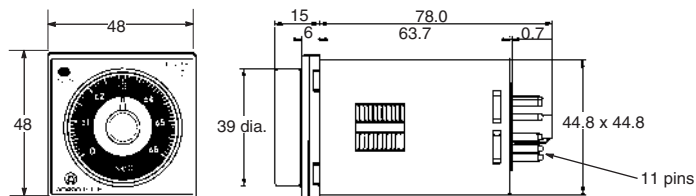
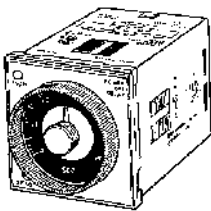
Dimensions

Note: All units are in millimeters unless otherwise indicated.

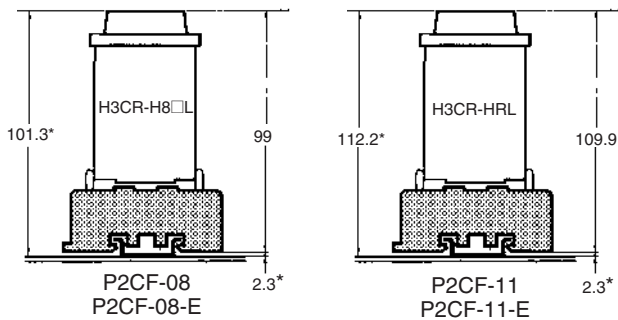
H3CR-H8L
H3CR-H8RL



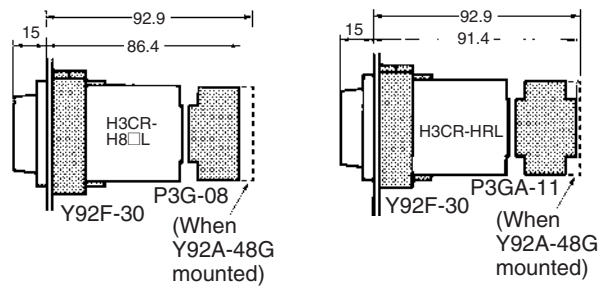
H3CR-HRL



Dimensions with Front Connecting Socket
P2CF-08-□/ P2CF-11-□



Dimensions with Back Connecting Socket
P3G-08/P3GA-11



*These dimensions vary with the kind of DIN track (reference value).

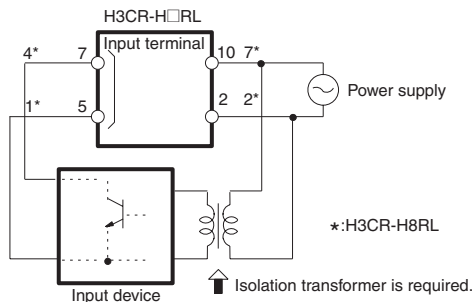
Precautions (H3CR-H)

Note: The undermentioned is common for all H3CR-H models.

■ Power Supplies

The H3CR-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.

With the H3CR-H□RL, 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.

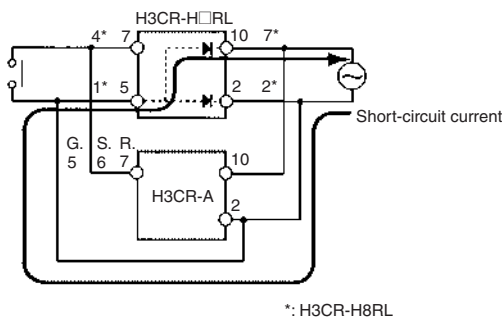


■ Input/Output (H3CR-H□RL)

An appropriate input is applied to the input signal terminal of the Timer when the input terminal for the input signal is short-circuited. Do not attempt to connect any input terminal to any terminal other than the input terminal or to apply voltage across other than the specified input terminals or the internal circuits of the Timer may be damaged.

The H3CR-H□RL uses transformerless power supply. When connecting a relay or transistor as an external signal input device, pay attention to the following points to prevent short-circuiting due to a sneak current to the transformerless power supply.

If input is made simultaneously from one input contact or a transistor to the H3CR-H and a Timer whose common input terminals are used as power terminals, such as the H3CR-A, a short-circuit current will be generated. Either input through isolated contacts, or isolate the power supply for one of the Timers.

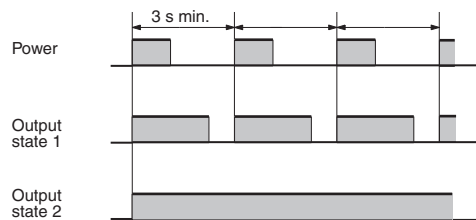


■ Wiring

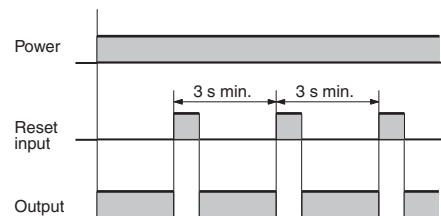
The H3CR-H has a high impedance circuit. Therefore, the H3CR-H may not be reset if the H3CR-H is influenced by inductive voltage. In order to eliminate any influence of inductive voltage, the wires connected to the H3CR-H must be as short as possible and should not be installed alongside power lines. If the H3CR-H 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 μF 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

An interval of 3 s minimum is required to turn on the H3CR-H after the H3CR-H is turned off. If the H3CR-H is turned on and off repeatedly with an interval of shorter than 3 s, abnormal heating or burning may occur in internal elements.



After the forced reset function of the H3CR-H is activated, an interval of 3 s minimum is required to activate the forced reset function again. If the forced reset function is activated repeatedly with an interval of shorter than 3 s, the internal parts of the H3CR-H may deteriorate and the H3CR-H 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 H3CR-A in mode D (signal OFF-delay).

■ Others

If the H3CR-H is dropped or experiences some other kind of shock, because a latching relay is used for output, contacts may be reversed or go into a neutral state. If the H3CR-H is dropped, reconfirm correct operation.

Operation (Common)

Note: The undermentioned is common for all H3CR models.

Basic Setting

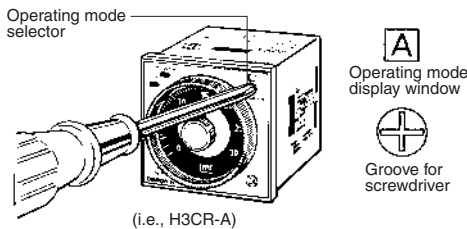
Setting of Selectors

The selectors can be turned clockwise and counterclockwise to select the desired time unit, time range, 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

• H3CR-A Multifunctional Timer

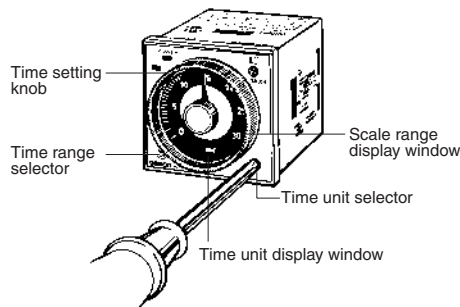
Turn the operating mode selector with a screwdriver until the desired operating mode (H3CR-A/AP/AS: A, B, B2, C, D, or E, H3CR-A8/A8S/A8E: A, B2, E or J, H3CR-A-300: G or J) appears in the display window located above the selector.



Selection of Time Unit and Time Range

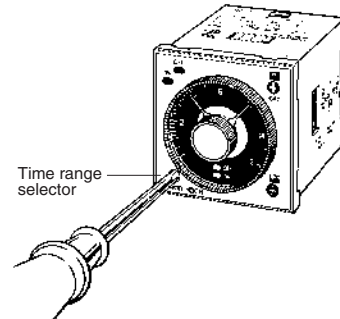
• H3CR-A Multifunctional Timer

The desired time unit (sec, min, hrs, or 10h) is displayed in the window below the time setting knob by turning the time unit selector located at the lower right corner of the front panel. A time range (1.2, 3, 12, or 30/2.4, 6, 24, or 60 for H3CR-A□-301) is selected with the time range selector at the lower left corner of the front panel, and the selected time range appears (in the window at the lower right part) within the plastic frame of the time setting knob.

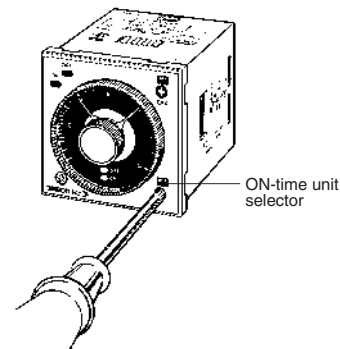


• H3CR-F Twin Timers

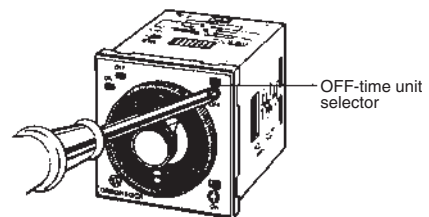
A time range (0 to 1.2, 0 to 3, 0 to 12, or 0 to 30) is selected for ON- and OFF-time using the time range selector at the lower left corner of the front panel, and the selected time range appears within the plastic frame of the time setting knob (= scale range display windows).



For ON-time, the desired time unit (sec, 10 s, min, and hrs, or 10 s, 10 min, hrs, and 10 h) is indicated in the ON-time unit display window at the lower right corner of the front panel and can be changed by turning the ON-time unit selector located below the ON-time unit display window.

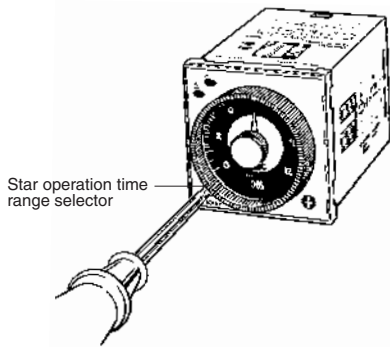


For OFF-time, the desired time unit (sec, 10 s, min, and hrs, or 10 s, 10 min, hrs, and 10 h) is indicated in the OFF-time unit display window at the upper right corner of the front panel and can be changed by turning the OFF-time unit selector located below the OFF-time unit display window.

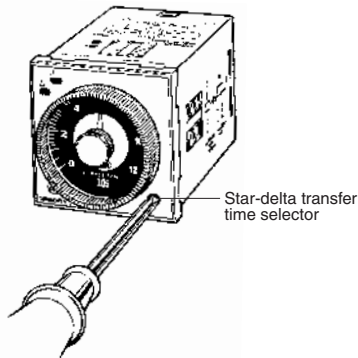


• H3CR-G Star-delta Timers

A star operation time range (0 to 6, 0 to 12, 0 to 60, or 0 to 120 seconds) is selected with the star operation time range selector at the lower left corner of the front panel.

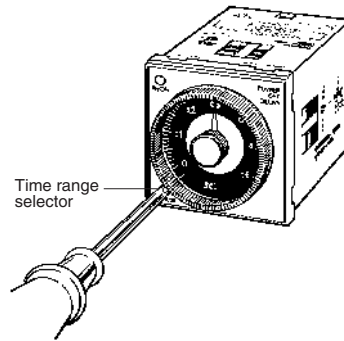


The time required for switching (0.05, 0.1, 0.25, or 0.5 second) from the star operation to the delta operation of the H3CR-G can be selected with the star-delta transfer time selector at the lower right corner of the front panel.



• H3CR-H Power OFF-delay Timers

A time range (0 to 0.6, 0 to 1.2, 0 to 6, and 0 to 12) is selected with the time range selector at the lower left corner of the front panel. No time unit selector is available. When ordering the H3CR-H, specify S (for the second unit) or M (for the minute unit) for your H3CR-H.



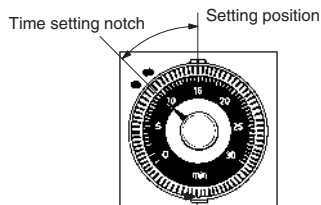
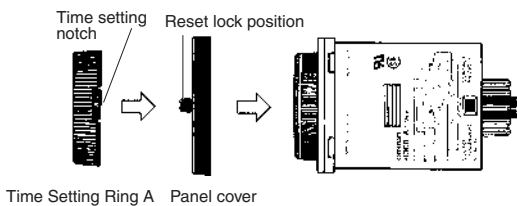
Setting of Time

Use the time setting knob to set the desired time.

■ Using the Time Setting Ring for H3CR-A/G

Setting a Specific Time

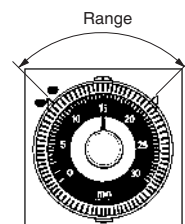
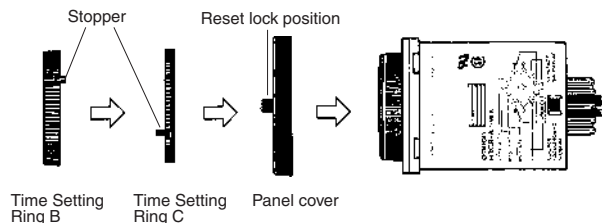
Mount the Panel Cover on the Timer, set the desired time with the time setting knob, and place Time Setting Ring A onto the time setting knob so that the time setting notch of Time Setting Ring A is in the center of the reset lock position of the Panel Cover.



Example: To set the time to 10 s.

Limiting the Setting Range

Example: To set a range of 10 and 20 s.
Mount the Panel Cover on the Timer, set the time setting knob to 10 s (the lower limit of the setting range), and place Time Setting Ring C onto the time setting knob so that the stopper of Time Setting Ring C is on the right edge of the reset lock position of the Panel cover. Next, set the time setting knob to 20 s (the upper limit of the setting range), place Time Setting Ring B onto the time setting knob so that the stopper of Time Setting Ring B is on the left edge of the reset lock position of the Panel Cover.



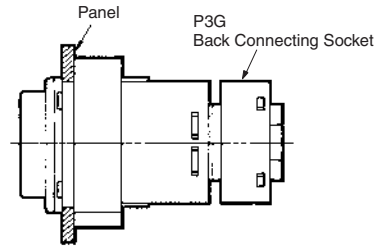
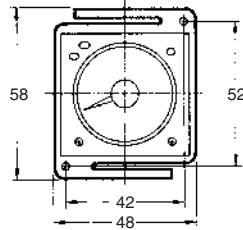
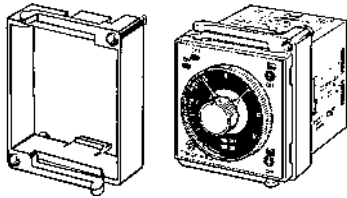
Accessories (Order Separately) (Common)

Note: The undermentioned is common for all H3CR models.

Note: All units are in millimeters unless otherwise indicated.

Flush Mounting Adaptor

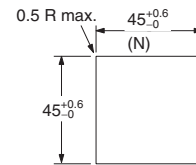
Y92F-30



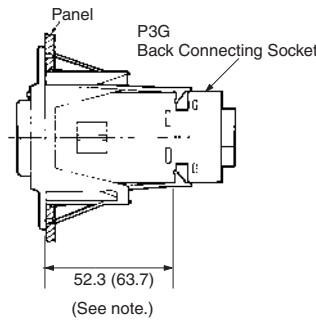
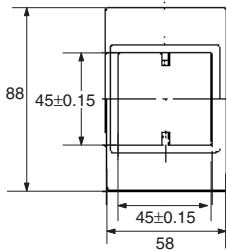
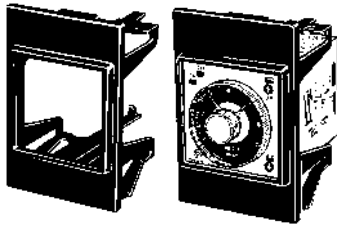
Note: The adapters for two or more timers mounted in a vertical line are different in orientation from those mounted in a horizontal line.

N can be obtained as follows (n: the number of H3CR models arranged side by side)
 Without a Cover: $N = (48n - 2.5)^{+1/-0}$
 With the Protective Cover: $N = (51n - 5.5)^{+1/-0}$
 With the Panel Cover: $N = (50n - 4.5)^{+1/-0}$

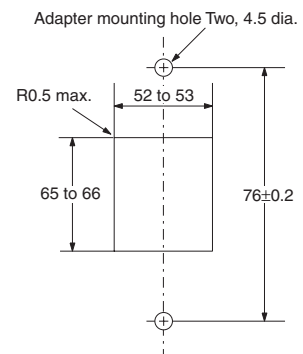
Panel Cutout



Y92F-70/73



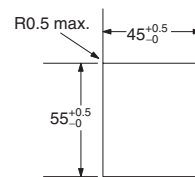
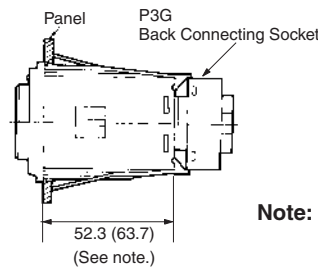
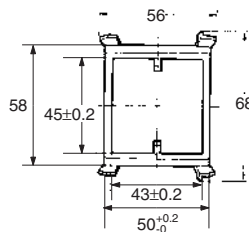
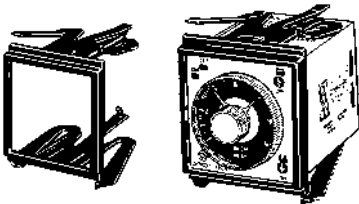
Panel Cutout



Note: The value shown in parentheses is for the Y92F-70.

Note: The mounting panel thickness should be 1 to 3.2 mm.

Y92F-71/74

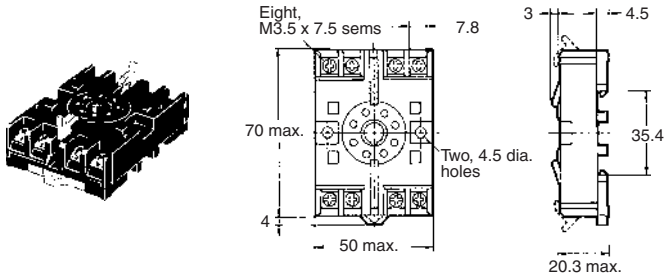


Note: The value shown in parentheses is for the Y92F-71.

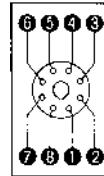
Note: The mounting panel thickness should be 1 to 3.2 mm.

Track Mounting/Front Connecting Socket

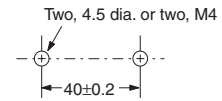
P2CF-08



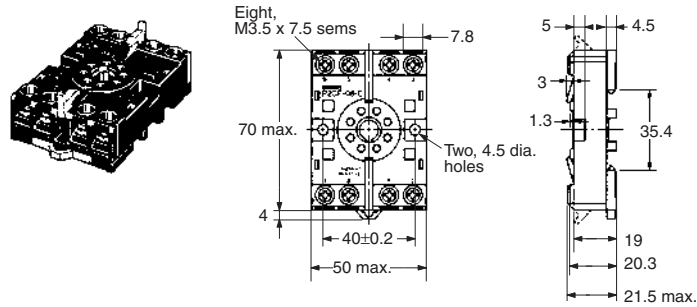
Terminal Arrangement/
Internal Connections
(Top View)



Surface Mounting Holes

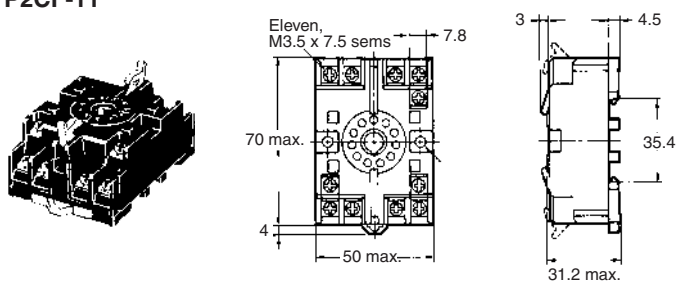


P2CF-08-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

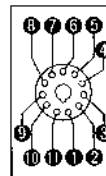


Track Mounting/Front Connecting Socket

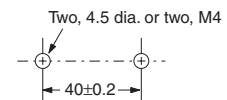
P2CF-11



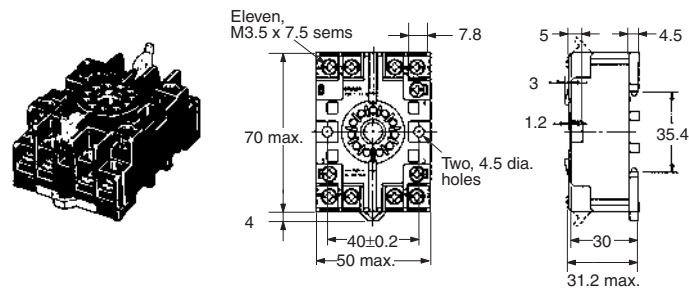
Terminal Arrangement/
Internal Connections
(Top View)



Surface Mounting Holes

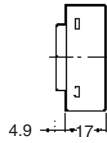
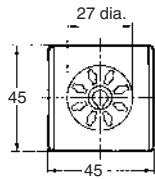
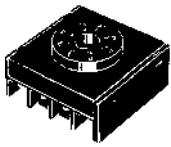


P2CF-11-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

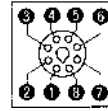


Back Connecting Socket

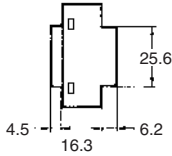
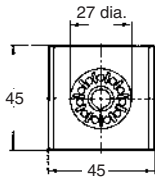
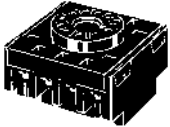
P3G-08



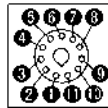
Terminal Arrangement/
Internal Connections
(Bottom View)



P3GA-11



Terminal Arrangement/
Internal Connections
(Bottom View)

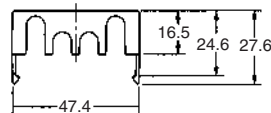
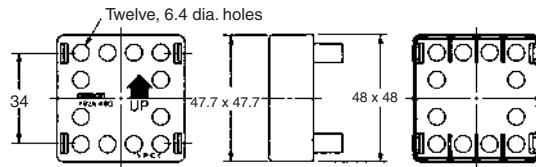
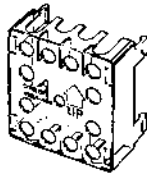


Finger Safe Terminal Cover

Conforming to VDE0106/P100

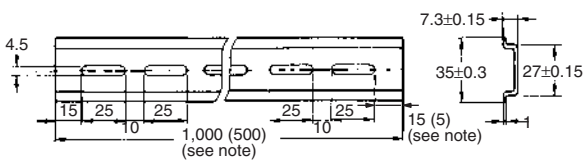
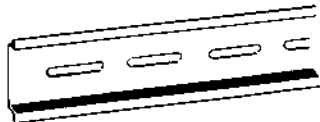
Y92A-48G

(Attachment for P3G-08/P3GA-11
Socket)

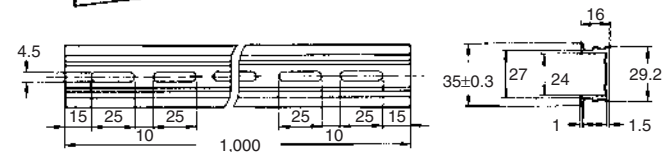


Mounting Track

PFP-100N, PFP-50N



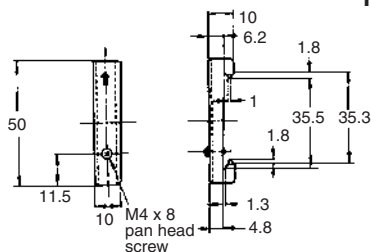
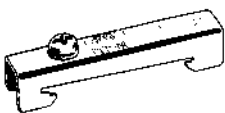
PFP-100N2



Note: The value shown in parentheses are for the PFP-50N.

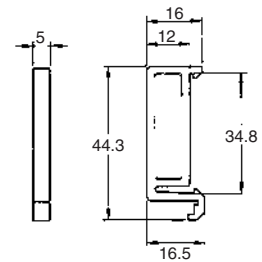
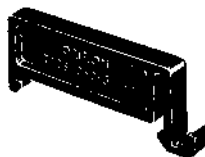
End Plate

PFP-M



Spacer

PFP-S



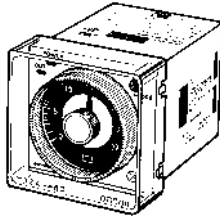
Protective Cover

Y92A-48B

The protective cover protects the front panel, particularly the time setting section, against dust, dirt, and water. It also prevents the set value from being altered due to accidental contact with the time setting knob.

- Note:** 1. The Y92A-48B Protective Cover is made of a hard plastic and therefore it must be removed to change the timer set value.
 2. The Protective Cover cannot be mounted if the Panel Cover (sold separately) is used on the Timer.

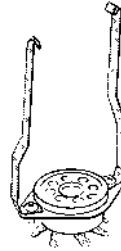
Y92A-48B



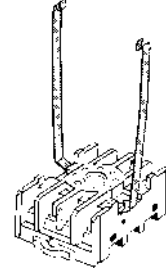
Hold-down Clip

Hold-down clips are sold in sets of two.

Y92H-7/-1
For PL08 and PL11 Sockets



Y92H-8/-2
For PF085A Socket



Time Setting Ring/Panel Cover for H3CR-A/-G

There are three types of Panel Covers (Y92P-48GL, Y92P-48GB, and Y92P-48GM), all of which are available in three colors. Use the most suitable type of Panel Cover with the design of the scaling plate according to the application.

When setting a given time for the Timer, use of the Y92S-27 or Y92S-28 Time Setting Ring facilitates the time setting operation and minimizes possible setting errors by operators.

The Y92F-73 or Y92-F-74 Flush Mounting Adapter or the Protective Cover cannot be used.

The Time Setting Ring and Panel Cover should be used as a pair.

Setting a specific time	Time Setting Ring A (Y92S-27) and Panel Cover (Y92P-48GL, -48GB, or -48GM)
Limiting the setting range	Time Setting Ring B or C (Y92S-28), and Panel Cover (Y92P-48GL, -48GB, or -48GM)

Y92S-27
Time Setting



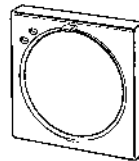
Y92S-28
Time Setting



Y92S-28
Time Setting C



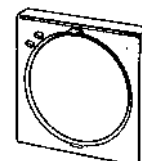
Y92P-48GL
Light Gray



Y92P-48GB
Black



Y92P-48GM
Medium Gray



Precautions (Common)

Note: The undermentioned is common for all H3CR models.

■ Changing the Setting

Do not change the time unit, time range, or operation mode while the Timer is in operation, otherwise the Timer may malfunction.

The time unit and time range can be set with the respective selectors turned clockwise or counterclockwise.

The selectors are of notched so that they will snap when they are properly set. Do not set the selectors midway between notches, otherwise the Timer may break or malfunction.

Do not use H3CR-A models (except for H3CR-A□S) in flicker mode, or H3CR-F models at the lowest selector setting. Doing so may result in damage to contacts.

■ Power Supplies

Pay the utmost attention not to make mistakes in polarity when wiring the Timer.

The H3CR Series uses a transformerless power supply. Do not touch the input terminals while the supply voltage is applied, otherwise an electric shock may be received.

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.

An AC power supply can be connected to the power input terminals without regard to polarity. A DC power supply must be connected to the power input terminals as designated according to the polarity of the terminals.

Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

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

Be aware that the operating voltage will rise by 5% if the rated voltage is applied to the Timer continuously while the ambient temperature is close to the maximum permissible ambient temperature.

The power supply circuit of any H3CR-A model (except for H3CR-A□S), H3CR-F 100-to-240-VAC model, and H3CR-G model is a switching circuit. If the power line connected to the power supply circuit has a transformer with high inductance, a counter-electromotive voltage will be induced by the inductance. To suppress the voltage, apply a CR filter to the power supply line.

■ Operating Environment

Do not use the Timer in the following locations.

- Locations with radical temperature changes.
- Locations with high humidity that may result in condensation.
- Locations with excessive vibration or shock.
- Locations with corrosive gas or dust.
- Locations where the Timer is exposed to sprayed water, oil, or chemicals.

Organic solvents (such as paint thinner) as well as strong acid or alkali solutions will damage the outer casing of the Timer.

If the Timer is used in an area with excessive electronic noise, be sure to separate the Timer, wires, and input device as far as possible from the noise sources. Furthermore, it is recommended that the input signal wiring be shielded to prevent electronic interference.

Using a surge absorber is recommended if surge voltages occur.

■ Precautions for EN61812-1 Conformance

The H3CR Series as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied.

Make sure that no voltage is applied to any terminals before dismounting the Timer from the Socket.

The output section of the H3CR is provided only with basic isolation.

The H3CR itself is designed under the following conditions:

- Overvoltage category III
- Pollution degree 2
- Isolation
 - Operation parts: Reinforced isolation
 - With clearance of 5.5 mm and creepage distance of 5.5 mm at 230 VAC
 - Output: Basic isolation (see note)
 - With clearance of 3 mm and creepage distance of 3 mm at 230 VAC

Note: The 11-pin model ensures basic isolation by itself and also ensures basic isolation with the 11-pin model mounted to the OMRON P2CF-11-□ or P3GA-11 Socket.

Connect the two output contacts different in polarity to the loads so that they will be the same in potential.

■ Others

If the Timer is mounted to a control board, dismount the Timer from the control board or short-circuit the control board circuitry before carrying out a voltage withstand test between the electric circuitry and non-charged metal part of the Timer. This protects the internal circuitry of the Timer from damage.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. L084-E1-05

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

Multifunction Digital Timer H5CX

- Highly visible display with backlit negative transmissive LCD.
- Programmable PV color to visually alert when output status changes (screw terminal block models).
- Intuitive setting enabled using DIP switch (H5CX-A/-A11 models) and ergonomic up/down digit keys.
- Twin timer in one body to meet a broader range of cyclic control application requirements as well as ON/OFF duty adjustable flicker mode.
- PNP/NPN switchable DC-voltage input (H5CX-A/-A11 models).
- Finger-safe terminals (screw terminal block models).
- Meet a variety of mounting requirements:
Screw terminal block models, and pin-style terminal models.
- NEMA4/IP66 compliance.
- Six-language instruction manual.



Contents

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Operation in Timer/Twin Timer Selection Mode	B-189
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Model Number Structure

Model Number Legend:

H5CX-□□□□□
1 2 3 4 5

1. Type classifier

A: Standard type

L: Economy type

2. External connection

None: Screw terminals

8: 8-pin socket

11: 11-pin socket

3. Output type

None: Contact output

S: Transistor output

4. Supply voltage

None: 100 to 240 VAC 50/60 Hz

D: 12 to 24 VDC/24 VAC 50/60 Hz

5. Case color

None: Black

G: Light gray (Munsell 5Y7/1): Produced upon request.

Ordering Information

List of Models

Output type	Supply voltage	Models		
		Standard type		Economy type
		Screw terminals	11-pin socket	8-pin socket
Contact output	100 to 240 VAC	H5CX-A	H5CX-A11	H5CX-L8
	12 to 24 VDC/24 VAC	H5CX-AD	H5CX-A11D	H5CX-L8D
Transistor output	100 to 240 VAC	H5CX-AS	H5CX-A11S	H5CX-L8S
	12 to 24 VDC/24 VAC	H5CX-ASD	H5CX-A11SD	H5CX-L8SD

Note: The power supply and input circuits for the H5CX-A11/A11S have basic insulation. Other models are not insulated.

Accessories (Order Separately)

Name	Models	
Flush Mounting Adapter (See note 1.)	Y92F-30	
Waterproof Packing (See note 1.)	Y92S-29	
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger-safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger-safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger-safe type	P3G-08 with Y92A-48G (See note 2.)
	11-pin	P3GA-11
	11-pin, finger-safe type	P3GA-11 with Y92A-48G (See note 2.)
Hard Cover	Y92A-48	
Soft Cover	Y92A-48F1	
Mounting Track	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate	PFP-M	
Spacer	PFP-S	

Note 1. Supplied with H5CX-A□ models (except for H5CX-A11□ and H5CX-L8□ models).

2. Y92A-48G is a finger-safe terminal cover attached to the P3G-08 or P3GA-11 Socket.

Specifications

■ Ratings

Item	H5CX-A□	H5CX-A11□	H5CX-L8□
Classification	Digital timer		
Rated supply voltage	100 to 240 VAC (50/60 Hz), 24 VAC (50/60 Hz)/12 to 24 VDC (permissible ripple: 20% (p-p) max.)		
Operating voltage range	85% to 110% rated supply voltage (12 to 24 VDC: 90% to 110%)		
Power consumption	Approx. 6.2 VA at 264 VAC Approx. 5.1 VA at 26.4 VAC Approx. 2.4 W at 12 VDC		
Mounting method	Flush mounting	Flush mounting, surface mounting, DIN track mounting	
External connections	Screw terminals	11-pin socket	8-pin socket
Terminal screw tightening torque	0.5 N·m max.	---	
Display	7-segment, negative transmissive LCD; Present value: 11.5-mm-high characters, red or green (programmable) Set value: 6-mm-high characters, green	7-segment, negative transmissive LCD Present value: 11.5-mm-high characters, red Set value: 6-mm-high characters, green	
Digits	4 digits		
Time ranges	9.999 s (0.001-s unit), 99.99 s (0.01-s unit), 999.9 s (0.1-s unit), 9999 s (1-s unit), 99 min 59 s (1-s unit) 999.9 min (0.1-min unit), 9999 min (1-min unit), 99 h 59 min (1-min unit), 999.9 h (0.1-h unit), 9999 h (1-h unit)		
Timer mode	Elapsed time (Up), remaining time (Down) (selectable)		
Input signals	Start, gate, reset		Start, reset
Input method	No-voltage input/voltage input (switchable) <u>No-voltage Input</u> ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA when 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min. <u>Voltage Input</u> High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input resistance: approx. 4.7 kΩ)		<u>No-voltage Input</u> ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA when 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min.
Start, reset, gate	Minimum input signal width: 1 or 20 ms (selectable, same for all input)		
Power reset	Minimum power-opening time: 0.5 s (except for A-3, b-1, and F mode)		
Reset system	Power resets (except for A-3, b-1, and F modes), external and manual reset		
Sensor waiting time	250 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.)		
Output modes	A, A-1, A-2, A-3, b, b-1, d, E, F, Z, ton or toff		
One-shot output time	0.01 to 99.99 s		
Control output	SPDT contact output: 5 A at 250 VAC/30 VDC, resistive load (cosφ=1) Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) Transistor output: NPN open collector, 100 mA at 30 VDC max. residual voltage: 1.5 VDC max. (Approx. 1 V) Output category according to EN60947-5-1 for Timers with Contact Outputs (AC-15; 250 V 3 A/AC-13; 250 V 5 A/DC-13; 30 V 0.5 A) Output category according to EN60947-5-2 for Timers with Transistor Outputs (DC-13; 30 V 100 mA) NEMA B300 Pilot Duty, 1/4 HP 5-A resistive load at 120 VAC, 1/3 HP 5-A resistive load at 240 VAC		
Key protection	Yes		
Memory backup	EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min.		
Ambient temperature	Operating: -10 to 55°C (-10 to 50°C if timers are mounted side by side) (with no icing or condensation) Storage: -25 to 65°C (with no icing or condensation)		
Ambient humidity	25% to 85%		
Case color	Black (N1.5)		
Attachments	Waterproof packing, flush mounting adapter, label for DIP switch settings	Label for DIP switch settings	None

■ Characteristics

Item	H5CX-A□/-A11□/-L8□
Accuracy of operating time and setting error (including temperature and voltage influences) (See note 1.)	Power-ON start: $\pm 0.01\% \pm 50$ ms max. Rated against set value Signal start: $\pm 0.005 \pm 30$ ms max. Rated against set value Signal start for transistor output model: $\pm 0.005\% \pm 3$ ms max. (See note 2.) If the set value is within the sensor waiting time at startup the control output of the H5CX will not turn ON until the sensor waiting time passes.
Insulation resistance	100 M Ω min. (at 500 VDC) between current-carrying terminal and exposed non-current-carrying metal parts, and between non-continuous contacts
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between current-carrying terminals and non-current-carrying metal parts 1,000 VAC (for H5CX-□SD), 50/60 Hz for 1 min between control output, power supply, and input circuit (2,000 VAC for models other than H5CX-□SD) 1,000 VAC, 50/60 Hz for 1 min between non-continuous contacts
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC, 1 kV for 24 VAC/12 to 24 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC 1.5 kV for 24 VAC/12 to 24 VDC
Noise immunity	± 1.5 kV (between power terminals) and ± 600 V (between input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 ms, 1-ns rise)
Static immunity	Destruction: 15 kV Malfunction: 8 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude each in three directions, four cycles each (8 min per cycle) Malfunction: 10 to 55 Hz with 0.35-mm single amplitude each in three directions, four cycles each (8 min per cycle)
Shock resistance	Destruction: 294 m/s ² each in three directions Malfunction: 98 m/s ² each in three directions
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load) See <i>Life-test Curve</i> on page 163.
Approved safety standards (See note 3.)	UL508/Recognition (H5CX-L8□: Listing only with OMRON's P2CF-08□ or P3G-08 socket), CSA C22.2 No. 14, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection).
EMC	(EMI) Emission Enclosure: EN61326 Emission AC mains: EN55011 Group 1 class A (EMS) Immunity ESD: EN61326 EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ± 5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 1 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 1 kV line to lines (power and output lines) (level 3); 2 kV line to ground (power and output lines) (level 3) Immunity Voltage Dip/Interruption EN61000-4-11: 0.5 cycle, 100% (rated voltage)
Degree of protection	Panel surface: IP66 and NEMA Type 4 (indoors) (See note 4.)
Weight	H5CX-A□: Approx. 135 g, H5CX-A11□/-L8□: Approx. 105 g

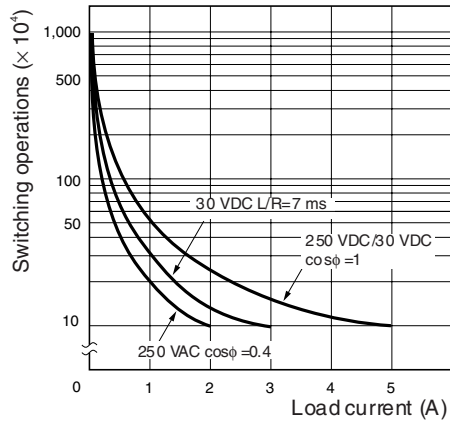
Note 1. The values are based on the set value.

2. The value is applied for a minimum pulse width of 1 ms.

3. To meet UL listing requirements with the H5CX-L8□, an OMRON P2CF-08-□ or P3G-08 Socket must be mounted on the Timer.

4. A waterproof packing is necessary to ensure IP66 waterproofing between the H5CX and installation panel.

Life-test Curve (Reference Values)



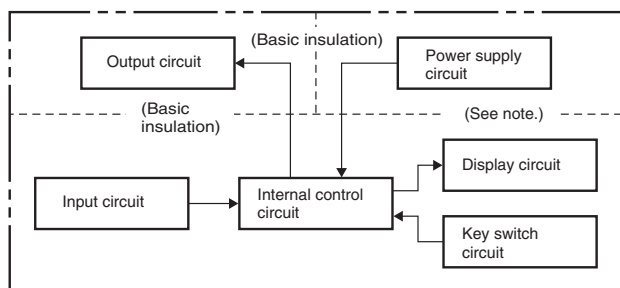
Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Inrush Current (Reference Values)

Voltage	Applied voltage	Inrush current (peak value)	Time
100 to 240 VAC	264 VAC	5.3 A	0.4 ms
24 VAC/ 12 to 24 VDC	26.4 VAC	6.4 A	1.4 ms
	26.4 VDC	4.4 A	1.7 ms

Connections

■ Block Diagram



Note: Power circuit is not insulated from the input circuit, except for H5CX-A11/-A11S, which have basic insulation.

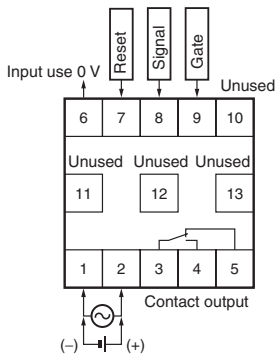
■ I/O Functions

Inputs	Start signal	Stops timing in A-2 and A-3 (power ON delay) modes. Starts timing in other modes.
	Reset	Resets present value. (In elapsed time mode, the present value returns to 0; in remaining time mode, the present value returns to the set value.) Count inputs are not accepted and control output turns OFF while reset input is ON. Reset indicator is lit while reset input is ON.
	Gate	Inhibits timer operation.
Outputs	Control output (OUT)	Outputs take place according to designated operating mode when timer reaches corresponding set value.

Terminal Arrangement

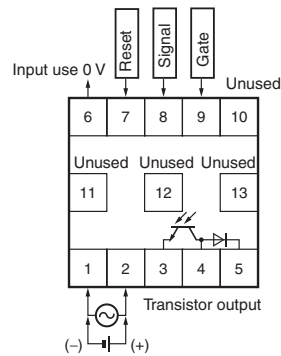
Confirm that the power supply meets specifications before use.
Recommended 24VDC power supply; eg. OMRON S8VS

H5CX-A/-AD



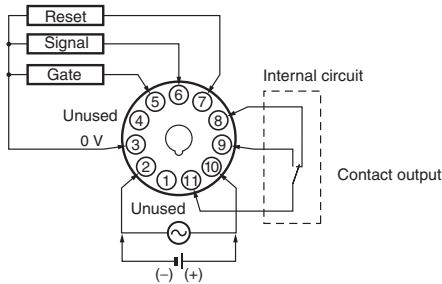
The power supply and input circuit are not insulated.
Terminals 1 and 6 of the H5CX-AD are connected internally.

H5CX-AS/-ASD



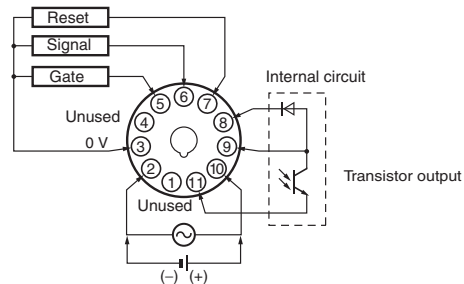
The power supply and input circuit are not insulated.
Terminals 1 and 6 of the H5CX-ASD are connected internally.

H5CX-A11/-A11D



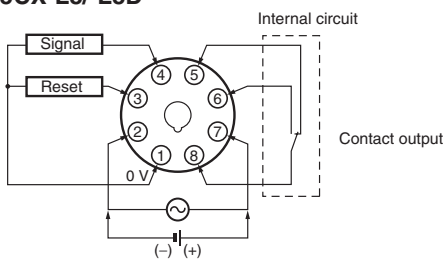
The power supply and input circuit of the H5CX-A11 have basic insulation.
The power supply and input circuit of the H5CX-A11D are not insulated.
Terminals 2 and 3 of the H5CX-A11D are connected internally.

H5CX-A11S/-A11SD



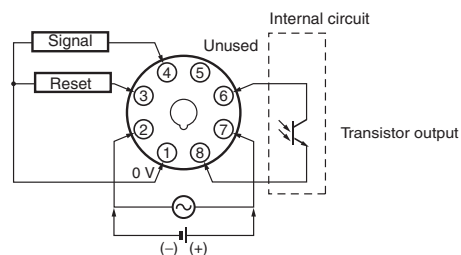
The power supply and input circuit of the H5CX-A11S have basic insulation.
The power supply and input circuit of the H5CX-A11SD are not insulated.
Terminals 2 and 3 of the H5CX-A11SD are connected internally.

H5CX-L8/-L8D



The power supply and input circuit are not insulated.
Terminals 1 and 2 of the H5CX-L8D are connected internally.

H5CX-L8S/-L8SD

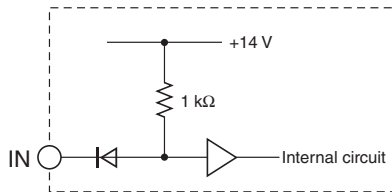


The power supply and input circuit are not insulated.
Terminals 1 and 2 of the H5CX-L8SD are connected internally.

Note: Do not connect unused terminals as relay terminals.

Input Circuits

Start, Reset, and Gate Input



Input Connections

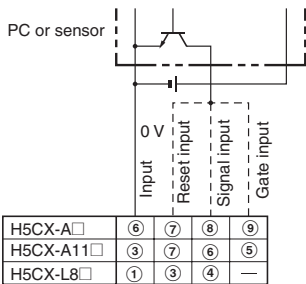
The inputs of the H5CX-A□/-A11□ are no-voltage (short-circuit or open) inputs or voltage inputs.

The input of the H5CX-L8□ is no-voltage input only.

No-voltage Inputs (NPN Inputs)

Open Collector

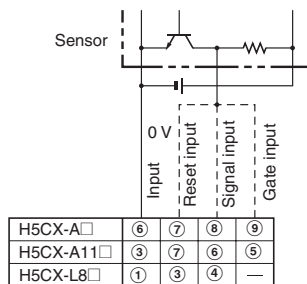
(Connection to NPN open collector output sensor)



Operate with transistor ON

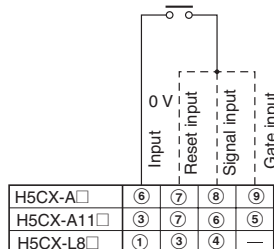
Voltage Output

(Connection to a voltage output sensor)



Operate with transistor ON

Contact Input

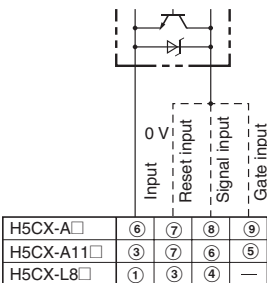


Operate with relay ON

No-voltage Input Signal Levels

No-contact input	Short-circuit level Transistor ON Residual voltage: 3 V max. Impedance when ON: 1 kΩ max. (the leakage current is 5 to 20 mA when the impedance is 0 Ω)
	Open level Transistor OFF Impedance when OFF: 100 kΩ min.
Contact input	Use contact which can adequately switch 5 mA at 10 V Maximum applicable voltage: 30 VDC max.

DC Two-wire Sensor



Operate with transistor ON

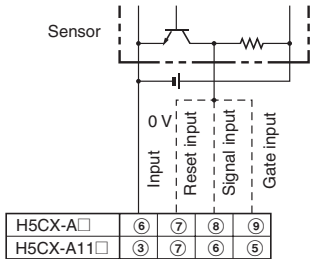
Applicable Two-wire Sensor

Leakage current: 1.5 mA max.
Switching capacity: 5 mA min.
Residual voltage: 3 VDC max.
Operating voltage: 10 VDC

Voltage Inputs (PNP Inputs)

No-contact Input (NPN Transistor)

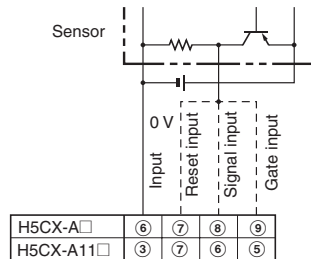
(Connection to NPN open collector output sensor)



Operate with transistor OFF

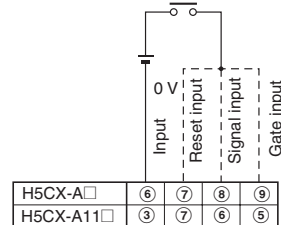
No-contact Input (PNP Transistor)

(Connection to PNP open collector output sensor)



Operate with transistor ON

Contact Input



Operate with relay ON

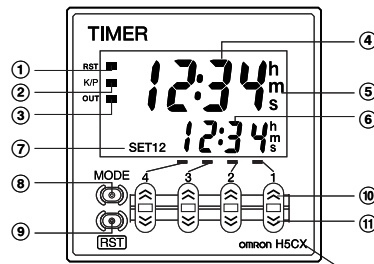
Voltage Input Signal Levels

High level (Input ON): 4.5 to 30 VDC
 Low level (Input OFF): 0 to 2 VDC
 Maximum applicable voltage: 30 VDC max.
 Input resistance: Approx. 4.7 kΩ

Note: Power circuit is not insulated from the input circuit, except for H5CX-A11/-A11S, which have basic insulation. For wiring, refer to *Precautions*.

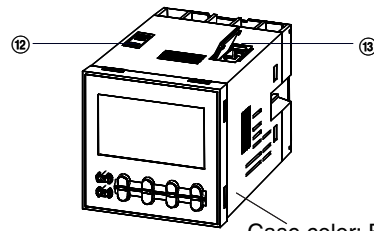
Nomenclature

Indicator
① Reset Indicator (orange)
② Key Protection Indicator (orange)
③ Control Output Indicator (orange)
④ Present Value (red or green (programmable) for H5CX-A models, red for H5CX-A11/-L models) Character height: 11.5 mm
⑤ Time Unit Display (Color is same as present value.): (If the time range is 0 min, 0 h, 0.0 h, or 0 h 0 min, this display flashes to indicate timing operation.)
⑥ Set Value (green) Character height: 6 mm
⑦ Set Value 1, 2 Display



Front View

Front color: Black



Case color: Black

Operation Key
⑧ Mode Key (Changes modes and setting items)
⑨ Reset Key (Resets present value and output)
⑩ Up Keys 1 to 4
⑪ Down Keys 1 to 4

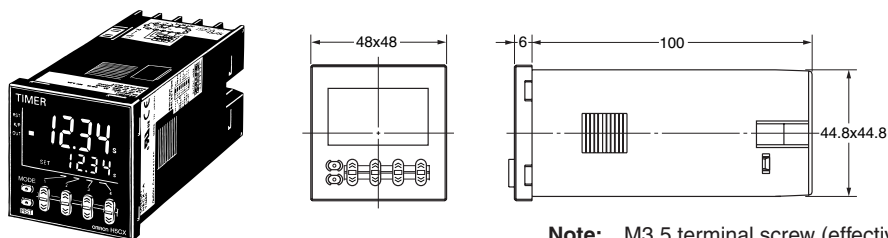
Switches
⑫ Key-protect Switch (default setting) OFF ← → ON
⑬ DIP Switch

Dimensions

Note: All units are in millimeters unless otherwise indicated.

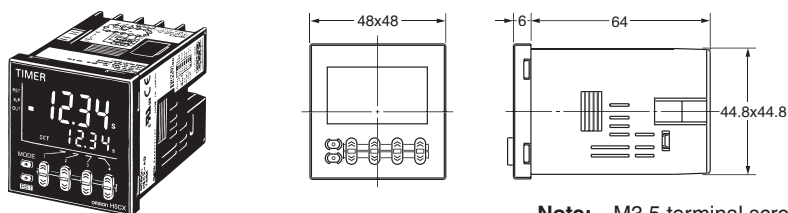
■ Timer (without Flush Mounting Adapter)

H5CX-A/-AS (Flush Mounting)



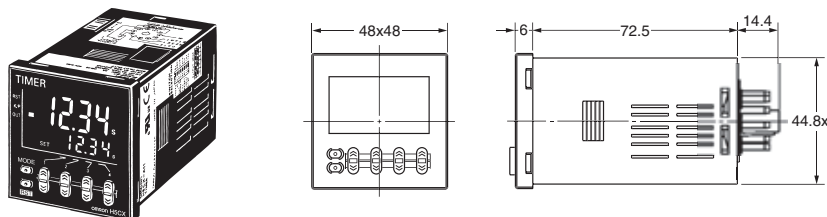
Note: M3.5 terminal screw (effective length: 6 mm)

H5CX-AD/-ASD (Flush Mounting)

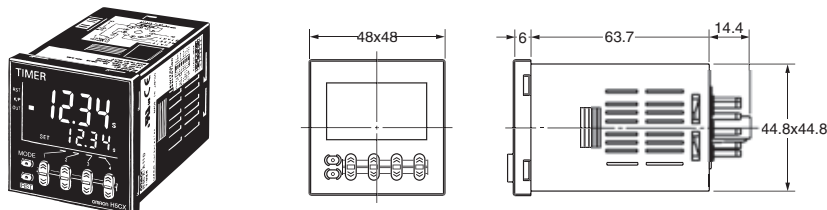


Note: M3.5 terminal screw (effective length: 6 mm)

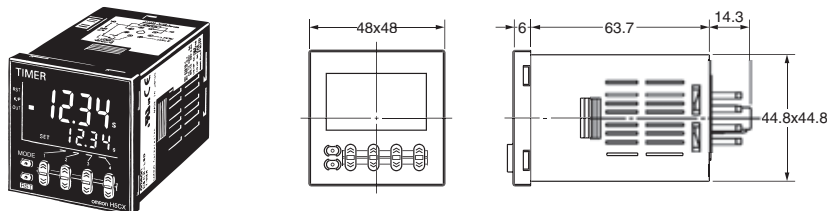
H5CX-A11/-A11S (Flush Mounting/Surface Mounting)



H5CX-A11D/-A11SD (Flush Mounting/Surface Mounting)

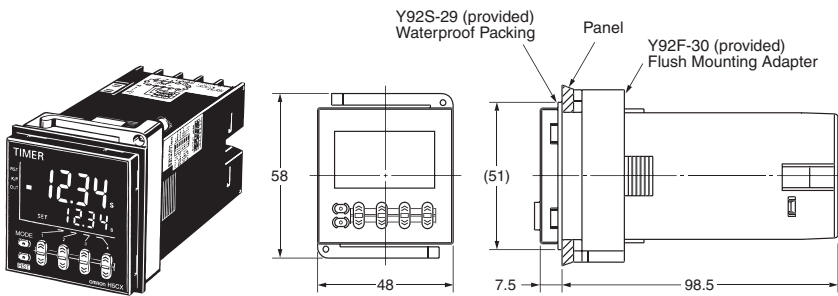


H5CX-L8 □ (Flush Mounting/Surface Mounting)

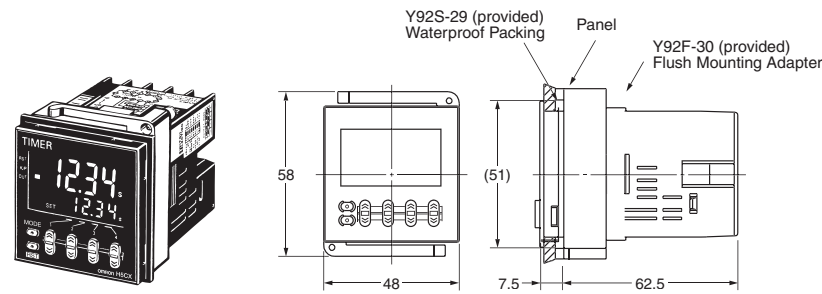


■ Dimensions with Flush Mounting Adapter

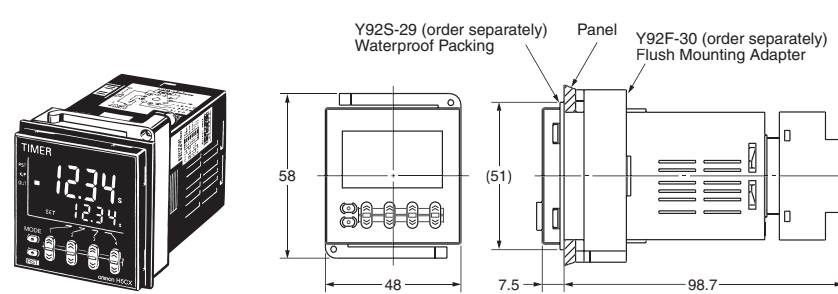
H5CX-A/-AS (Provided with Adapter and Waterproof Packing)



H5CX-AD/-ASD (Provided with Adapter and Waterproof Packing)

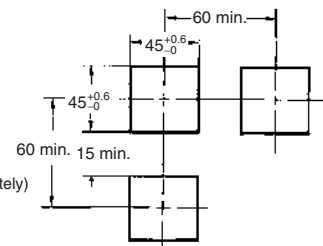


H5CX-A11/-A11S (Adapter and Waterproof Packing Ordered Separately)



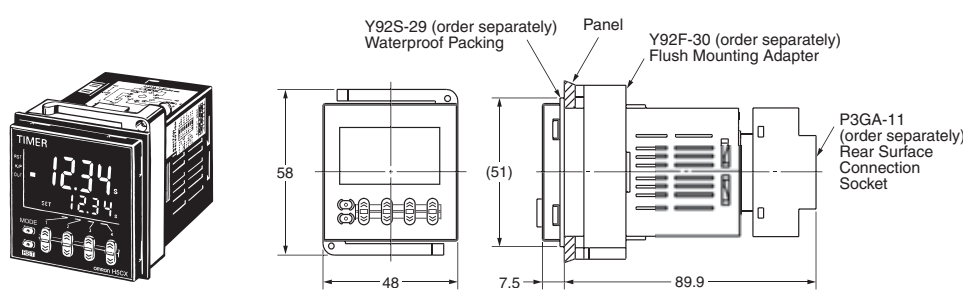
Panel Cutouts

Panel cutouts areas shown below. (according to DIN43700).



- Note 1.** The mounting panel thickness should be 1 to 5 mm.
- 2.** To allow easier operability, it is recommended that Adapters are mounted so that the gap between sides with hooks is at least 15 mm.
- 3.** It is possible to mount timers side by side, but only in the direction without the hooks.

H5CX-A11D/-A11SD (Adapter and Waterproof Packing Ordered Separately)



n side by side mounting

A

$$A = (48n - 2.5) \begin{matrix} +1 \\ 0 \end{matrix}$$

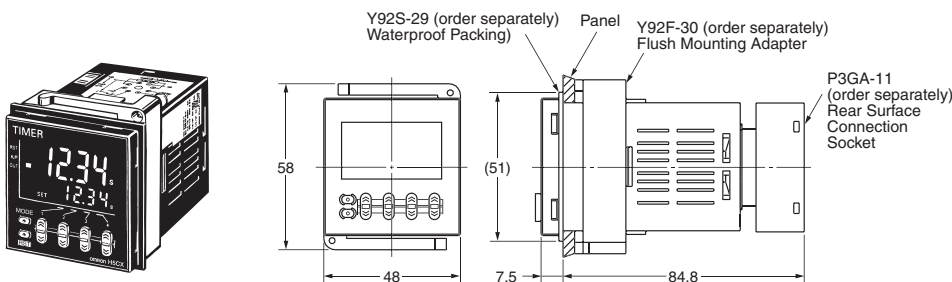
With Y92A-48F1 attached.

$$A = \{48n - 2.5 + (n-1) \times 4\} \begin{matrix} +1 \\ 0 \end{matrix}$$

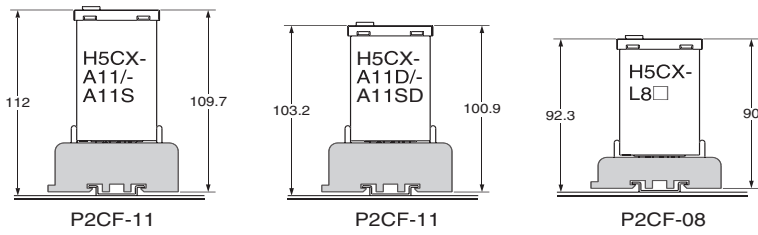
With Y92A-48 attached.

$$A = (51n - 5.5) \begin{matrix} +1 \\ 0 \end{matrix}$$

H5CX-L8□ (Adapter and Waterproof Packing Ordered Separately)



■ Dimensions with Front Connecting Socket



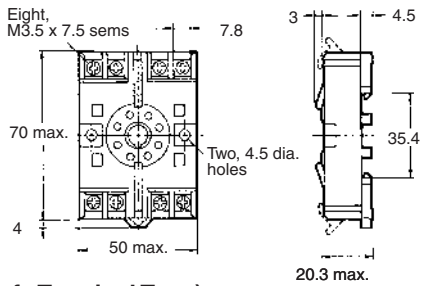
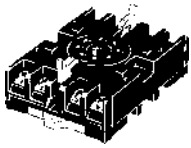
Note: These dimensions vary with the kind of DIN track (reference value).

■ Accessories (Order Separately)

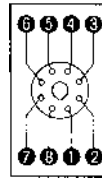
Note: All units are in millimeters unless otherwise indicated.

Track Mounting/Front Connecting Socket

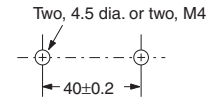
P2CF-08



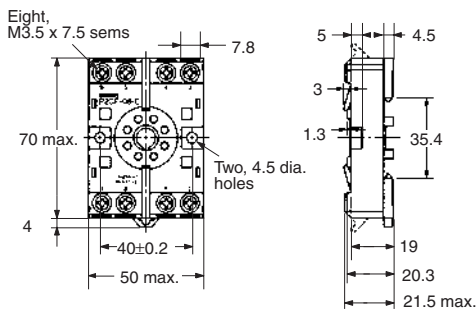
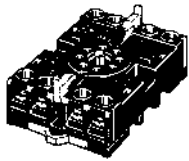
Terminal Arrangement/ Internal Connections (Top View)



Surface Mounting Holes

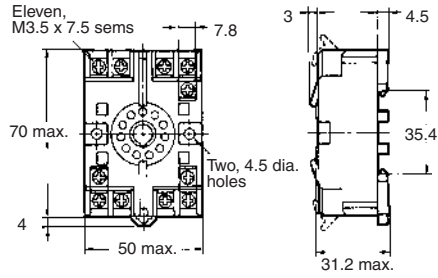
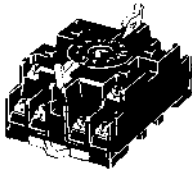


P2CF-08-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

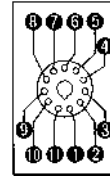


Track Mounting/Front Connecting Socket

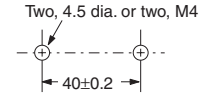
P2CF-11



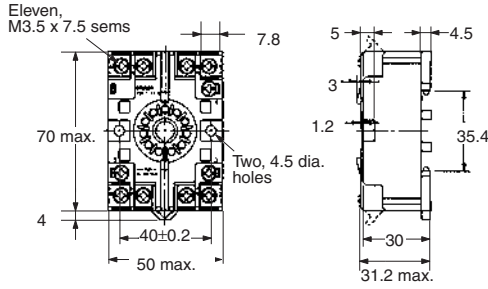
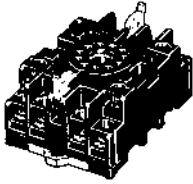
**Terminal Arrangement/
Internal Connections
(Top View)**



Surface Mounting Holes

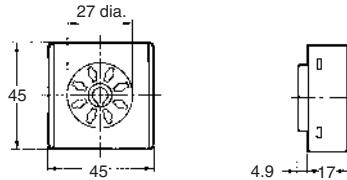
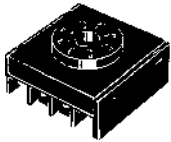


**P2CF-11-E (Finger Safe Terminal Type)
Conforming to VDE0106/P100**

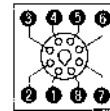


Back Connecting Socket

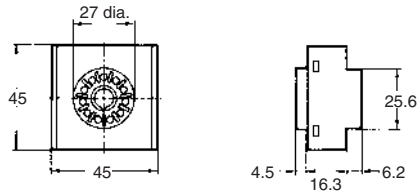
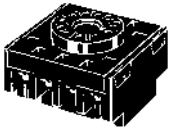
P3G-08



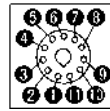
**Terminal Arrangement/
Internal Connections
(Bottom View)**



P3GA-11



**Terminal Arrangement/
Internal Connections
(Bottom View)**

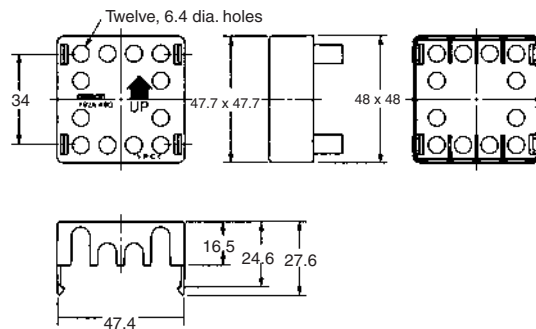
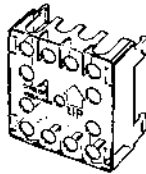


Finger Safe Terminal Cover

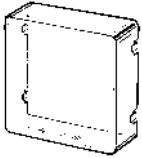
Conforming to VDE0106/P100

Y92A-48G

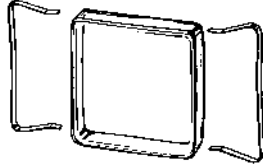
**(Attachment for P3G-08/P3GA-11
Socket)**



Hard Cover
Y92A-48

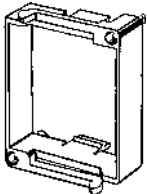


Soft Cover
Y92A-48F1



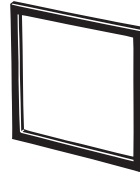
Flush Mounting Adapter
(provided with H5CX-A□ models)

Y92F-30



Waterproof Packing
(provided with H5CX-A□ models)

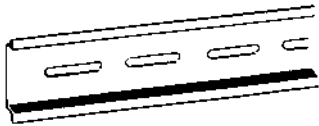
Y92S-29



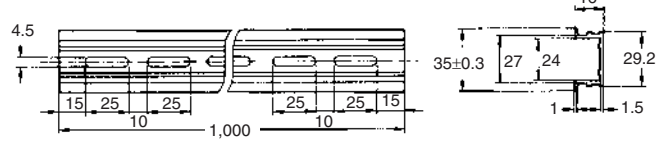
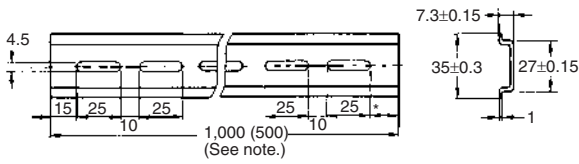
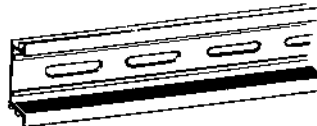
Note: Order the Flush Mounting Adapter separately if it is lost or damaged.

Note: Order the Waterproof Packing separately if it is lost or damaged. Depending on the operating environment, the Waterproof Packing may deteriorate, contract, or harden and so regular replacement is recommended to ensure NEMA4 compliance.

Mounting Track
PFP-100N, PFP-50N

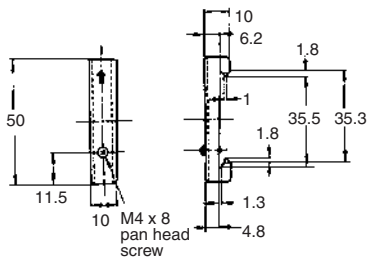
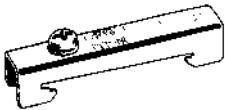


PFP-100N2

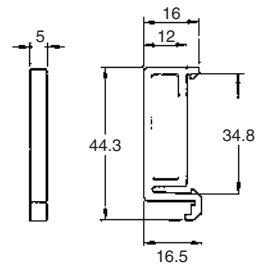
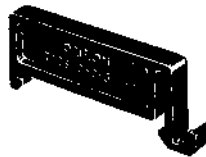


Note: The values shown in parentheses are for the PFP-50N.

End Plate
PFP-M



Spacer
PFP-S



Precautions

⚠ Caution

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

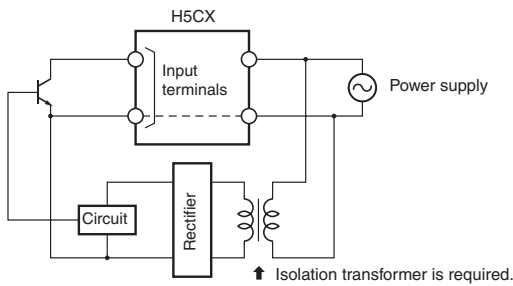
The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact deposition or burning.

Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.

Do not allow metal objects or conductive wires to enter the product. Doing so may result in electric shock, fire, or malfunction.

■ Power Supplies

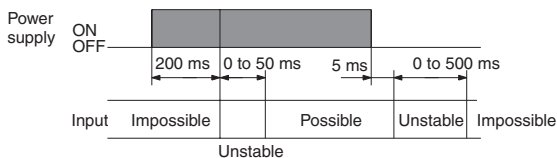
For the power supply of an input device of the H5CX (except for H5CX-A11□), use an isolating transformer with the primary and secondary windings mutually isolated and the secondary winding not grounded.



Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

Do not touch the input terminals while power is supplied. The H5CX (except for H5CX-A11/-A11S) has a transformerless power supply and so touching the input terminals with power supplied may result in electric shock.

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.



Turn the power ON and OFF using a relay with a rated capacity of 10 A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF.

Apply the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value immediately, otherwise they may not be reset or a timer error may result.

Be sure that the capacity of the power supply is large enough, otherwise the Timer may not start due to inrush current (approx. 10 A) that may flow for an instant when the Timer is turned on.

Make sure that the fluctuation of the supply voltage is within the permissible range.

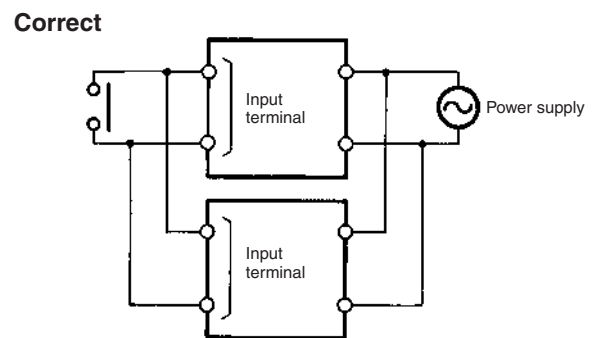
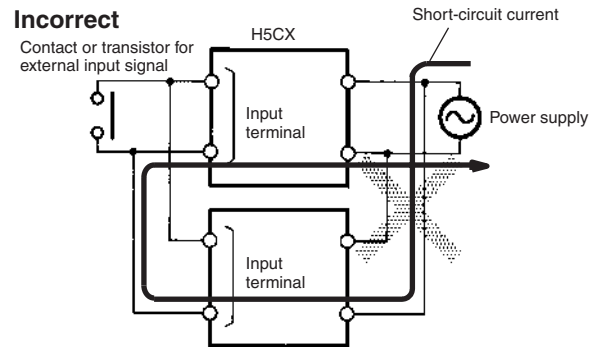
■ Timer Control with Power Start

To allow for the startup time of peripheral devices (sensors, etc.), the H5CX starts timing operation between 200 ms to 250 ms after power is turned ON. For this reason, in operations where timing starts from power ON, the time display will actually start from 250 ms. If the set value is 249 ms or less, the time until output turns ON will be a fixed value between 200 and 250. (Normal operation is possible for set value of 250 ms or more.) In applications where a set value of 249 ms or less is required, use start timing with signal input.

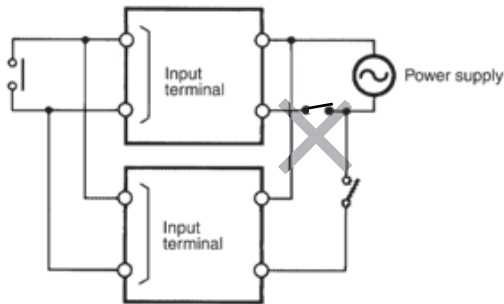
When the H5CX is used with power start in F mode (i.e., accumulative operation with output on hold), there will be a timer error (approximately 100 ms each time the H5CX is turned ON) due to the characteristics of the internal circuitry. Use the H5CX with signal start if timer accuracy is required.

■ Input/Output

The H5CX (except for H5CX-A11/-A11S) uses a transformerless power supply. When connecting a relay or transistor as an external input signal 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 differ in phase, otherwise the terminals will be short-circuited to one another.



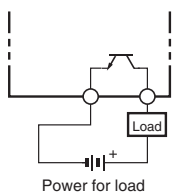
It is impossible to provide two independent power switches as shown below regardless of whether or not the Timers are different in phase.



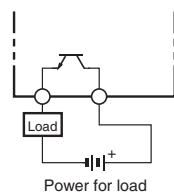
■ Transistor Output

The transistor output of the H5CX is insulated from the internal circuitry by a photocoupler, so the transistor output can be used as both NPN and PNP output.

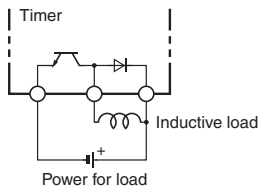
NPN Output



PNP Output



The diode connected to the collector of the output transistor is used to absorb inverted voltage that is generated when an inductive load is connected to the H5CX.



■ Changing the Set Values

When changing the set value during a timing operation, the output will turn ON if the set value is changed as follows because of the use of a constant read-in system:

Elapsed time mode: Present value \geq set value

Remaining time mode: Elapsed time \geq set value (The present value is set to 0.)

Note: When in the remaining time mode, the amount the set value is changed is added to or subtracted from the present value.

■ Self-diagnostic Function

The following displays will appear if an error occurs.

Main display	Sub-display	Error	Output status	Correction method	Set value after reset
E1	Not lit	CPU	OFF	Either press the reset key or reset the power supply.	No change
E2	Not lit	Memory error (RAM)	OFF	Reset the power supply.	No change
E2	5U7	Memory error (EEP) (See note)	OFF	Reset to the factory settings using the reset key.	0

Note: This includes times when the life of the EEPROM has expired.

■ Operation with a Set Value of 0

Operation with a set value of 0 will vary with the output mode. Refer to the *Timing Charts*.

■ DIP Switch Setting

Ensure that the power is turned OFF before changing DIP switch settings. Changing DIP switch settings with the power turned ON may result in electric shock due to contact with terminals subject to high voltages.

■ Power Failure Backup

All data is stored in the EEPROM when there is a power failure. The EEPROM can be overwritten more than 100,000 times.

Operating mode	Overwriting timing
A-3, F mode	When power is turned OFF.
Other mode	When settings are changed.

■ Response Delay Time When Resetting (Transistor Output)

The following table shows the delay from when the reset signal is input until the output is turned OFF.

(Reference value)

Minimum reset signal width	Output delay time
1 ms	0.8 to 1.2 ms
20 ms	15 to 25 ms

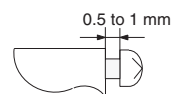
■ Wiring

Be sure to wire the Timer with the correct polarity.

■ Mounting

Tighten the two mounting screws on the Adapter. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.

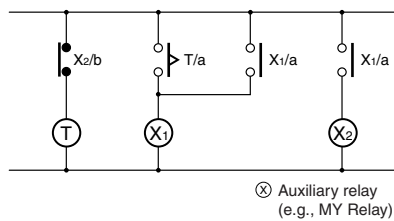
The H5CX's panel surface is water-resistant (conforming to NEMA 4 and IP66). In order to prevent the internal circuit from water penetration through the space between the timer and operating panel, attach a waterproof packing between the timer and installation panel and secure the waterproof packing with the Y92F-30 flush-mounting adapter.



It is recommended that the space between the screw head and the adapter should be 0.5 to 1 mm.

■ Operating Environment

- Use the product within the ratings specified for submerging in water, and exposure to oil.
- Do not use the product in locations subject to vibrations or shocks. Using the product in such locations over a long period may result in damage due to stress.
- Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
- Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
- Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g., forming compounds, powders, or fluid materials being transported by pipe).
- Organic solvents (such as paint thinner), as well as very acidic or basic solutions might damage the outer casing of the Timer.
- Use the product within the ratings specified for temperature and humidity.
- Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.
- Store at the specified temperature. If the H5CX has been stored at a temperature of less than -10°C , allow the H5CX to stand at room temperature for at least 3 hours before use.
- Leaving the H5CX with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.



■ Insulation

There is no insulation between power supply and input terminals (except for H5CX-A11/-A11S).

Basic insulation between power supply and output terminals, and between input terminals and output terminals.

Input and output terminals are connected to devices without exposed charged parts.

Input and output terminals are connected to devices with basic insulation that is suitable for the maximum operating voltage.

Operating Procedures

■ Setting Procedure Guide

Settings for Timer Operation

Use the following settings for all models except the H5CX-L8□.
Refer to page 178 for the H5CX-L8□.

<p>When Using Basic Functions Only</p> <p>--- Basic Functions ---</p> <ul style="list-style-type: none"> • Time range (0.001 s to 999.9 h, except 9999 h and 9999min) • Output mode (A, A-2, E, F) • Timer mode (UP/DOWN) • Input signal width (20 ms/1 ms) 	<p>The settings can be performed easily with the DIP switch.</p> <p>➔For details on the setting methods, refer to page 23.</p> <div style="text-align: center;"> </div>
--	---

When Using Other Time Ranges (9999 h, 9999 min) and Output Modes (A-1, A-3, b, b-1, d, and Z)

All the functions can be set with the operation keys.
➔For details on the setting methods, refer to page 24.

When Using More Detailed Setting Items (Output Time, NPN/PNP Input Mode, Display Color, Key Protect Level)

Setting for items other than the basic functions can be performed with the operation keys.
➔For details on the setting methods, refer to page 24.

Note: At the time of delivery, the H5CX is set for timer operation.

Settings for Twin Timer Operation

Use the following settings for all models except the H5CX-L8□.
Refer to page 185 for the H5CX-L8□.

<p>When Using Basic Functions Only</p> <p>--- Basic Functions ---</p> <ul style="list-style-type: none"> • Time range (0.01 s to 99 min 59 s) • ON/OFF start mode (flicker OFF start/flicker ON start) • Timer mode (UP/DOWN) • Input signal width (20 ms/1 ms) 	<p>The settings can be performed easily with the DIP switch.</p> <p>➔For details on the setting methods, refer to page 31.</p> <div style="text-align: center;"> </div>
--	---

When Using Other Time Ranges (999.9 min, 9999 min, 99 h 59 min, 999.9 h, 9999 h, 9.999 s)

All the functions can be set with the operation keys.
➔For details on the setting methods, refer to page 32.

When Using More Detailed Setting Items (NPN/PNP Input Mode, Display Color, Key Protect Level)

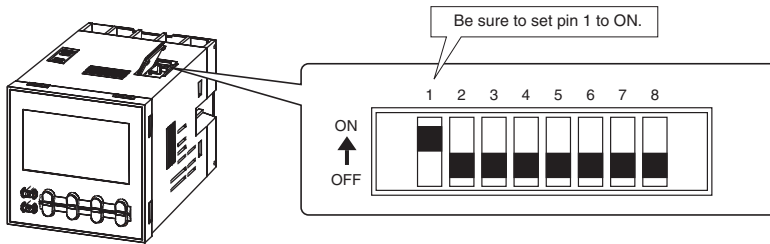
Setting for items other than the basic functions can be performed with the operation keys.
➔For details on the setting methods, refer to page 32.

Note: At the time of delivery, the H5CX is set for timer operation.

Operating Procedures (Timer Function)

Settings for Basic Functions

Settings for basic functions can be performed with just the DIP switch.



	Item	OFF	ON
1	DIP switch settings enable/disable	Disabled	Enabled
2	Time range	Refer to the table on the right.	
3			
4			
5	Output mode	Refer to the table on the right.	
6			
7	Timer mode	Elapsed time (UP)	Remaining time (DOWN)
8	Input signal width	20 ms	1 ms

Pin 2	Pin 3	Pin 4	Time range
ON	ON	ON	0.001 s to 9.999 s
OFF	OFF	OFF	0.01 s to 99.99 s
ON	OFF	OFF	0.1 s to 999.9 s
OFF	ON	OFF	1 s to 9999 s
ON	ON	OFF	0 min 01 s to 99 min 59 s
OFF	OFF	ON	0.1 min to 999.9 min
ON	OFF	ON	0 h 01 min to 99 h 59 min
OFF	ON	ON	0.1 h to 999.9 h

Note: All the pins are factory-set to OFF.

Pin 5	Pin 6	Output mode
OFF	OFF	A mode (signal ON delay (I): power reset operation)
ON	OFF	A-2 mode: (power ON delay (I): power reset operation)
OFF	ON	E mode (interval: power reset operation)
ON	ON	F mode (accumulative: power hold operation)

Easy Confirmation of Switch Settings Using Indicators

The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page 36.

- Note 1.** Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.
- Changes to DIP switch settings are enabled when the power is turned ON. (Perform DIP switch settings while the power is OFF.)
 - There is no DIP switch on the H5CX-L8□. For details on the setting methods, refer to page 178.
 - When using time ranges or output modes that cannot be set with the DIP switch, all of the settings have to be made using the operation keys. For details on the setting methods, refer to page 178.

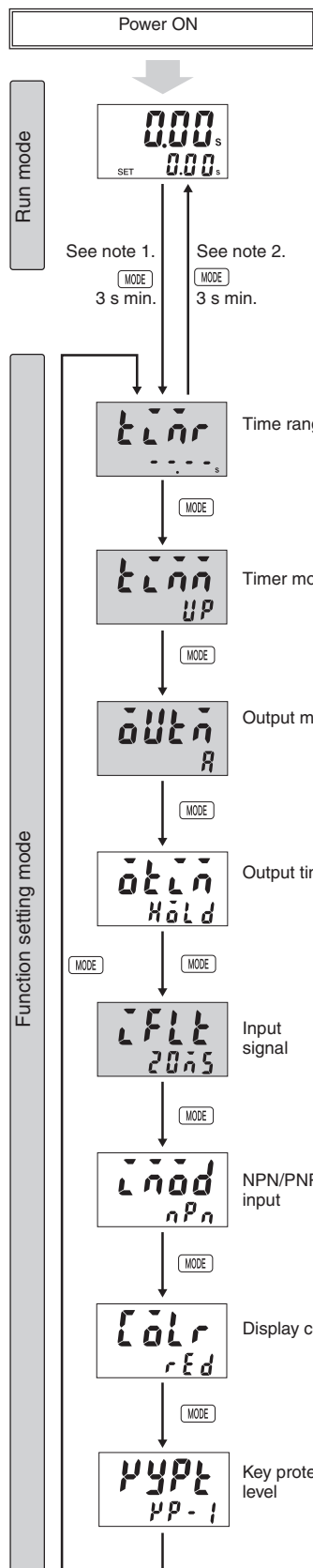
Detailed Settings

After making DIP switch settings for basic functions, detailed settings (see note) can be added using the operation keys. For details, refer to page 24.

Note: Output time, NPN/PNP input mode, display color, key protect level.

Settings for Advanced Functions

Settings that cannot be performed with the DIP switch are performed with the operation keys.

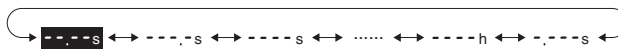


For details on operations in run mode, refer to page 26.

- Note 1.** If the mode is switched to the function setting mode during operation, operation will continue.
- 2.** Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the timer is reset (time initialized and output turned OFF).

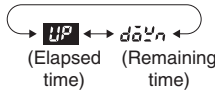
The characters displayed in reverse video are the default settings. When performing settings with operation keys only, set pin1 of the DIP switch to OFF (factory setting). If pin 1 of the DIP switch is set to ON, the setting items indicated in will not be displayed.

Set the time range using the \uparrow \downarrow keys.

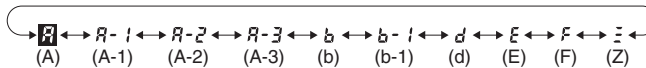


For details, refer to *Time Range List* below.

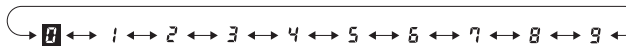
Set the timer mode using the \uparrow \downarrow keys.



Set the output mode using the \uparrow \downarrow keys.



Set each digit for the output time using the corresponding \uparrow \downarrow keys.

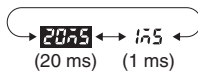


Hold/0.01 ~ 99.99 : Output hold/0.01 to 99.99 s
(If the output time is set to 0.00, *Hold* is displayed.)
Displayed for modes A, A-1, A-2, A-3, b, and b-1 only.

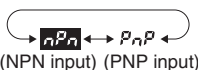
Time Range List

Display	Set Value
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{s}$	0.01 s to 99.99 s (default setting)
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{s}$	0.1 s to 999.9 s
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{s}$	1 s to 9999 s
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{m}$	0 min 01 s to 99 min 59 s
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{m}$	0.1 min to 999.9 min
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{m}$	1 min to 9999 min
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{h}$	0 h 01 min to 99 h 59 min
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{h}$	0.1 h to 999.9 h
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{h}$	1 h to 9999 h
$\overline{\text{---}}\text{---}\text{---}\text{---}\text{s}$	0.001 s to 9.999 s

Set the input signal width using the \uparrow \downarrow keys.

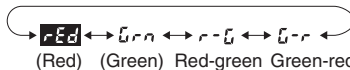


Set the NPN/PNP input mode using the \uparrow \downarrow keys.



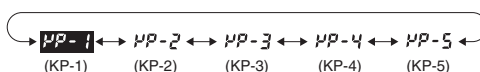
Only displayed for H5CX-A□ and H5CX-A11□ models.

Set the display color using the \uparrow \downarrow keys.



Displayed for terminal-block models (H5CX-A□) only.

Set the key protect level using the \uparrow \downarrow keys.



Explanation of Functions

Time Range (tLr) (Setting possible using DIP switch.)

Set the range to be timed in the range 0.000 s to 9,999 h. Settings of type --- h (9,999 h) and --- min (9,999 min) cannot, however, be made with the DIP switch. Use the operation keys if these settings are required.

Timer Mode (Lr) (Setting possible using DIP switch.)

Set either the elapsed time (UP) or remaining time (DOWN) mode.

Output Mode (ULr) (Setting possible using DIP switch.)

Set the output mode. The possible settings are A, A-1, A-2, A-3, b, b-1, d, E, F, and Z. Only output modes A, A-2, E, and F can be set using the DIP switch. Use the operation keys if a different setting is required. (For details on output mode operation, refer to "Timing Charts" on page 181.)

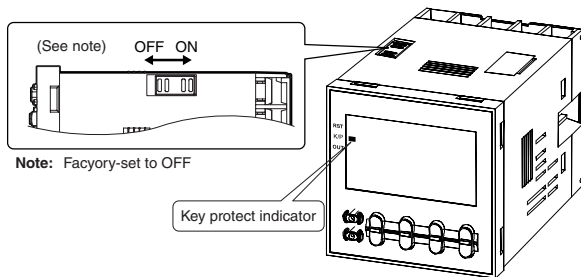
Output Time (Lr)

When using one-shot output, set the output time for one-shot output (0.01 to 99.99 s). One-shot output can be used only if the selected output mode is A, A-1, A-2, b, or b-1. If the output time is set to 0.00, Hold is displayed, and the output is held.

Key Protect Level (KPL)

Set the key protect level.

When the key-protect switch is set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON.



Input Signal Width (FLt) (Setting possible using DIP switch.)

Set the minimum signal input width (20 ms or 1 ms) for signal, reset, and gate inputs. The same setting is used for all external inputs (signal, reset, and gate inputs). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

NPN/PNP Input Mode (Lnd)

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to "Input Connections" on page 166.

Display Color (Lr)

Set the color used for the present value.

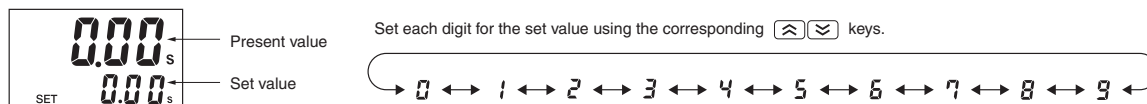
	Output OFF	Output ON
rEd	Red (fixed)	
Grn	Green (fixed)	
r-G	Red	Green
G-r	Green	Red

Level	Meaning	Details			
		Changing mode (See note.)	Switching display during operation	Reset key	Up/down key
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

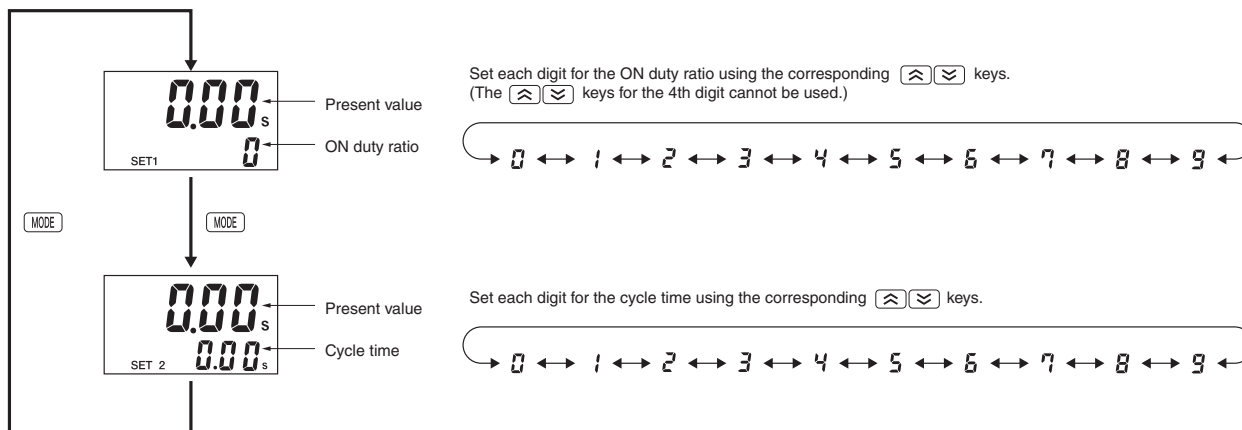
Note: Changing mode to timer/twin timer selection mode (**MODE** + **1** 1 s min.) or function setting mode (**MODE** 3 s min.).

Operation in Run Mode

When Output Mode Is Not Z



When Output Mode Z Is Selected



Present Value and Set Value

These items are displayed when the power is turned ON. The present value is displayed in the main display and the set value is displayed in the sub-display. The values displayed will be determined by the settings made for the time range and the timer mode in function setting mode.

Present Value and ON Duty Ratio (Output Mode = Z)

The present value is displayed in the main display and the ON duty ratio is displayed in the sub-display. "SET1" lights at the same time.

Set the ON duty ratio used in ON/OFF-duty adjustable flicker mode (Z) as a percentage.

If a cycle time is set, cyclic control can be performed in ON/OFF-duty adjustable flicker mode simply by changing the ON duty ratio.

$$\text{ON time} = \text{Cycle time} \times \frac{\text{ON duty ratio (\%)}}{100}$$

The output accuracy will vary with the time range, even if the ON duty ratio setting is the same. Therefore, if fine output time adjustment is required, it is recommended that the time range for the cycle time is set as small as possible.

Examples:

1. If the cycle time is 20 s, the ON duty ratio is 31%, and the time range is 1 s to 9999 s, the ON time is given by the following:

$$20 \text{ (s)} \times \frac{31 \text{ (\%)}}{100} = 6.2 \text{ (s)} \rightarrow \text{Rounded off to the nearest integer}$$

(because of the time range setting) \rightarrow ON time = 6 s

2. If the cycle time is 20.00 s, the ON duty ratio is 31%, and the time range is 0.01 s to 99.99 s, the ON time is given by the following:

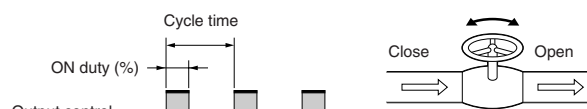
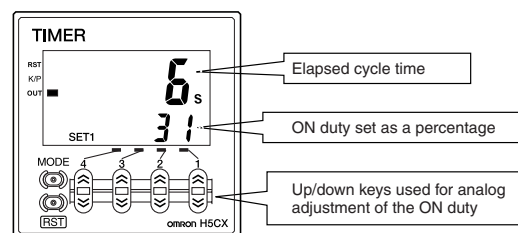
$$20.00 \text{ (s)} \times \frac{31 \text{ (\%)}}{100} = 6.200 \text{ (s)} \rightarrow \text{Rounded off to 2 decimal places}$$

(because of the time range setting) \rightarrow ON time = 6.20 s

Present Value and Cycle Time (Output Mode = Z)

The present value is displayed in the main display and the cycle time is displayed in the sub-display. "SET2" lights at the same time.

Set the cycle time used in ON/OFF-duty adjustable flicker mode (Z).

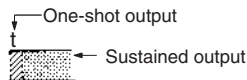


Opening/closing valve	Fully closed \leftrightarrow Fully open
ON duty	0% \leftrightarrow 100%

Timing Charts

Timer Operation

The gate input is not included in the H5CX-L8□ models.



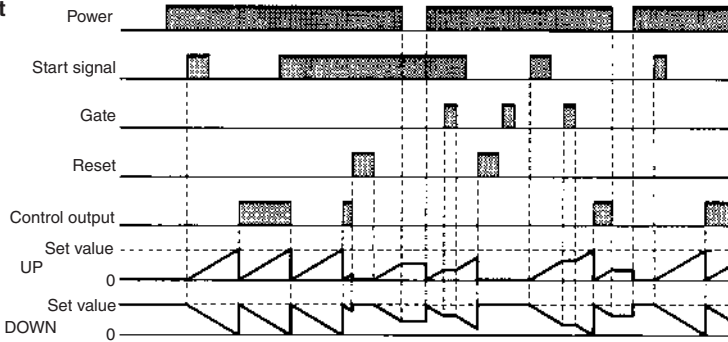
Either one-shot output or sustained output can be selected.

Timers

Output mode A: Signal ON delay 1 (Timer resets when power comes ON.)	
	<p>Timing starts when the start signal goes ON. While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF. The control output is controlled using a sustained or one-shot time period.</p> <p>Basic Operation</p> <p>* Output is instantaneous when setting is 0. ** Start signal input is disabled during timing.</p>
Output mode A-1: Signal ON delay 2 (Timer resets when power comes ON.)	
	<p>Timing starts when the start signal goes ON, and is reset when the start signal goes OFF. While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF. The control output is controlled using a sustained or one-shot time period.</p> <p>Basic Operation</p> <p>*Output is instantaneous when setting is 0.</p>
Output mode A-2: Power ON delay 1 (Timer resets when power comes ON.)	
	<p>Timing starts when the reset input goes OFF. The start signal disables the timing function (i.e., same function as the gate input). The control output is controlled using a sustained or one-shot time period.</p> <p>Basic Operation</p> <p>*Output is instantaneous when setting is 0.</p>
Output mode A-3: Power ON delay 2 (Timer does not reset when power comes ON.)	
	<p>Timing starts when the reset input goes OFF. The start signal disables the timing function (i.e., same function as the gate input). The control output is controlled using a sustained or one-shot time period.</p> <p>Basic Operation</p> <p>*Output is instantaneous when setting is 0.</p>

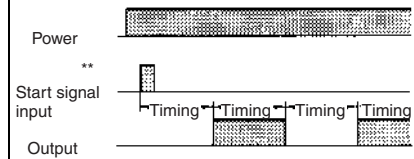
Output mode b: Repeat cycle 1 (Timer resets when power comes ON.)

Sustained Output



Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (OFF at start). While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

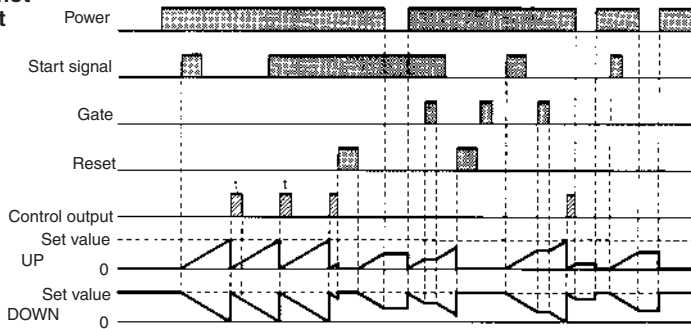
Basic Operation



* Normal output operation will not be possible if the set time is too short. Set the value to at least 100 ms (contact output type).

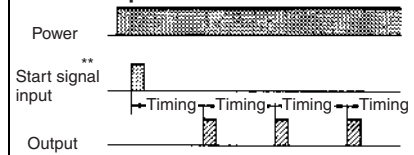
** Start signal input is disabled during timing.

One-shot Output



Timing starts when the start signal goes ON. The control output is turned ON when time is up. While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation

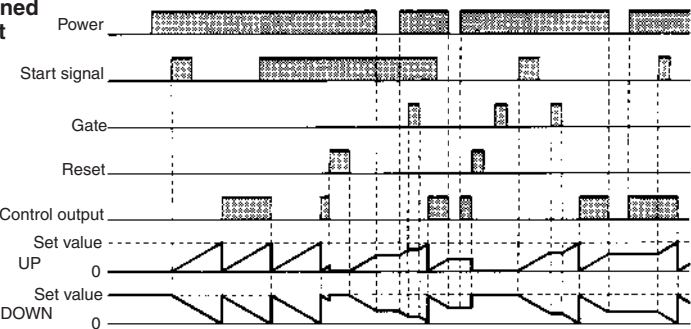


* Normal output operation will not be possible if the set time is too short. Set the value to at least 100 ms (contact output type).

** Start signal input is disabled during timing.

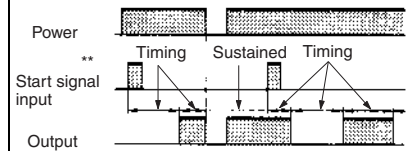
Output mode b-1: Repeat cycle 2 (Timer does not reset when power comes ON.)

Sustained Output



Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (OFF at start). While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

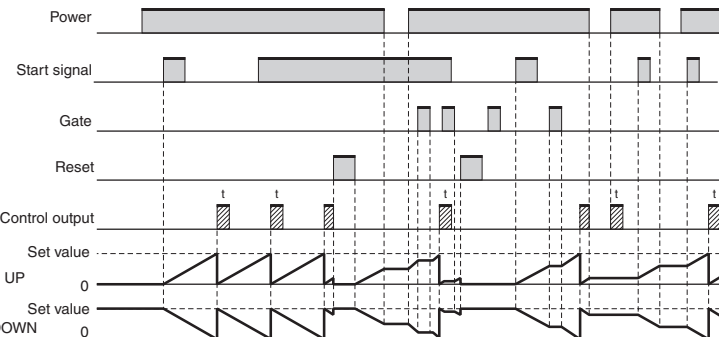
Basic Operation



* Normal output operation will not be possible if the set time is too short. Set the value to at least 100 ms (contact output type).

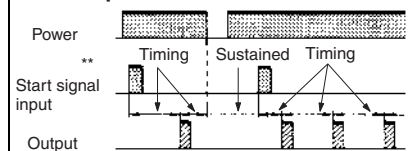
** Start signal input is disabled during timing.

One-shot Output



Timing starts when the start signal goes ON. The control output comes ON when time is up. While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation



* Normal output operation will not be possible if the set time is too short. Set the value to at least 100 ms (contact output type).

** Start signal input is disabled during timing.

Output mode d: Signal OFF delay (Timer resets when power comes ON.)	
<p>Timing diagram</p>	<p>The control output is ON when the start signal is ON (except when the power is OFF or the reset is ON). The timer is reset when the time is up.</p> <p>Basic Operation</p> <p>* Output functions only during start signal input when setting is 0. ** Start signal input is enabled during timing.</p>
Output mode E: Interval (Timer resets when power comes ON.)	
<p>Timing diagram</p>	<p>Timing starts when the start signal comes ON. The control output is reset when time is up. While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.</p> <p>Basic Operation</p> <p>* Output is disabled when the setting is 0. ** Start signal input is enabled during timing.</p>
Output mode F: Cumulative (Timer does not reset when power comes ON.)	
<p>Timing diagram</p>	<p>Start signal enables timing (timing is stopped when the start signal is OFF or when the power is OFF). A sustained control output is used.</p> <p>Basic Operation</p> <p>* Output is instantaneous when setting is 0.</p>
Z mode: ON/OFF-duty adjustable flicker	
<p>Timing diagram</p>	<p>Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (ON at start). While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.</p> <p>Basic Operation</p> <p>* Normal output operation will not be possible if the set time is too short. Set the value to at least 100 ms (contact output type). ** Start signal input is disabled during timing.</p>

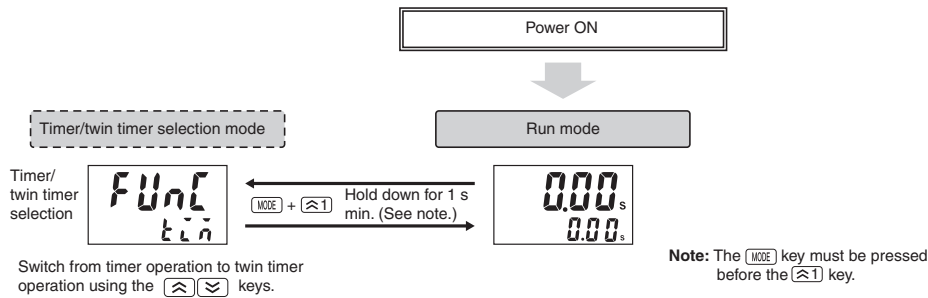
Z Mode

Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value. The set value shows the ON duty (%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF. When the cycle time is not 0 and when ON duty has been set to 0 (%), the output will always be OFF. When ON duty has been set to 100 (%), the output will always be ON.

■ Operating Procedures (Twin Timer Function)

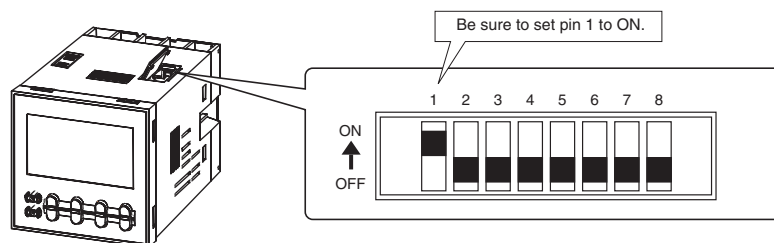
Switching from Timer to Twin Timer

The H5CX is factory-set for timer operation. To switch to twin timer operation, use the procedure given below. For details, refer to page 190.



Settings for Basic Functions

Settings for basic functions can be performed with just the DIP switch.



	Item	OFF	ON
1	DIP switch settings enable/disable	Disabled	Enabled
2	OFF time range	Refer to the table on the right.	
3			
4	ON time range	Refer to the table on the right.	
5			
6	ON/OFF start mode	Flicker OFF start	Flicker ON start
7	Timer mode	UP	DOWN
8	Input signal width	20 ms	1 ms

Pin 2	Pin 3	OFF time range
OFF	OFF	0.01 s to 99.99 s
ON	OFF	0.1 s to 999.9 s
OFF	ON	1 s to 9999 s
ON	ON	0 min 01 s to 99 min 59 s

Pin 4	Pin 5	ON time range
OFF	OFF	0.01 s to 99.99 s
ON	OFF	0.1 s to 999.9 s
OFF	ON	1 s to 9999 s
ON	ON	0 min 01 s to 99 min 59 s

Note: All the pins are factory-set to OFF.

Easy Confirmation of Switch Settings Using Indicators

The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page 36.

Note 1. Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.

2. Changes to DIP switch settings are enabled when the power is turned ON. (Perform DIP switch settings while the power is OFF.)

3. There is no DIP switch on the H5CX-L8□. For details on the setting methods, refer to page 185.

4. When using time ranges that cannot be set with the DIP switch, all of the settings have to be made using the operation keys. For details on the setting methods, refer to page 185.

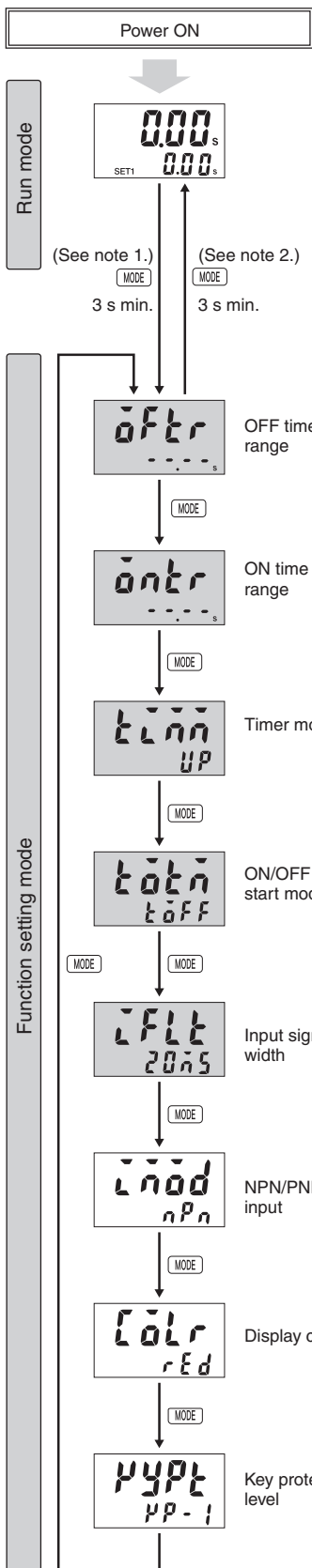
Detailed Settings

After making DIP switch settings for basic functions, detailed settings (see note) can be added using the operation keys. For details, refer to page 32.

Note: NPN/PNP input mode, display color, key protect level.

Settings for Advanced Functions

Settings that cannot be performed with the DIP switch are performed with the operation keys.



For details on operations in run mode, refer to page 34.

- Note 1.** If the mode is switched to the function setting mode during operation, operation will continue.
- 2.** Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the timer is reset (time initialized and output turned OFF).

The characters displayed in reverse video are the initial values. When performing settings with operation keys only, set pin1 of the DIP switch to OFF (factory setting). If pin 1 of the DIP switch is set to ON, the setting items indicated by ■ will not be displayed.

Set the OFF time range using the \uparrow \downarrow keys.
 ---s ← ---s ← ---s ← ← ---h ← ---s
 ⇒ For details, refer to *Time Range List* below.

Set the ON timer range using the \uparrow \downarrow keys.
 ---s ← ---s ← ---s ← ← ---h ← ---s
 ⇒ For details, refer to *Time Range List* below.

Set the timer mode using the \uparrow \downarrow keys.
 UP ↔ dōn
 (Elapsed time) (Remaining time)

Set the twin timer output mode using the \uparrow \downarrow keys.
 tōFF ↔ tōn
 (Flicker OFF start) (Flicker ON start)

Set the input signal width using the \uparrow \downarrow keys.
 20ms ↔ 1ms
 (20 ms) (1 ms)

Set the NPN/PNP input mode using the \uparrow \downarrow keys.
 nPn ↔ PnP
 (NPN input) (PNP input)
 Only displayed for H5CX-A□ and H5CX-A11□ models.

Set the display color using the \uparrow \downarrow keys.
 rEd ↔ Grn ↔ r-G ↔ G-r
 (Red) (Green) (Red-green) (Green-red)
 Displayed for terminal-block models (H5CX-A□) only.

Set the key protect level using the \uparrow \downarrow keys.
 KP-1 ↔ KP-2 ↔ KP-3 ↔ KP-4 ↔ KP-5
 (KP-1) (KP-2) (KP-3) (KP-4) (KP-5)

Time Range List	
Display	Set Value
---s	0.01 s to 99.99 s (default setting)
---.s	0.1 s to 999.9 s
---s	1 s to 9999 s
---m	0 min 01 s to 99 min 59 s
---m	0.1 min to 999.9 min
---m	1 min to 9999 min
---h	0 h 01 min to 99 h 59 min
---h	0.1 h to 999.9 h
---h	1 h to 9999 h
---s	0.001 s to 9.999 s

Explanation of Functions

OFF Time Range (\overline{OFF}) (Setting possible using DIP switch.)

Set the time range for the OFF time in the range 0.000 s to 9,999 h. Only settings of type --.-- s (99.99 s), ---. s (999.9 s), ---- s (9,999 s), and -- min -- s (99 min 59 s), however, can be made with the DIP switch. Use the operation keys if another type of setting is required.

ON Time Range (\overline{ON}) (Setting possible using DIP switch.)

Set the time range for the ON time in the range 0.001 s to 9,999 h. Only settings of type --.-- s (99.99 s), ---. s (999.9 s), ---- s (9,999 s), and -- min -- s (99 min 59 s), however, can be made with the DIP switch. Use the operation keys if another type of setting is required.

Timer Mode (\overline{TM}) (Setting possible using DIP switch.)

Set either UP (incremental) or DOWN (decremental) timer mode. In UP mode, the elapsed time is displayed, and in DOWN mode, the remaining time is displayed.

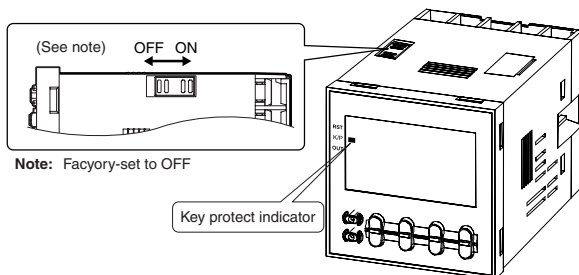
ON/OFF Start Mode (\overline{OST}) (Setting possible using DIP switch.)

Set the output mode. Set either flicker OFF start or flicker ON start. (For details on output mode operation, refer to "Timing Charts" on page 188.)

Key Protect Level (\overline{KPL})

Set the key protect level.

When the key-protect switch is set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON.



Input Signal Width (\overline{ISW}) (Setting possible using DIP switch.)

Set the minimum signal input width (20 ms or 1 ms) for signal, reset, and gate inputs. The same setting is used for all external inputs (signal, reset, and gate inputs). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

NPN/PNP Input Mode (\overline{INM})

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to "Input Connections" on page 166.

Display Color (\overline{DC})

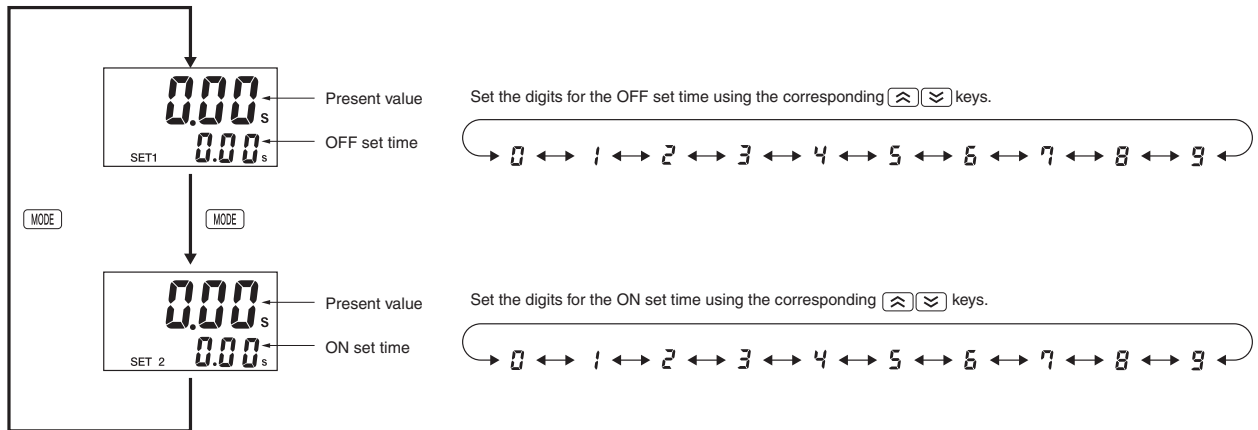
Set the color used for the present value.

	Output OFF	Output ON
\overline{Red}	Red (fixed)	
\overline{Green}	Green (fixed)	
$\overline{r-g}$	Red	Green
$\overline{g-r}$	Green	Red

Level	Meaning	Details			
		Changing mode (See note.)	Switching display during operation	Reset key	Up/down key
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

Note: Changing mode to timer/twin timer selection mode (\overline{MODE} + $\overline{\wedge}$ 1 s min.) or function setting mode (\overline{MODE} 3 s min.).

Operation in Run Mode



Present Value and OFF Set Time

The present value is displayed in the main display and the OFF set time is displayed in the sub-display. "SET1" lights at the same time.

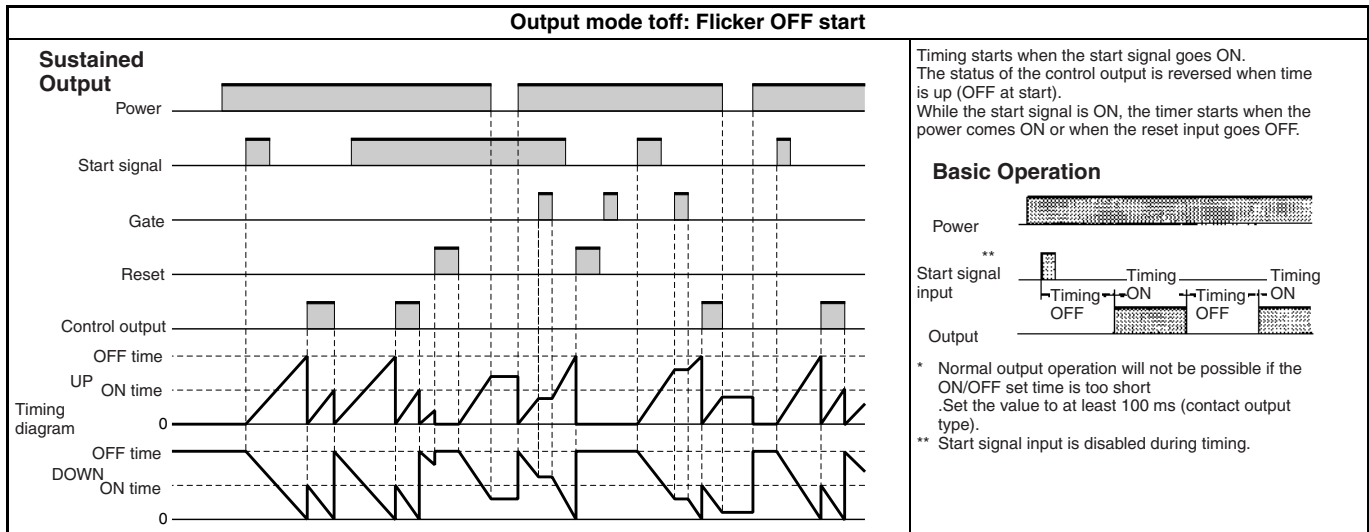
Present Value and ON Set Time

The present value is displayed in the main display and the ON set time is displayed in the sub-display. "SET2" lights at the same time.

Timing Charts

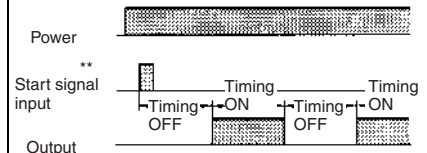
Twin Timer Operation

The gate input is not included in the H5CX-L8□ models.



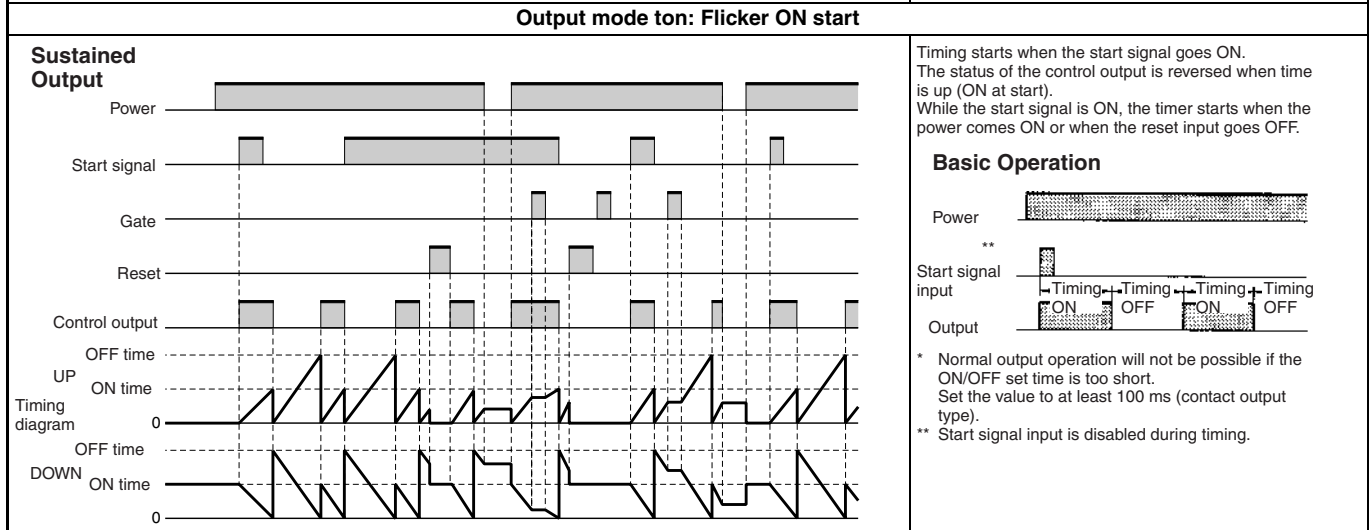
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



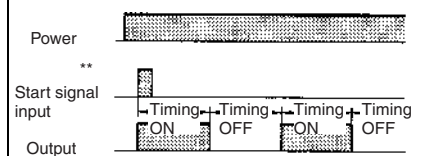
* Normal output operation will not be possible if the ON/OFF set time is too short.
.Set the value to at least 100 ms (contact output type).

** Start signal input is disabled during timing.



Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (ON at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation

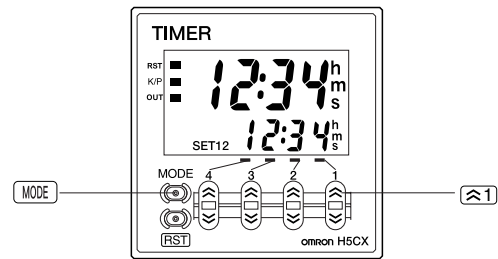
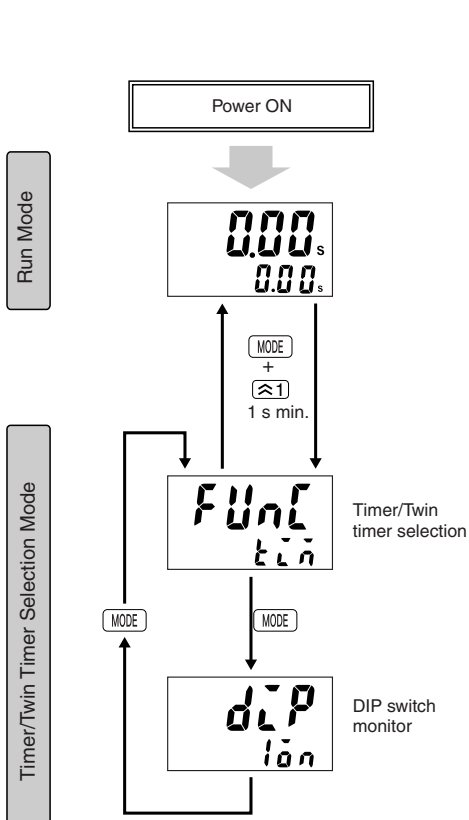


* Normal output operation will not be possible if the ON/OFF set time is too short.
.Set the value to at least 100 ms (contact output type).

** Start signal input is disabled during timing.

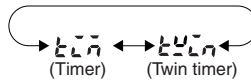
■ Operation in Timer/Twin Timer Selection Mode

Select whether the H5CX is used as a timer or a twin timer in timer/twin timer selection mode. The H5CX is also equipped with a DIP switch monitor function, a convenient function that enables the settings of the DIP switch pins to be confirmed using the front display.



To change the mode to timer/twin timer selection mode, hold down the **F1** key for 1 s min. with the **MODE** key held down. The **MODE** key must be pressed before the **F1** key. If the **F1** key is pressed first, the mode will not change.

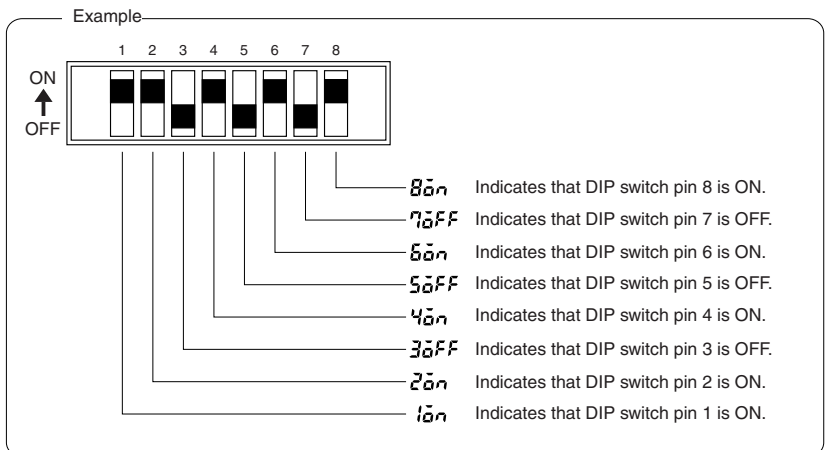
Select either timer operation or twin timer operation using the **F2**/**F3** keys.



Note: The H5CX is factory-set for timer operation.

Confirm the status of DIP switch pins 1 to 8 using the **F2**/**F3** keys.

- Note 1.** This display is not supported with H5CX-L8□.
- 2.** This display is only possible when DIP switch pin 1 (DIP switch settings enable/disable) is set to ON (enable).



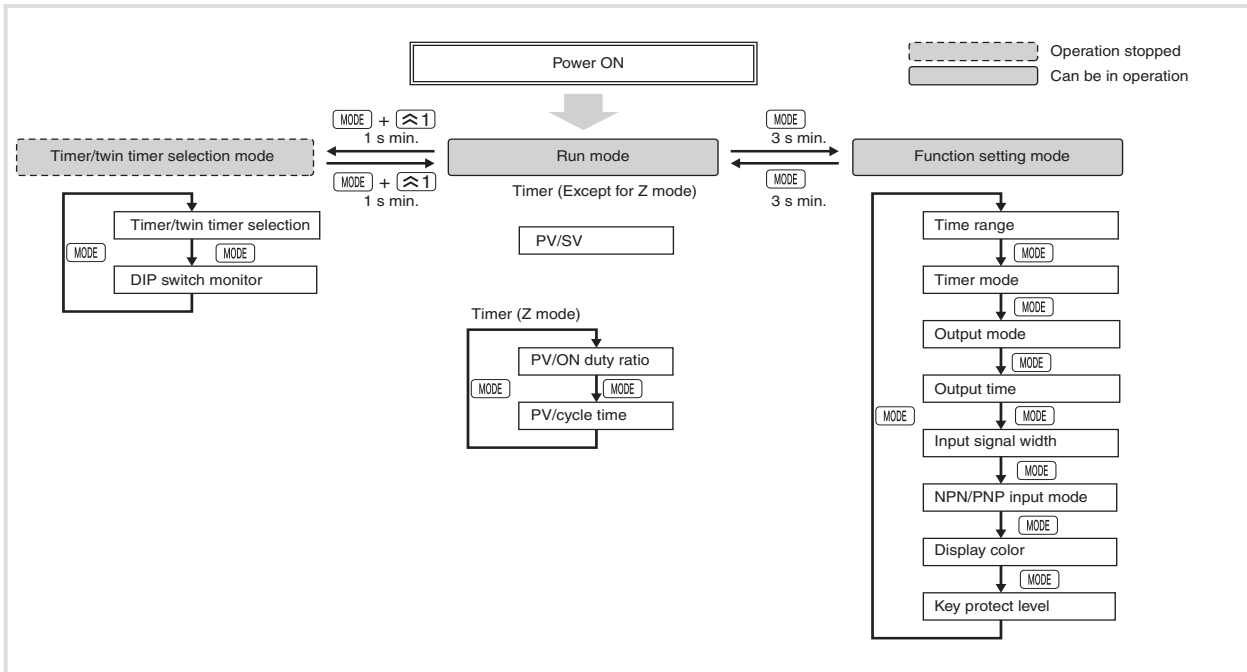
Note 1. When the mode is changed to timer/twin timer selection mode, the present value is reset and output turns OFF. Timing operation is not performed in timer/twin timer selection mode.

2. Setting changes made in timer/twin timer selection mode are enabled when the mode is changed to run mode. If settings are changed, the H5CX is automatically reset (present value initialized, output turned OFF).

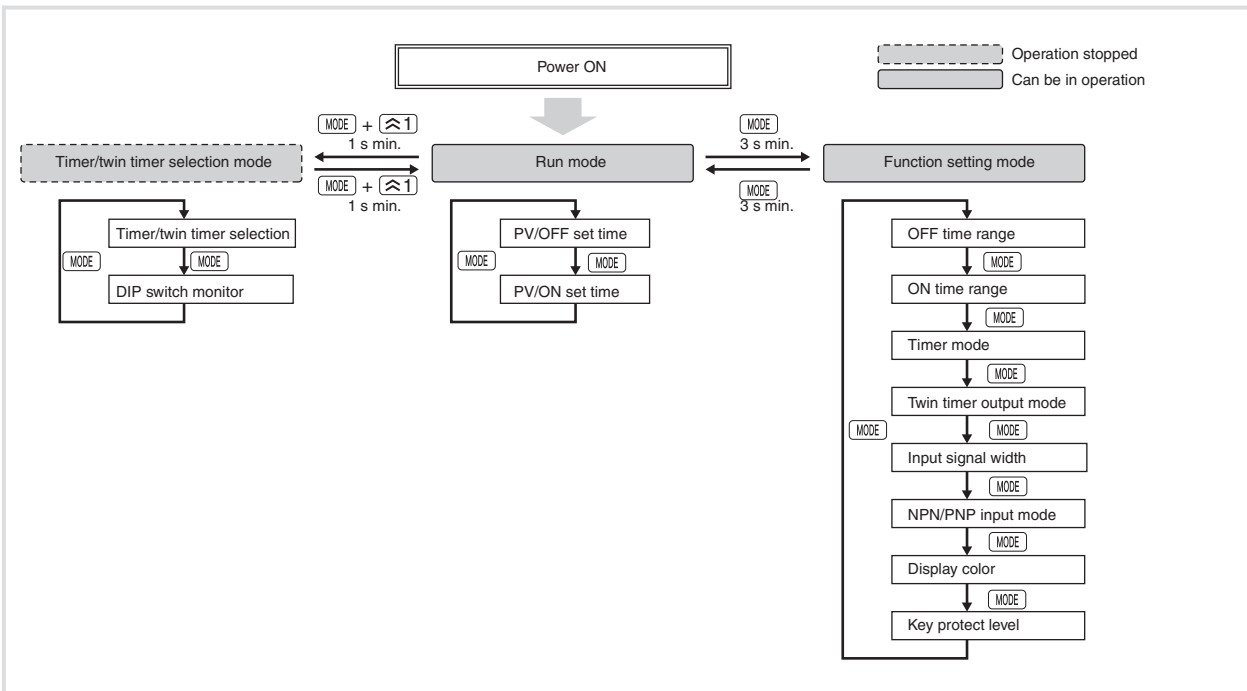
Additional Information

Using the Operation Keys

Timer Operation



Twin Timer Operation



- Note 1.** All setting changes are performed using the **⇧** and **⇩** keys.
2. The above flowcharts outline the procedure for all models. For details on specific models, refer to page 178 (timer operation) or page 185 (twin timer operation).

List of Settings

Fill in your set values in the set value column of the following tables and utilize the tables for quick reference.

Timer/Twin Timer Selection Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Timer/Twin Timer selection	<i>FUnC</i>	<i>tLn/tLn</i>	<i>tLn</i>	---	
DIP switch monitor	<i>dLP</i>	<i>on/off</i>	<i>off</i>	---	

Settings for Timer Operation

Run Mode when Output Mode Is Not Z

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Present value, set value	Set value	---	0.00 to 99.99 (Time range: --,--s)	0.00	s
		---	0.0 to 999.9 (Time range: ---, -s)	0.0	s
		---	0 to 9999 (Time range: ----s)	0	s
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s
		---	0.0 to 999.9 (Time range: ---, -min)	0.0	min
		---	0 to 9999 (Time range: ----min)	0	min
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min
		---	0.0 to 999.9 (Time range: ---, -h)	0.0	h
		---	0 to 9999 (Time range: ----h)	0	h
		---	0.000 to 9.999 (Time range: -,---s)	0.000	s
		Present value	---	Same as set value	Same as left

Run Mode when Output Mode = Z

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Present value, ON duty ratio	Cycle time	---	0.00 to 99.99 (Time range: --,--s)	0.00	s
		---	0.0 to 999.9 (Time range: ---, -s)	0.0	s
		---	0 to 9999 (Time range: ----s)	0	s
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s
		---	0.0 to 999.9 (Time range: ---, -min)	0.0	min
		---	0 to 9999 (Time range: ----min)	0	min
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min
		---	0.0 to 999.9 (Time range: ---, -h)	0.0	h
		---	0 to 9999 (Time range: ----h)	0	h
		---	0.000 to 9.999 (Time range: -,---s)	0.000	s
			ON duty ratio	---	0 to 100
Present value, cycle time	Present value	---	Same as cycle time above	Same as left	Same as left
	Present value	---	Same as cycle time above	Same as left	Same as left

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Time range	<i>tLn</i>	--,--s/---, -s/----s/--min--s/---, -min/----min/--h--min/---, -h/---h/---s	---	---	
Timer mode	<i>tLn</i>	UP/dLn	UP	---	
Output mode	<i>oLn</i>	R/R- 1/R- 2/R- 3/b/b- 1/d/E/F/E	R	---	
Output time	<i>oLn</i>	Hd/d10.0 1 to 99.99	Hd	s	
Input signal width	<i>fL</i>	20ns/ 1ns	20ns	---	
NPN/PNP input mode	<i>in</i>	nPn/PnP	nPn	---	
Display color	<i>Ed</i>	rEd/Gr/G/r- o/o-r	rEd	---	
Key protect level	<i>HP</i>	HP- 1/HP- 2/HP- 3/HP- 4/HP- 5	HP- 1	---	

Settings for Twin Timer Operation

Run Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Present value, OFF set time	OFF set time	---	0.00 to 99.99 (Time range: --,-s)	0.00	s
		---	0.0 to 999.9 (Time range: ---,-s)	0.0	s
		---	0 to 9999 (Time range: ----s)	0	s
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s
		---	0.0 to 999.9 (Time range: ---,-min)	0.0	min
		---	0 to 9999 (Time range: ----min)	0	min
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min
		---	0.0 to 999.9 (Time range: ---,-h)	0.0	h
		---	0 to 9999 (Time range: ----h)	0	h
	---	0.000 to 9.999 (Time range: -,---s)	0.000	s	
Present value	---	Same as OFF set time above	Same as left	Same as left	
Present value, ON set time	ON set time	---	Same as OFF set time above	Same as left	Same as left
	Present value	---	Same as OFF set time above	Same as left	Same as left

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
OFF time range	ōFŁr	--,-s/---,-s/---s/--min-s/----min/---min/ --h--min/----h/---h/-,-s	---,-s	---	
ON time range	ōnŁr	--,-s/---,-s/---s/--min--s/----min/---min/ --h--min/----h/---h/-,-s	---,-s	---	
Timer mode	ŁŁŃŃ	UP/dōŁn	UP	---	
ON/OFF start mode	ŁōŁŃ	ŁōFF/Łōn	ŁōFF	---	
Input signal width	ŁFLŁ	20Ń5/ 1Ń5	20Ń5	---	
NPN/PNP input mode	ŁŃōd	nPn/PnP	nPn	---	
Display color	ŁōŁr	rEd/Łrn/r-Ł/Ł-r	rEd	---	
Key protect level	ŁŁPL	ŁP- 1/ŁP-2/ŁP-3/ŁP-4/ŁP-5	ŁP- 1	---	

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

Period Meter K3NP

An Ideal Interface for Easily Measuring the Time Interval

- 50-kHz input range and 0.08% accuracy for sophisticated control.
- A wide selection of outputs: relay, transistor, BCD, linear, or communications.
- Maximum/Minimum value hold, set value write protection, and more.
- Banks with four comparative output values and four prescale values.
- Set value teaching, linear output range teaching, and prescale teaching are available using actual measured values.
- Prescale function available, which displays in units of actual physical parameters (length, volume, etc.).
- Displays values in hours, minutes, and seconds in operating modes 2 to 4.
- Built-in sensor power supply (12 VDC, 80 mA).
- Compact 1/8 DIN size.
- Conforms to EMC standards, EN61010-1 (IEC1010-1).
- UL/CSA approved.



Model Number Structure

■ Model Number Legend

Base Units and Output Boards can be ordered individually or as sets. Refer to the *Output Board Combinations* table on page 194.

Base Units

K3NP -

1 2 3 4

Output Boards

K31 -

5 6 7 8

Base Units with Output Boards

K3NP - -

1 2 3 4 5 6 7 8

1, 2. Input Sensors Codes

- NB: NPN inputs/Voltage pulse inputs
- PB: PNP inputs

3. Supply Voltage

- 1: 100 to 240 VAC
- 2: 12 to 24 VDC

4. Display

- A: Basic
- C: Set Value LED Display

5, 6, 7, 8. Output Type Codes



- C1: 3 comparative relay contact outputs (H, PASS, L: SPDT)
- C2: 5 comparative relay contact outputs (HH, H, L, LL: SPST-NO; PASS: SPDT)
- C5: 5 comparative relay contact outputs (HH, H, L, LL: SPST-NC; PASS: SPDT)
- T1: 5 comparative transistor outputs (NPN open collector)
- T2: 5 comparative transistor outputs (PNP open collector)
- B2: BCD output (NPN open collector) (see note)
- B4: BCD output + 5 transistor outputs (NPN open collector)
- L1: Linear output (4 to 20 mA) (see note)

- L2: Linear output (1 to 5 VDC) (see note)
- L3: Linear output (1 mV/10 digits) (see note)
- L4: Linear output, 4 to 20 mA + 5 transistor outputs (NPN open collector)
- L5: Linear output, 1 to 5 V + 5 transistor outputs (NPN open collector)
- L6: Linear output, 1 mV/10 digits+ 5 transistor outputs (NPN open collector)
- L7: Linear output, 0 to 5 VDC (see note)
- L8: Linear output, 0 to 10 VDC (see note)
- L9: Linear output, 0 to 5 VDC + 5 transistor outputs (NPN open collector)
- L10: Linear output, 0 to 10 VDC + 5 transistor outputs (NPN open collector)
- FLK1: Communication RS-232C (see note)
- FLK2: Communication RS-485 (see note)
- FLK3: Communication RS-422 (see note)
- FLK4: RS-232C + 5 transistor outputs (NPN open collector)
- FLK5: RS-485 + 5 transistor outputs (NPN open collector)
- FLK6: RS-422 + 5 transistor outputs (NPN open collector)

Note: These output types are available on Basic Models only.

Ordering Information

■ Base Unit

Input type Supply voltage	NPN/Voltage pulse		PNP	
	100 to 240 VAC	12 to 24 VDC	100 to 240 VAC	12 to 24 VDC
Basic Models These models provide a present value LED and front-panel control keys. Can be connected to any Output Board, or can be used for display only without an Output Board. 	K3NP-NB1A	K3NP-NB2A	K3NP-PB1A	K3NP-PB2A
Set Value LED Models These models provide a present value LED, set value LED, and front-panel control keys. Can be connected to Relay, Transistor, or Combination Output Boards. 	K3NP-NB1C	K3NP-NB2C	K3NP-PB1C	K3NP-PB2C

■ Available Output Board Combinations

Output type	Output configuration	Output boards	Base units	
			Basic	Set Value LED Display
Relay contact	3 outputs: H, PASS, L (SPDT)	K31-C1	Yes	Yes
	5 outputs: HH, H, L, LL (SPST-NO), and PASS (SPDT)	K31-C2	Yes	Yes
	5 outputs: HH, H, L, LL (SPST-NC), and PASS (SPDT)	K31-C5	Yes	Yes
Transistor	5 outputs (NPN open collector)	K31-T1	Yes	Yes
	5 outputs (PNP open collector)	K31-T2	Yes	Yes
BCD (see note)	5-digit output (NPN open collector)	K31-B2	Yes	---
Linear	4 to 20 mA DC	K31-L1	Yes	---
	1 to 5 VDC	K31-L2	Yes	---
	1 mV/10 digits	K31-L3	Yes	---
	0 to 5 VDC	K31-L7	Yes	---
	0 to 10 VDC	K31-L8	Yes	---
Communication boards (see note)	RS-232C	K31-FLK1	Yes	---
	RS-485	K31-FLK2	Yes	---
	RS-422	K31-FLK3	Yes	---
Combination output and communication boards	BCD output + 5 transistor outputs (NPN open collector)	K31-B4	Yes	Yes
	4 to 20 mA + 5 transistor outputs (NPN open collector)	K31-L4	Yes	Yes
	1 to 5 V + 5 transistor outputs (NPN open collector)	K31-L5	Yes	Yes
	1 mV/10 digits + 5 transistor outputs (NPN open collector)	K31-L6	Yes	Yes
	0 to 5 VDC + 5 transistor outputs (NPN open collector)	K31-L9	Yes	Yes
	0 to 10 VDC + 5 transistor outputs (NPN open collector)	K31-L10	Yes	Yes
	RS-232C + 5 transistor outputs (NPN open collector)	K31-FLK4	Yes	Yes
	RS-485 + 5 transistor outputs (NPN open collector)	K31-FLK5	Yes	Yes
	RS-422 + 5 transistor outputs (NPN open collector)	K31-FLK6	Yes	Yes

Note: For details, refer to the *Communication Operation Manual*.

Specifications

■ Ratings

Supply voltage	100 to 240 VAC (50/60 Hz); 12 to 24 VDC																																	
Operating voltage range	85% to 110% of supply voltage																																	
Power consumption (see note)	15 VA max. (max. AC load with all indicators lit) 10 W max. (max. DC load with all indicators lit)																																	
Sensor power supply	80 mA at 12 VDC±10%																																	
Insulation resistance	20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.																																	
Dielectric strength	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.																																	
Noise immunity	±1,500 V on power supply terminals in normal or common mode ±1 μs, 100 ns for square-wave noise with 1 ns																																	
Vibration resistance	Malfunction: 10 to 55 Hz, 0.5-mm for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 0.75-mm for 2 hrs each in X, Y, and Z directions																																	
Shock resistance	Malfunction: 98 m/s ² (10G) for 3 times each in X, Y, and Z directions Destruction: 294 m/s ² (30G) for 3 times each in X, Y, and Z directions																																	
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -20°C to 65°C (with no icing)																																	
Ambient humidity	Operating: 25% to 85% (with no condensation)																																	
EMC	<table border="0"> <tr> <td>(EMI)</td> <td>EN61326+A1</td> <td>Industry</td> </tr> <tr> <td>Emission Enclosure:</td> <td>CISPR 11 Group 1 class A: CISRP16-1/-2</td> <td></td> </tr> <tr> <td>Emission AC Mains:</td> <td>CISPR 11 Group 1 class A: CISRP16-1/-2</td> <td></td> </tr> <tr> <td>(EMS)</td> <td>EN61326+A1</td> <td>Industry</td> </tr> <tr> <td>Immunity ESD:</td> <td>EN61000-4-2:</td> <td>4 kV contact discharge (level 2) 8 kV air discharge (level 3)</td> </tr> <tr> <td>Immunity RF-interference:</td> <td>EN61000-4-3:</td> <td>10 V/m (amplitude-modulated, 80 MHz to 1 GHz) (level 3)</td> </tr> <tr> <td>Immunity Fast Transient Noise:</td> <td>EN61000-4-4:</td> <td>2 kV (power line) (level 3)</td> </tr> <tr> <td>Immunity Burst Noise:</td> <td></td> <td>1 kV line to line (I/O signal line)</td> </tr> <tr> <td>Immunity Surge:</td> <td>EN61000-4-5:</td> <td>1 kV line to line 2 kV line to ground (power line)</td> </tr> <tr> <td>Immunity Conducted Disturbance</td> <td>EN61000-4-6:</td> <td>3 V (0.15 to 80 MHz) (level 2)</td> </tr> <tr> <td>Immunity Voltage Dip/Interrupting</td> <td>EN61000-4-11:</td> <td>0.5 cycles, 0, 180°, 100% (rated voltage)</td> </tr> </table>	(EMI)	EN61326+A1	Industry	Emission Enclosure:	CISPR 11 Group 1 class A: CISRP16-1/-2		Emission AC Mains:	CISPR 11 Group 1 class A: CISRP16-1/-2		(EMS)	EN61326+A1	Industry	Immunity ESD:	EN61000-4-2:	4 kV contact discharge (level 2) 8 kV air discharge (level 3)	Immunity RF-interference:	EN61000-4-3:	10 V/m (amplitude-modulated, 80 MHz to 1 GHz) (level 3)	Immunity Fast Transient Noise:	EN61000-4-4:	2 kV (power line) (level 3)	Immunity Burst Noise:		1 kV line to line (I/O signal line)	Immunity Surge:	EN61000-4-5:	1 kV line to line 2 kV line to ground (power line)	Immunity Conducted Disturbance	EN61000-4-6:	3 V (0.15 to 80 MHz) (level 2)	Immunity Voltage Dip/Interrupting	EN61000-4-11:	0.5 cycles, 0, 180°, 100% (rated voltage)
(EMI)	EN61326+A1	Industry																																
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Immunity Voltage Dip/Interrupting	EN61000-4-11:	0.5 cycles, 0, 180°, 100% (rated voltage)																																
Approved standards	UL508, CSA22.2; Conforms to EN61326+A1, EN61010-1 (IEC61010-1) Conforms to VDE0106/P100 (finger protection) when the terminal cover is mounted.																																	
Weight	Approx. 400 g																																	

Note: A K3NP with DC supply voltage requires approximately 1 A DC as control power supply current the moment the K3NP is turned ON. Do not forget to take this into consideration when using several K3NP units. When the K3NP is not in measuring operation (e.g., the K3NP has been just turned ON or is operating for startup compensation time), the display will read "00000" and all outputs will be OFF.

■ Characteristics

Input signal	No-voltage contact (30 Hz max., ON/OFF pulse width: 15 ms min.) Voltage pulse (50 kHz max., ON/OFF pulse width: 9 μs min., ON voltage: 4.5 to 30 V/OFF voltage: -30 to 2 V) Open collector (50 kHz max., ON/OFF pulse width: 9 μs min.) Connectable Sensors ON residual voltage: 3 V max. OFF leakage current: 1.5 mA max. Load current: Must have switching capacity of 20 mA min. Must be able to dependably switch a load current of 5 mA max.
Measuring accuracy (at 23±5°C)	±0.08%rdg±1 digit
Measuring modes and ranges	Operating mode 1: Passing speed 10 ms to 3,200 seconds Operating mode 2: Cycle 20 ms to 3,200 seconds Operating mode 3: Time difference 10 ms to 3,200 seconds Operating mode 4: Elapsed time 10 ms to 3,200 seconds Operating mode 5: Length measurement 0 to 4G count (32-bit counter) Operating mode 6: Interval 0 to 4G count (32-bit counter)
Max. displayed digits	5 digits (0 to 99999)
Display	7-segment LED
Polarity display	Not available
Zero display	Leading zeros are not displayed.
Prescale function	Programming via front-panel key inputs. (0.0001 x 10 ⁻⁹ to 9.9999 x 10 ⁹ , decimal point can be set freely) Can be set using prescale value teaching.
HOLD functions	Max. value (peak) hold, Min. value (bottom) hold
External control	HOLD (Process value held) RESET (Maximum/minimum data reset) BANK (Selection of one bank out of 4 banks of set values) (Selection of one bank out of 4 banks of prescale values)
Other functions	Variable linear output range (for models with linear outputs only) (see note) Remote/Local processing (available for communications output models only) Maximum/Minimum value data reset with front panel keys Comparative output pattern selection Time unit display Security
Output configuration	Relay contact output (3 or 5 outputs) Transistor output (NPN and PNP open collector), BCD (NPN open collector) Parallel BCD (NPN open collector) + transistor output (NPN open collector) Linear output (4 to 20 mA, 1 to 5 V) + transistor output (NPN open collector) Communication functions (RS-232C, RS-485, RS-422) Communication functions (RS-232C, RS-485, RS-422) + transistor output (NPN open collector)
Delay in comparative outputs (at transistor output)	20 ms max.
Linear output response time	40 ms max.
Degree of protection	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

Note: The linear output range cannot be set when connected to a 1 mV/10-digit Linear Output Board.

Input/Output Ratings

Relay Contact Output

(Incorporating a G6B Relay)

Item	Resistive load (cosφ = 1)	Inductive load (cosφ = 0.4, L/R = 7 ms)
Rated load	5 A at 250 VAC; 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	380 VAC, 125 VDC	
Max. contact current	5 A max. (at COM terminal)	
Max. switching capacity	1,250 VA, 150 W	375 VA, 80 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	50,000,000 times min. (at a switching frequency of 18,000 times/hr)	
Electrical life (at an ambient temperature of 23°C)	100,000 times min. (at a rated load switching frequency of 1,800 times/hr)	

Transistor Output

Rated load voltage	12 to 24 VDC ^{+10%} / _{-15%}
Max. load current	50 mA
Leakage current	100 μA max.

BCD Output

I/O signal name		Item	Rating
Inputs	REQUEST, HOLD, MAX, MIN, RESET	Input signal	No-voltage contact input
		Input current with no-voltage input	10 mA
		Signal level	ON voltage: 1.5 V max. OFF voltage: 3 V min.
Outputs	DATA, POLARITY, OVERFLOW, DATA VALID, RUN	Rated load voltage	12 to 24 VDC ^{+10%} / _{-15%}
		Max. load current	10 mA
		Leakage current	100 μA max.

Note: Logic method: negative logic

Linear Output

Item	4 to 20 mA	1 to 5 V	1 mV/10 digits (see note)
Resolution	4,096		
Output error	±0.5% FS		±1.5% FS
Permissible load resistance	600 Ω max.	500 Ω min.	1 KΩ min.

Note: For the 1 mV/10-digit output, the output voltage changes for every 40 to 50 increment in the display value.

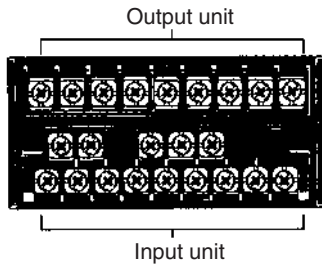
Communications Specifications

Item		RS-232C, RS-422	RS-485
Transmission method		4-wire, half-duplex	2-wire, half-duplex
Synchronization method		Start-stop synchronization	
Baud rate		1,200/2,400/4,800/9,600/19,200/38,400 bps	
Transmission code		ASCII (7-bit)	
Communications	Write	Comparative set value, prescaling value, remote/local programming, reset control of maximum/minimum values, and other setting mode items excluding communications conditions.	
	Read	Process value, comparative set value, maximum value, minimum value, model data, error code, and others	

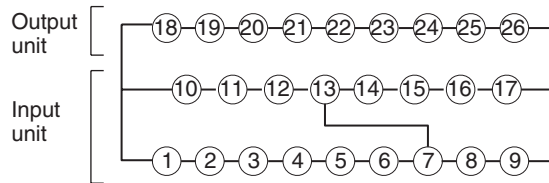
For details, refer to *Communication Operation Manual*.

Connections

Terminal Arrangement

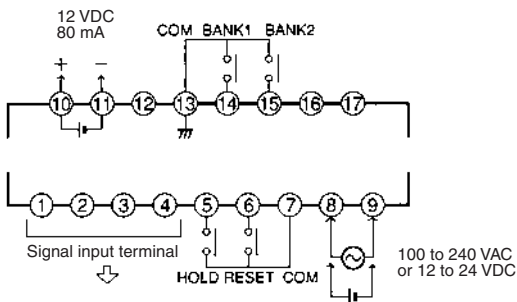


Terminal Numbers



Note: Terminals 7 to 13 are connected internally. Terminals 7 and 11 are mutually isolated.

Input Unit



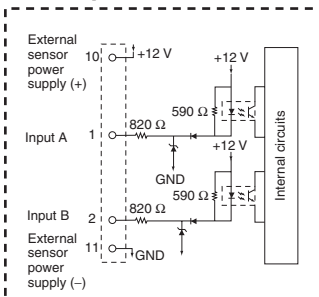
When inputting the external control signals through the open collector:

Transistor Inputs:
 ON: Residual voltage must be 3 V max.
 OFF: Leakage current must be 1.5 mA max.
 The switching capacity must be 20 mA or greater.

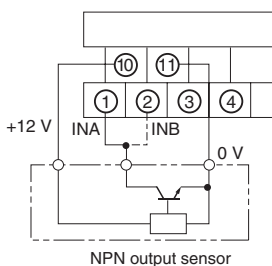
When the external signal input is short-circuited, a voltage of approximately 5 V will be applied to between the terminals 5 to 7 and the COM terminal, and a current of approximately 18 mA (nominal value) will flow.

Note: Check the power supply specifications of the model used before connecting the power supply. Recommended 24VDC power supply; eg. OMRON S8VS

NPN Inputs

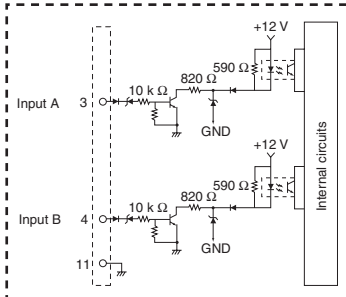


NPN Open Collector Output (NPN Linear 2-wire Output)

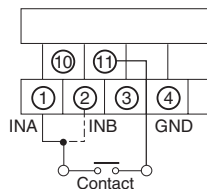


Note: Connect the + side of the NPN linear 2-wire input to terminal 1 and the - side to terminal 11.

Voltage Pulse Inputs

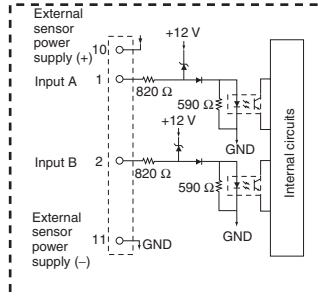


Contact Output

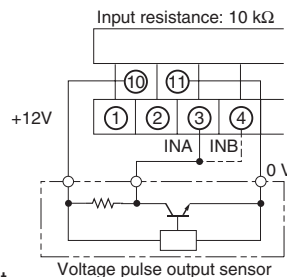


Note: When the contact is short-circuited, a current of approximately 13 mA will flow at a voltage of approximately 12 V.

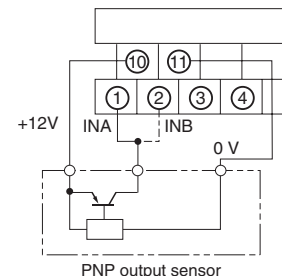
PNP-input Models



Voltage Output



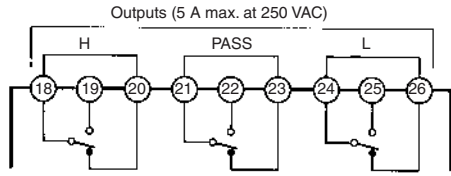
PNP Open Collector Output



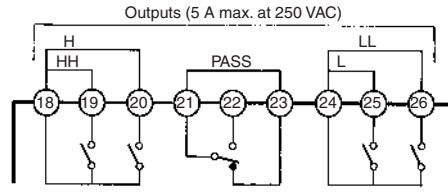
Note: With voltage pulse input not from a 3-wire sensor, connect the + side to terminal 3 and the - side to terminal 11.

Output Units

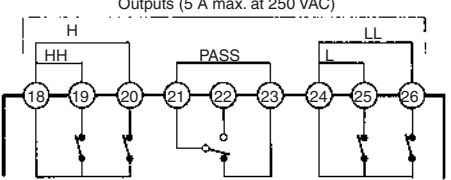
K31-C1: Relay (3 Outputs)



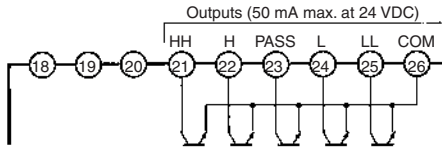
K31-C2: Relay (5 Outputs)



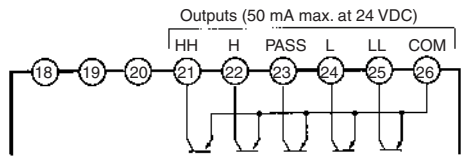
K31-C5: Relay (5 Outputs)



K31-T1: Transistor (NPN Open Collector)

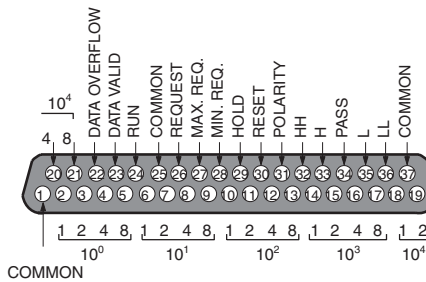


K31-T2: Transistor (PNP Open Collector)



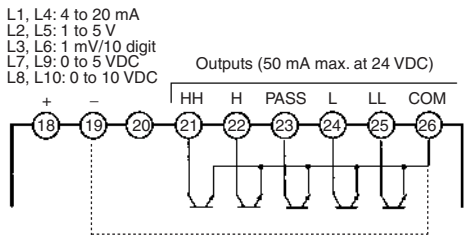
K31-B2, -B4: BCD (NPN Open Collector)

(Terminals 32 to 36 are provided only on K31-B4.)



K31-L1, L2, L3, -L4, -L5, -L6, -L7, -L8, -L9, -L10: Linear

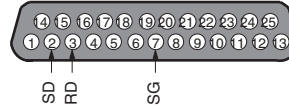
(Terminals 21 to 26 are provided only on K31-L4, -L5, -L6, -L9, -L10.)



- L1, L4: 4 to 20 mA
- L2, L5: 1 to 5 V
- L3, L6: 1 mV/10 digit
- L7, L9: 0 to 5 VDC
- L8, L10: 0 to 10 VDC

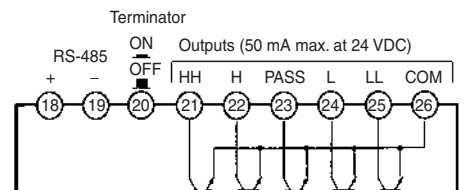
Note: With K31-L4/-L5/-L6/-L9/-L10 models, terminals 19 and 26 are connected internally.

K31-FLK1: RS-232C



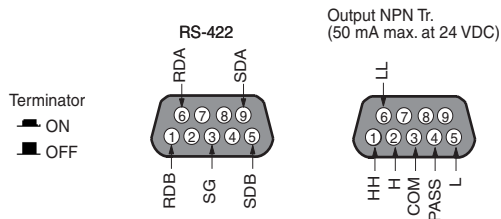
K31-FLK2, -FLK5: RS-485

(Terminals 21 to 26 are provided only on K31-FLK5.)



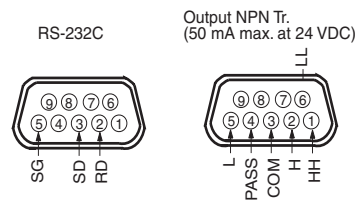
K31-FLK3, -FLK6: RS-422

(The right connector is provided only on K31-FLK6)

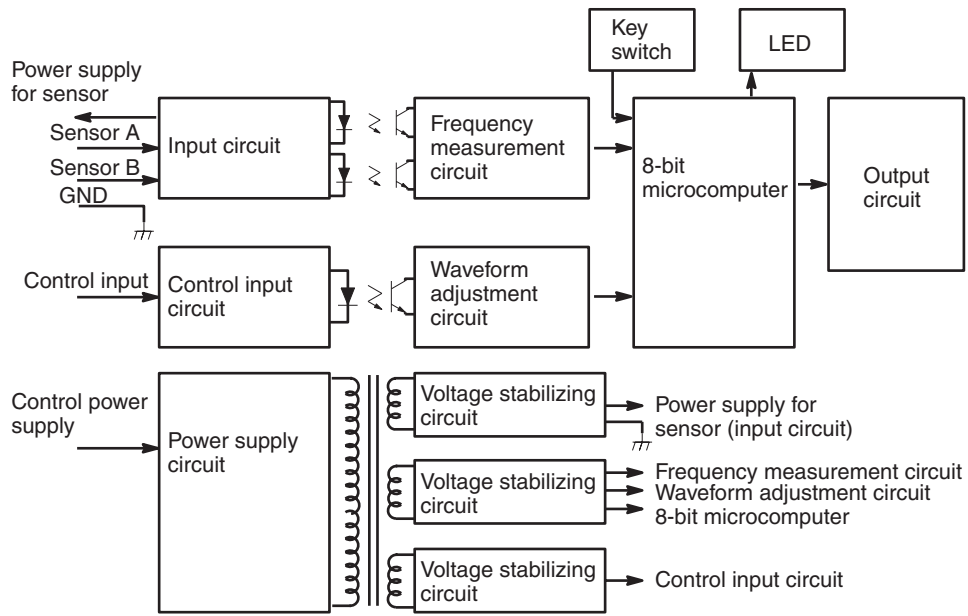


- D-sub 37P Connectors for BCD output (attachment)
Plug: XM2A-3701
Hood: XM2S-3711
- D-sub 25P connectors for RS-232C output (K31-FLK1) (order separately)
Plug: XM2A-2501
Hood: XM2S-2511
- D-sub 9P connectors for RS-422 output (K31-FLK3 and K31-FLK6) (order separately)
Plug: XM2A-0901
Hood: XM2S-0911
- D-sub 9P connectors for RS-232C output (K31-FLK4) (order separately)
Plug: XM2D-0901
Hood: XM2D-0911

K31-FLK4: RS-232C + Transistor (NPN Open Collector)



■ Block Diagram

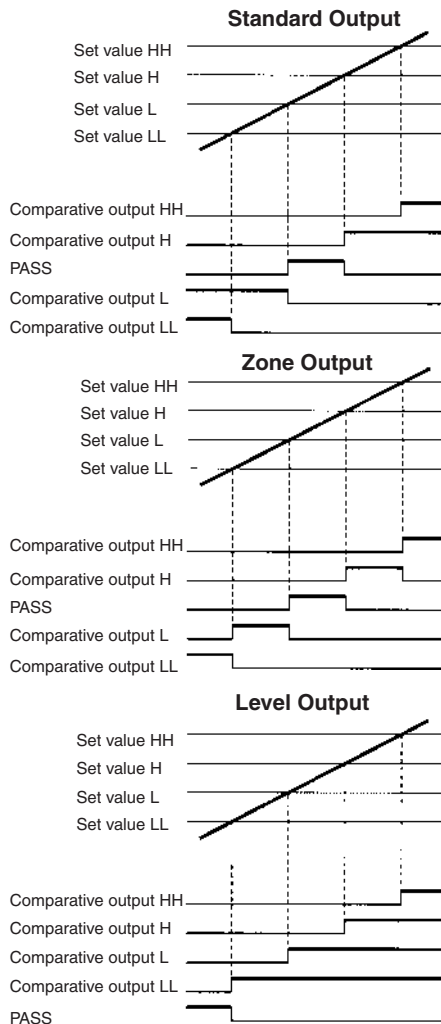


Operation

■ Main Functions

Output Pattern Selection *L-OUT*

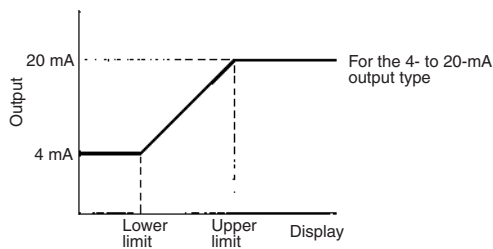
The patterns of comparative output are selectable according to the level change. Select the pattern according to the application.



Note: The following setting conditions must be satisfied, otherwise no zone output will turn ON correctly.
 $LL < L < H < HH$

Linear Output Range *LSET*

A linear output range can be set as required. A value corresponding to the maximum output value and that corresponding to the minimum output value can be set.



Remote/Local Selection *r-L*

Select remote programming when performing all settings through the host devices and select local programming when performing settings through key operation.

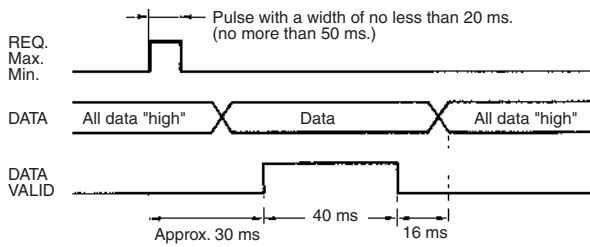
Prescaling

Input pulses are converted into desired values.

BCD Output Timing Chart

A request signal from an external device (such as a Programmable Controller) is required to read BCD data.

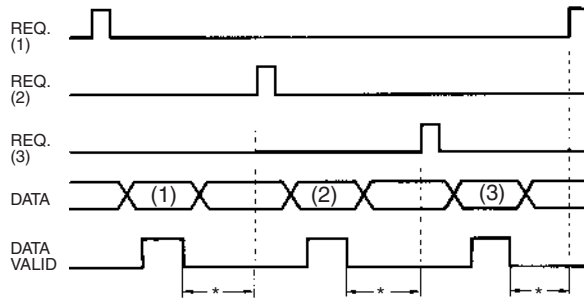
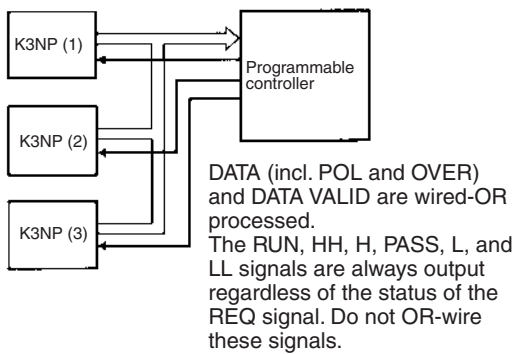
Single Sampling Data Output



Approximately 30 ms after the REQ signal rises, a sample is taken and the DATA VALID signal is output. Read the data when the DATA VALID signal is ON.

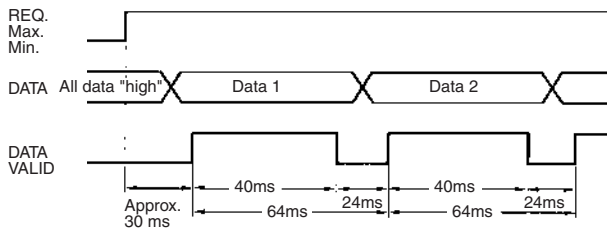
The DATA VALID signal will turn OFF in 40 ms, and then in 16 ms, the data will go OFF.

Models with a BCD output have an open collector output configuration so that wired-OR connection is possible.



*The period between the DATA VALID signal and the REQ signal should be no less than 20 ms max.

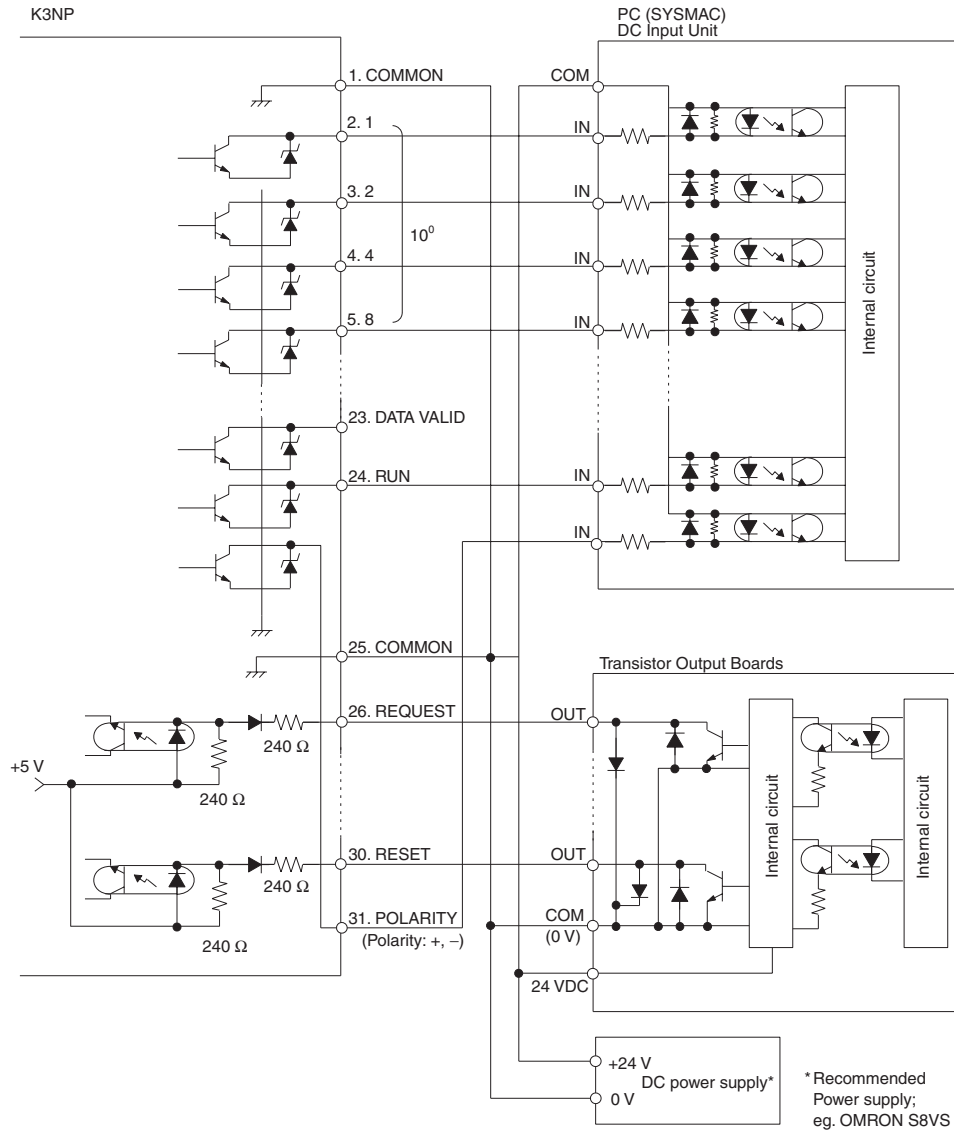
Continuous Data Output



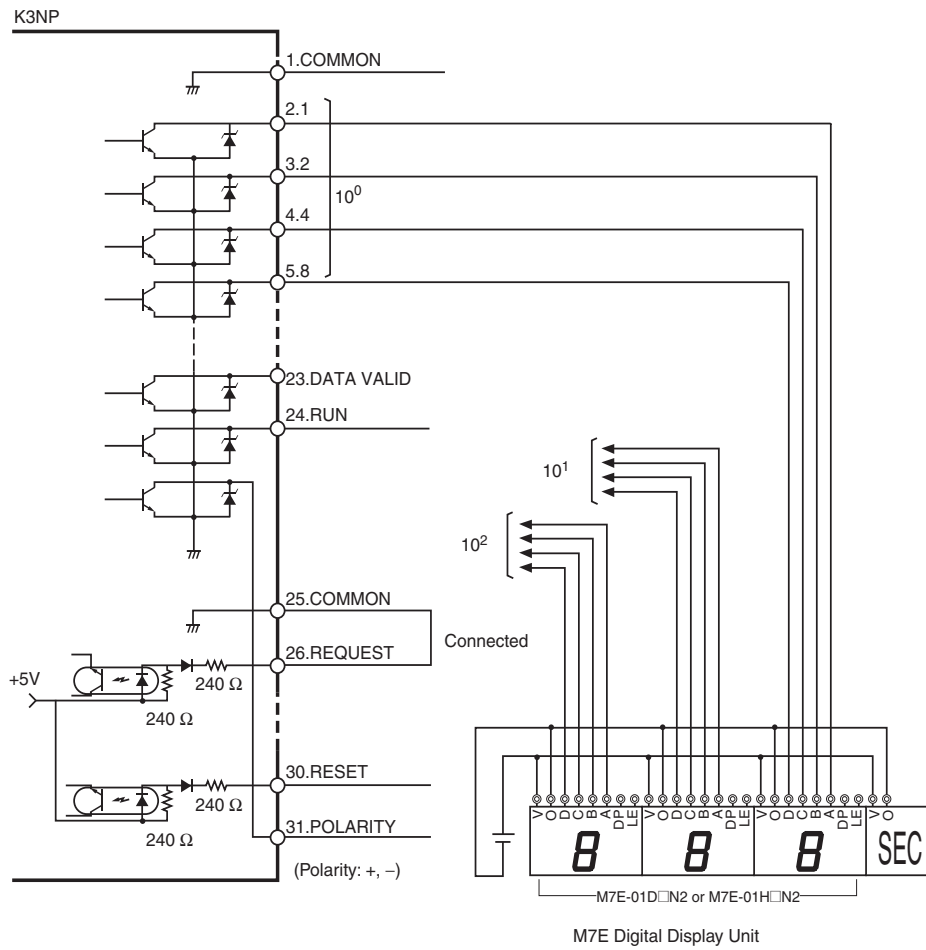
The K3NP outputs each measurement at an interval of 64 ms when a REQ signal is ON continuously.

If the HOLD signal is ON at the moment the DATA output is switched from Data 1 to Data 2 or vice versa, the output BCD data will be either Data 1 or Data 2 according to the timing of the HOLD signal. However, output data will never be below.

Example of Connection to Programmable Controller

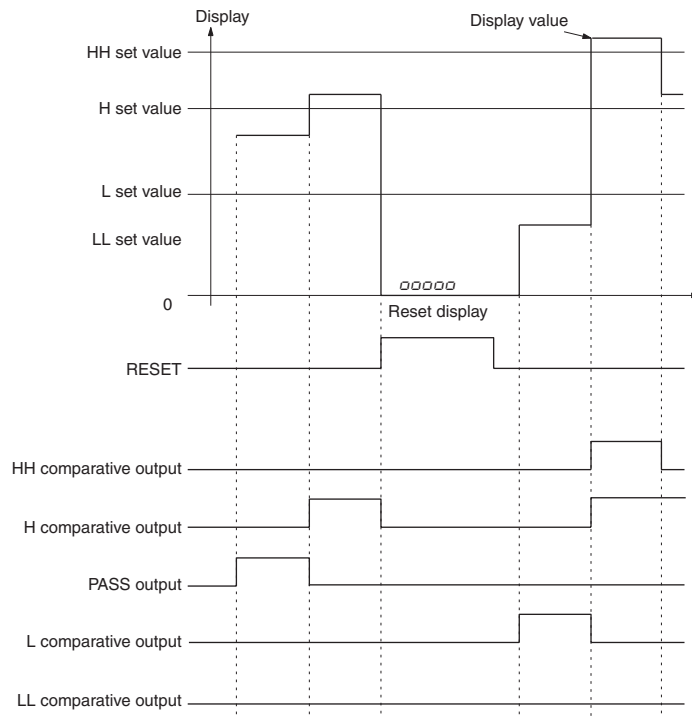


Example of Connection to Display Unit



Output Operation Timing in RUN Mode (Relay or Transistor Outputs)

The following timing chart is for a 5-comparative Output Board when the standard output pattern is selected.



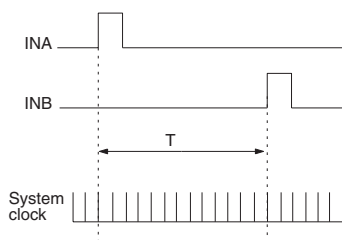
Note: Because measuring is not continuous, the comparative output turns ON when the measuring operation is completed.

Operating Modes

The K3NP provides 6 operating modes for converting input pulses to display values. The mode can be selected via key operations on the front panel.

The time between pulses or the pulse ON time is measured using the internal system clock, and time and other display values are calculated accordingly.

Example: F1 Passing Speed



Operating mode no.	Use
01	Passing speed
02	Cycle
03	Time difference
04	Elapsed time
05	Length measurement
06	Interval

The time (T) between the INA pulse and the INB pulse is counted using the internal system clock.

If the count between the pulses is 100,000, then

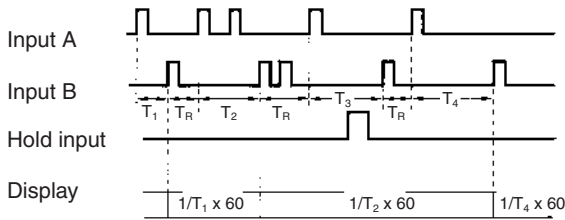
$$T = \text{System clock pulse (0.5 } \mu\text{s)} \times 100,000 = 0.05 \text{ s}$$

For operating mode 1 (Passing Speed), $1/T \times 60$ (m/min) is used. The display value is thus $1/0.05 \times 60$, or 1,200 (m/min)

Operating Mode 1: Passing Speed

The inverse of the time between input A coming ON and input B coming ON is multiplied by 60 and displayed.

A 20-ms recovery time (T_R) is required at the start of each measurement operation.

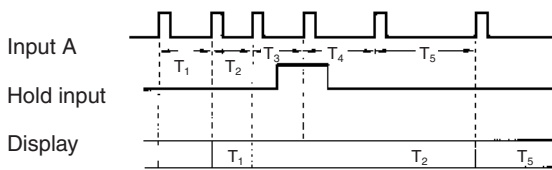


Units: mm/s; m/s; m/min; km/h; etc.

Operating Mode 2: Cycle

The period (T) of input A is displayed.

The K3NP is in measuring operation during every other period of input A ON.

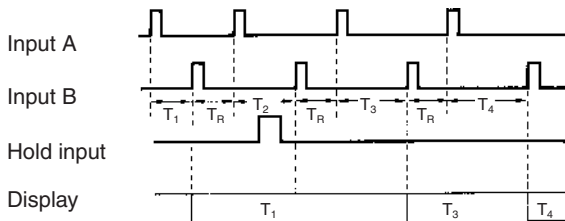


Units: s; min; h, min, s; min, s, 1/10 s; etc.

Operating Mode 3: Time Difference

The time between input A turning ON and input B turning ON is displayed.

A 20-ms recovery time (T_R) is required at the start of each measurement operation.

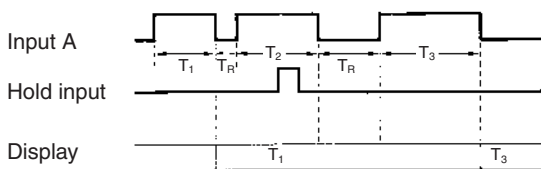


Units: s; min; h, min, s; min, s, 1/10 s; etc.

Operating Mode 4: Elapsed Time

The time (T) that input A is ON is displayed.

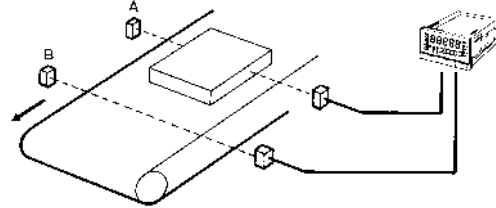
A 20-ms recovery time (T_R) is required at the start of each measurement operation.



Units: s; min; h, min, s; min, s, 1/10 s; etc.

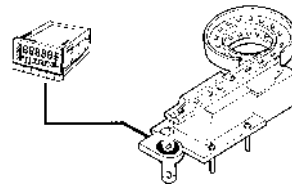
Application Example

Measuring the Speed of Workpieces between Points A and B



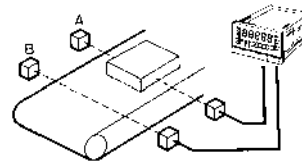
Application Example

Measuring the Rate at which Parts are Fed

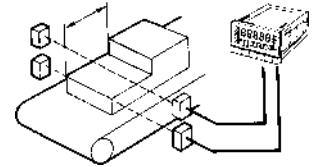


Application Example

Measuring the Time Required for Workpieces to Pass from Point A to Point B

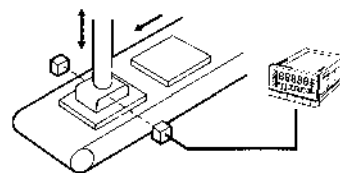


Can be Used with Prescaling to Measure Lengths of Steps

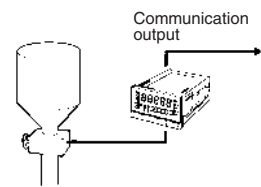


Application Example

Monitoring the Time That a Press is Activated

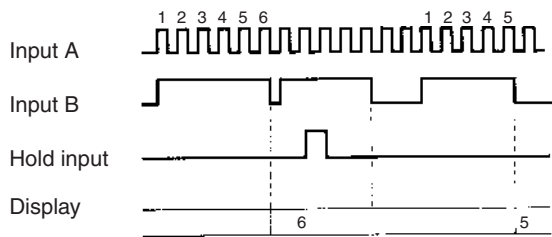


Controlling the Time That a Valve is Open



Operating Mode 5: Length Measurement

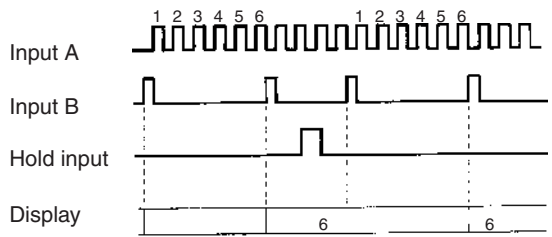
The number of pulses received on input A while input B is ON is displayed.



Units: mm; cm; m; etc.

Operating Mode 6: Interval

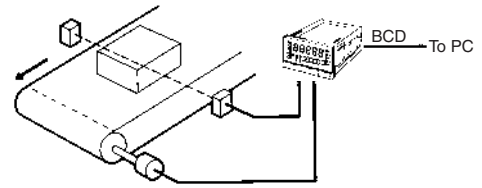
The number of pulses received on input A between two pulses on input B is displayed.



Units: mm; cm; m; etc.

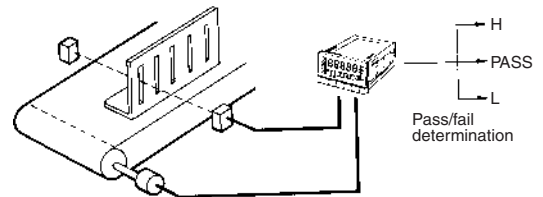
Application Example

Measuring Workpiece Length

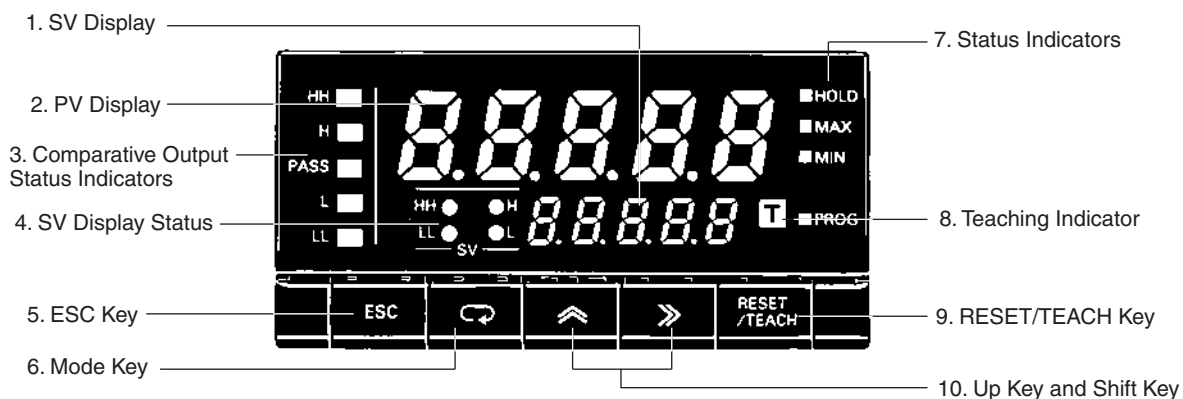


Application Example

Measuring Slot Spacing



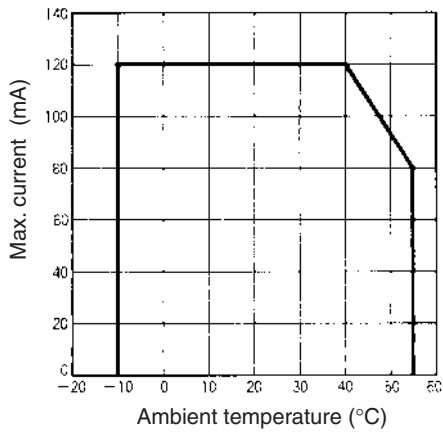
Nomenclature



Name	Functions
1. SV display	Displays the set value or parameter. Available for Set Value LED Models only.
2. PV display	Displays the process value in addition to the maximum value or parameter.
3. Comparative output status indicators	Displays the status of comparative output.
4. SV display status	Indicates which comparative set value is currently on the SV display.
5. ESC Key	Used to return to the RUN mode from the Setting, Protect, or Maintenance mode. The process value, maximum value, or minimum value to be displayed can be selected.
6. Mode Key	Used to enter the Setting mode. Used to allow the PV display to indicate set values sequentially. Available for Basic Models only. Used to indicate set values sequentially on the SV display. Available for Set Value LED Models only.
7. Status indicators	HOLD: Lit when HOLD input is ON. MAX: Lit when the maximum value is indicated on the PV display. MIN: Lit when the minimum value is indicated on the PV display. PROG: Lit or flashes while parameters are being set.
8. Teaching indicator	Lit when the teaching function is enabled and flashes when the K3NP is in teaching operation.
9. RESET/TEACH Key	The measurement data, maximum value, and minimum value are reset by pressing this key. Teaching is available when the teaching function is enabled.
10. Up Key and Shift Key	The digit being set is scrolled by pressing the Shift Key. The set value increases by one whenever the Up Key is pressed.

Engineering Data

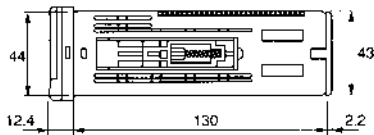
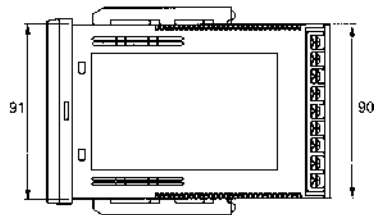
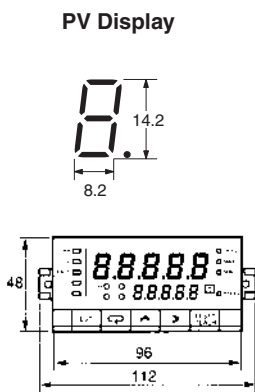
Derating Curve for Sensor Power Supply



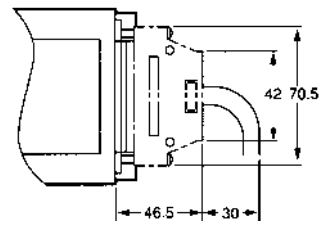
Note: The derating curve shown is for standard installation. The derating curve depends on the mounting direction.

Dimensions

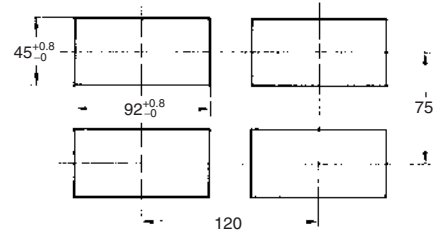
Note: All units are in millimeters unless otherwise indicated.



Note: The K3NP uses M3.5 terminals. A terminal cover is provided.



Panel Cutouts



Precautions

⚠ WARNING

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not allow metal objects or conductive wire cuttings to enter the product. Doing so may result in electric shock, fire, or malfunction.

⚠ Caution

Do not attempt to take the product apart or touch any internal parts while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

⚠ Caution

The lifetime of output relays varies greatly with the switching capacity and conditions. Consider the actual operating conditions, and use the relays within the rated load without exceeding the number of operations specified as the rated electrical life. Using relays beyond their rated electrical life may result in contact deposition or burning.

⚠ Caution

Do not use loads exceeding the rated value. Doing so may result in damage or burning.

⚠ Caution

Use a power supply voltage within the specified range. Not doing so may result in damage or burning.

⚠ Caution

Use settings that are appropriate for the control system. Discrepancies between the settings and the actual control conditions may result in unexpected operation leading to damage or accidents.

⚠ Caution

Be sure to tighten terminal screws to the specified torque.
Specified torque for M3.5 screws: 0.74 to 0.90 N·m
Loose screws may result in burning or malfunction.

■ Application Precautions

- Use a power supply voltage within the specified range. Not doing so may result in damage or burning.
- Be sure to perform wiring correctly, verifying the terminal names. Incorrect wiring may result in burning.
- Be sure to tighten the screws on the terminal block properly.
- Do not connect anything to unused terminals.

■ Correct Use

Long-term Use

Use all products within the specified ranges. When using inside a control panel, ensure that the temperature around the product, rather than the temperature around the control panel, does not exceed the specified temperature range. Electronic products, such as this product, have a lifetime that is dependent on the lifetime of internal electronic components, as opposed to the lifetime related to the number of relay switching operations. The lifetime of these components varies with the temperature; the higher the temperature, the shorter the lifetime. Therefore, the product lifetime can be extended by lowering the internal temperature of the product.

When several Period Meters are mounted close together (either horizontally or vertically), the internal temperature of the Period Meters may rise, leading to a reduction in the lifetime. In this case, take measures to cool the Period Meters, such as installing fans. Ensure, however, that the terminals are not cooled as this may lead to incorrect measurement.

Operating Environment

Do not use the product in locations subject to temperatures or humidity levels above the specified ranges, or in locations subject to condensation.

Do not use the product in locations subject to severe shocks or vibrations.

Separate the product from machines that generate high-frequency noise, such as high-frequency welding machines and high-frequency sewing machines.

Do not use the product in locations subject to dust or corrosive gases.

Do not use the product outdoors or in locations subject to direct sunlight.

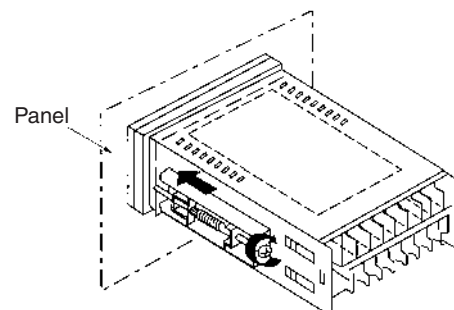
Operation

When using models with comparative outputs, if an error occurs at the Period Meter, comparative output may not operate correctly. We therefore recommend that you consider providing an alarm system separately as a countermeasure.

Parameter settings that allow the functions to operate properly are made, using the setting menu, at the factory prior to delivery. When using the product, change the settings as required for the application.

Mounting

Recommended panel thickness is 1 to 3.2 mm.



Attach the mounting bracket on the left and right sides of the Period Meter as shown in the illustration above and gradually tighten each screw evenly in turn by considering the balance of the tightening force until the ratchets start slipping without being further tightened.

Mount the Period Meter as horizontally as possible.

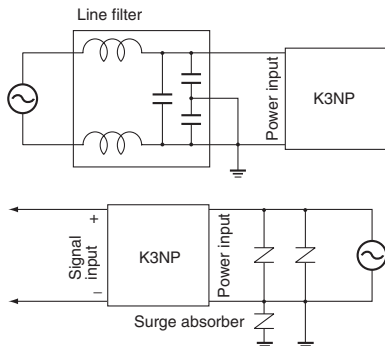
Waterproof Specifications

Products for which the degree of protection is not specified or models with IP□0 degree of protection do not have waterproof specifications.

Noise Countermeasures

Separate the product as far as possible from machines that generate high-frequency noise, such as high-frequency welding machines and high-frequency sewing machines, and machines that generate surges.

Attach surge absorbers or noise filters to noise-generating peripheral devices (in particular, devices with inductance such as motors, transformers, solenoids, and magnet coils).

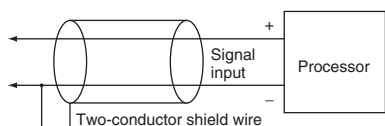


In order to prevent inductive noise, wire the lines connected to the terminal block separately from power lines carrying high voltages or large currents. Also, do not wire in parallel to, or in the same cable as power lines. There are other methods that are effective for reducing noise, such as running wires along ducts and using shield lines.

When using a noise filter for the power supply, check the voltage and current and install as close to the Period Meter as possible.

Inductive Noise Countermeasure for Input Line

Analog Input



Temperature Input

In order to prevent the influence of induction, separate the lead wire joining the temperature sensor and the Period Meter from power and load lines.

Using the product near radios, television sets, or other wireless devices may result in reception interference.

Unit Label (Provided)

No product is shipped with the unit label attached. Select a unit label from the sheet provided and attach it to the Period Meter.


A	A	mA	mA	V	kV	s	m'	cm'	rad
V	mV	mV	W	kW	S	S	-	kL	L/s
VA	kVA	var	kvar	Ω	L/min	L/h	kN	mN	Pa
C	F	K	Hz	rpm	kPa	mPa	N·m	kN·m	mN·m
m	mm	cm	μm	km	kg·m'	lx	c3s	•	rPh
l	kl	t	TON	lx	r/s	r/min	r/h	min'	h'
m'	cm'	mm'	kg	g	秒	時	分	度	h.min.s
mg	kg/m'	g/cm'	m'/kg	m/s	mas/100	時分秒	秒/100	omron	
G	N	mmHg	mmH ₂ O	kg/cm ²					
kg/mm ²	J	kJ	kgf-cm	gf-cm					
PS	hp	cal	kcal	kg/h					
t/h	kg/s	m/min	m'/h	m'/s					
l/s	l/min	l/h	m/min	mm/s					
m/s	%	dB	φ-mm	SCCM					
sec	ms	min	counts	-10					
×100	×1000	pH	ppm	pcs					
deg	cP	cSt	kΩ	MΩ					
kHz	rps								

Timers

Operating Procedures

■ Operation in RUN Mode

Reset


The initial status before any measurements were made can be returned to using the RESET/TEACH Key . (This status is referred to as the "reset status.") The status of the K3NP when it is in the reset status is as follows:

Display: All 5 digits in the PV display are 0 (00000).

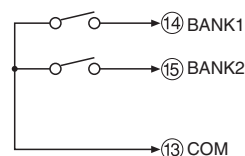
Comparative output: HH, H, PASS, L, and LL outputs are all OFF.

Maximum/minimum values: These values are reset.

Checking the Bank Number

Press the Shift Key  for 1 s min. during measurement to display the bank number in the PV display. (The display will return to the measurement value if there is no key operation for 5 seconds.)

Bank Selection




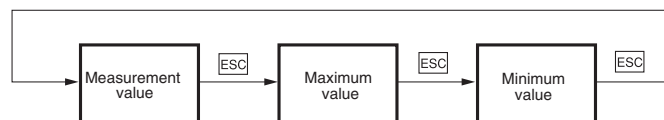
- Switch between the comparative set values and the prescaling values for banks 1 to 4 using the BANK 1 and BANK 2 signals.
- The relationship between the BANK 1 and BANK 2 signals and the bank numbers is shown in the following table.


Bank number	BANK 1	BANK 2	Comparative set value	Prescaling value
1	OFF	OFF	Sw 1.**	P5 1.**
2	ON	OFF	Sw 2.**	P5 2.**
3	OFF	ON	Sw 3.**	P5 3.**
4	ON	ON	Sw 4.**	P5 4.**

Note: If the prescale value bank is set to OFF, then the prescaling value for each bank is fixed.


Confirming Maximum and Minimum Values

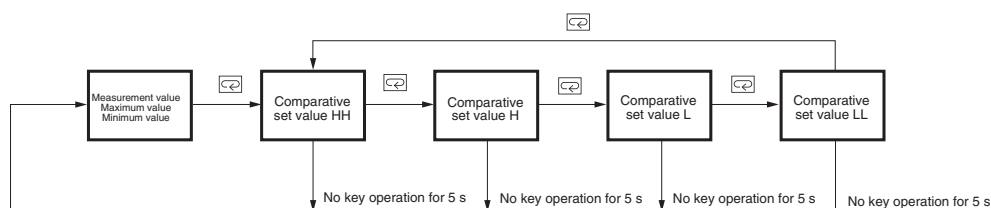
Press the ESC Key  during measurement to display the maximum and minimum values.





Press the RESET/TEACH Key  while the maximum or minimum value is displayed to reset the value. (This is not possible, however, if maximum/minimum value reset was prohibited in Protect Mode.)

Confirming and Setting Comparative Set Values

When the measurement value, the maximum value, or the minimum value is displayed, press the Mode Key  repeatedly to display the comparative set values in the order HH, H, L, and LL. (With models that have an SV display, the comparative set values are displayed in the SV display.)

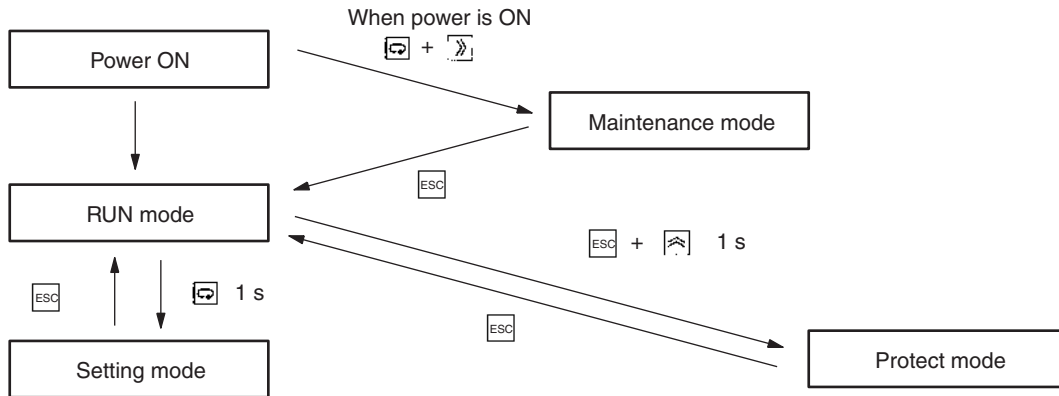


Note: When a comparative set value is displayed, it can be changed using the Up Key  and Shift Key  (if key protection is OFF).

Setting Procedures

The K3NP has four modes: RUN mode for normal operations, Setting mode for initial parameter input, Protect mode for lock-out configuration, and Maintenance mode for initializing set values. The parameters that are accessible on any individual K3NP will vary depending on the Output Board installed. Refer to the *K3NP Operation Manual* for details.

- RUN Mode:** Remains in this mode under normal operation.
The process value or the max./min. value can be monitored.
Using the front panel keys, the comparative set value can be changed and max./min. values reset can be performed.
- Setting Mode:** Used for making initial settings.
Includes settings for four menus (Set value (*SuSEt*), prescaling (*P5CL*), setup (*SEtUP*), option (*oPt*)) and the output test.
- Protect Mode:** Used for locking the front key operation or parameter changes.
- Maintenance Mode:** Used for initializing set values.



SuSEt - Program set values

- S.brAnP* Select bank no. of set values
- Su*.HH* Enter set value HH of bank 1
- Su*. H* Enter set value H of bank 1
- Su*. L* Enter set value L of bank 1
- Su*. LL* Enter set value LL of bank 1

Note: The above is an example when the bank number is set to 1.

P5CL - Display prescaling

- P.brAnP* Select bank no. of prescale values
- P5*.R_U* Set the mantissa (X) of the prescale value of input A
- P5*.R_Y* Set the exponent (Y) of the prescale value of input A
- dECP.** Select decimal point

Note: The above is an example when the bank number is set to 1.

SEtUP - Program operating mode/input sensor/serial communications

- FUnC* Specify operating mode
- LnA* Select a sensor type of input A
- LnB* Select a sensor type of input B
- tCnE* Select the display time unit
- U-n_o* Enter the unit no. for the host
- bPS* Select the baud rate
- LEn* Select the word bit length
- SbCt* Select the stop bits
- PrLy* Select the parity bits

oPt - Supplementary settings related to display or control

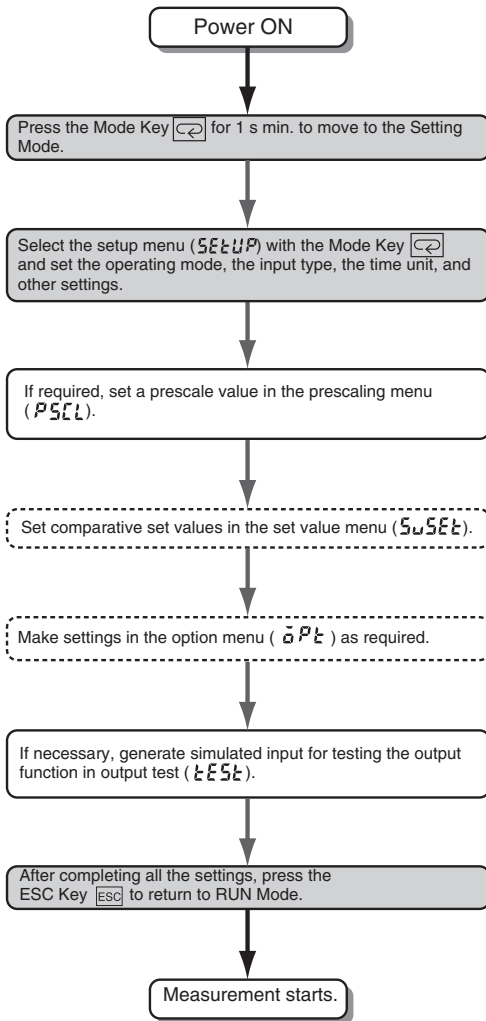
- C-oUt* Select the output pattern
- LSEt.H* Enter the upper limit (H) of linear output range
- LSEt.L* Enter the lower limit (L) of linear output range
- r-L* Select the remote/local programming

tESt - Generating simulated input for testing the output function

Prōt - Program lock-out configuration

- ALL* Enable all key protection
- SuSEt* Enable set value change prohibition
- rESEt* Enable prohibition of all the measurement data and max./min. value reset using the front panel keys
- SECr* Specify the menus to be protected against setting in the setting mode

Initial Settings



Prescaling

To display the passing speed between two points based on input pulses, the time measured internally must be multiplied by a fixed coefficient. The value of this coefficient will depend on the distance between the two points and the display unit. This coefficient is called the "prescale value." (Refer to the Operation Manual for details.)

Time Unit Setting

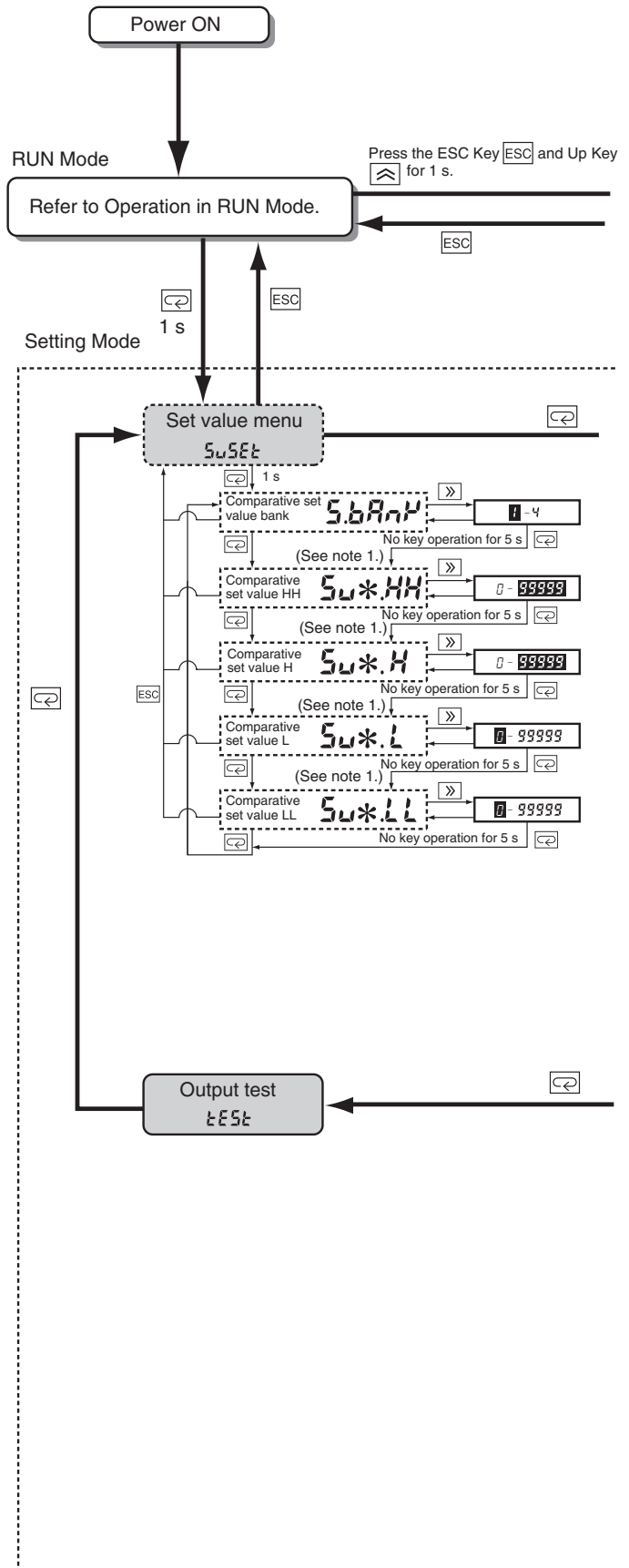
Setting	Meaning
SCAL	Set in the prescaling menu
SEC	Seconds
m.n	Minutes
m.n.ss.d	Minutes and seconds
H.m.n.ss	Hours, minutes, and seconds

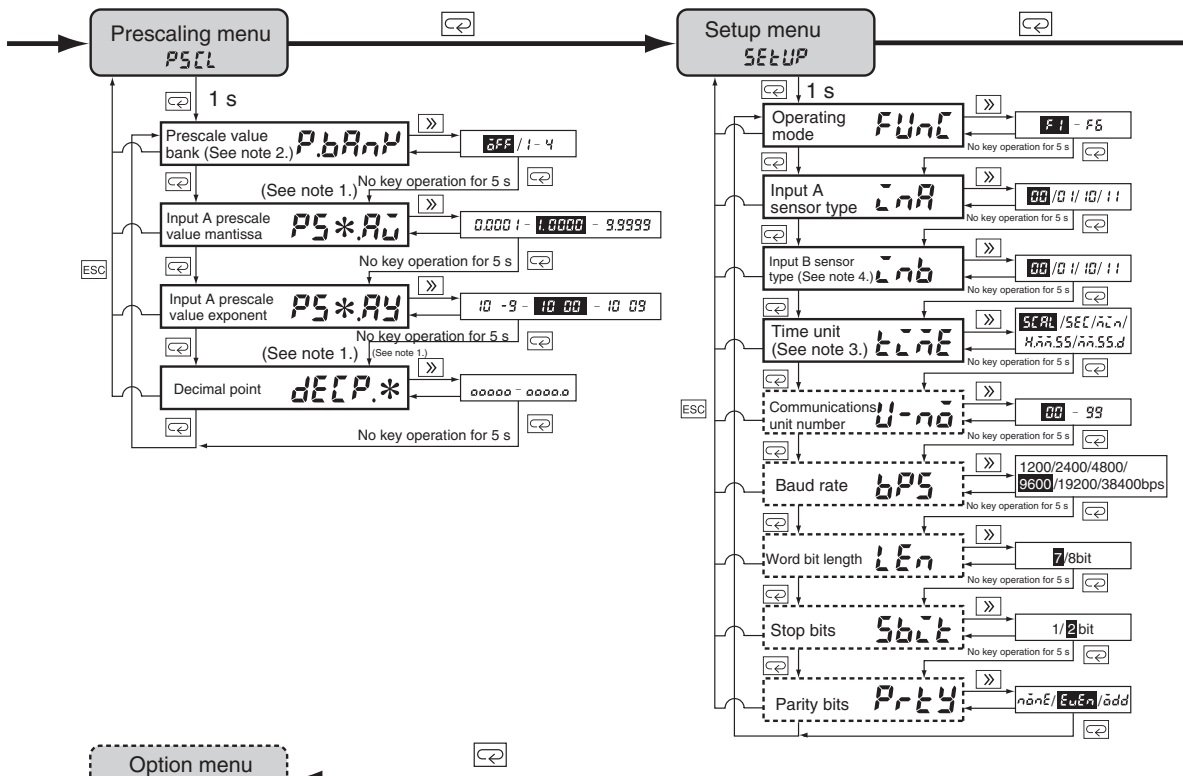
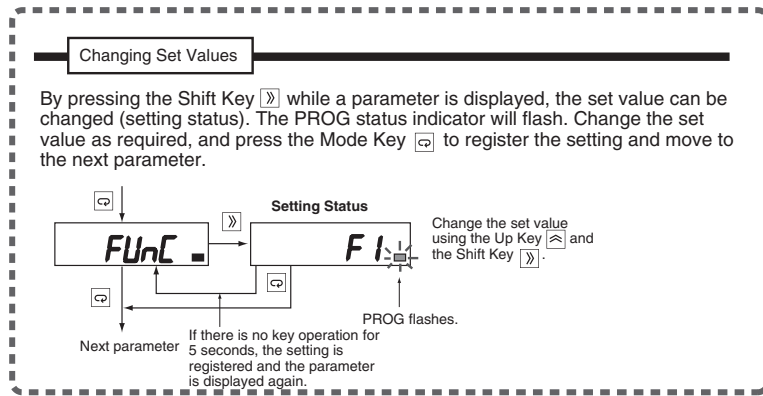
Selecting the Sensor Type

	NO: Voltage pulse H	NC: Voltage pulse L
No-contact or voltage pulse input	00	01
Contact input	10	11

Note: If there are large discrepancies in the display select 10 or 11. Note, however, that the maximum counting frequency is 30 Hz.

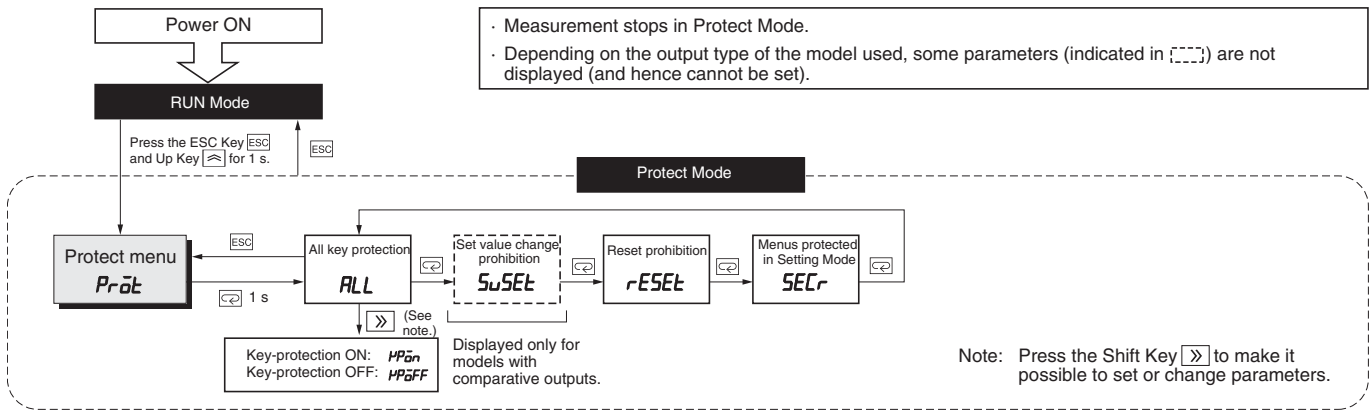
Parameters





- In the Setting Mode, measurement stops and all outputs turn OFF.
 - Depending on the output type of the model used, some parameters (indicated in $\boxed{}$) are not displayed (and hence cannot be set).
 - If the operating mode is changed, the prescale values and linear output range parameters will be re-set to their initial values. Set the operating mode first.
- Note 1:** A number in the range 1 to 4 will be displayed.
- Note 2:** Set a number in the range 2 to 4 to set more than one prescale value (i.e., to display measurements in more than one unit).
- Note 3:** These parameters will be displayed if F2, F3, or F4 (i.e., operating mode 2, 3, or 4) is set. If a parameter other than **SCALE** is set, the prescaling menu (**PSCL**) will not be displayed.
- Note 4:** This parameter will be displayed if F1, F3, F5, or F6 is selected.

Settings displayed in reverse colors are defaults.



Menu display	Parameter display	Meaning of parameter	Setting range	Setting key (See note.)																				
<p>Pröt</p> <p>Press the Mode Key [⇐] to display the parameter.</p> <p>Press the ESC Key [ESC] to return to the menu.</p>	<p>ALL</p> <p>Setting: [⇧]</p> <p>Next parameter: [⇐]</p>	<p>All key protection: All key operations are prohibited in RUN Mode. (If all key protection is ON, only the key for going to Protect Mode is enabled.)</p>	<p>Key protection ON: HPōn</p> <p>Key protection OFF: HPōFF</p>	<p>Use the Up Key [↑] to change the setting.</p> <p>↳ HPōn → HPōFF ↵</p> <p>Use the Mode Key [⇐] to enable the setting and move to the next parameter.</p>																				
	<p>SuSEt</p> <p>Setting: [⇧]</p> <p>Next parameter: [⇐]</p>	<p>Set value change prohibition: Changes to comparative set values are prohibited in RUN Mode. (Displayed only for models with comparative outputs.)</p>																						
	<p>rESEt</p> <p>Setting: [⇧]</p> <p>Next parameter: [⇐]</p>	<p>Reset prohibition: Resetting using the front panel keys is prohibited. (Resetting by external signals is not prohibited.)</p>																						
	<p>SECr</p> <p>Setting: [⇧]</p> <p>Next parameter: [⇐]</p>	<p>Menus protected in Setting Mode: Setting operations in Setting Mode are prohibited in the way shown below.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Setting menu</th> <th colspan="3">Setting</th> </tr> <tr> <th>0</th> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>Set value menu</td> <td></td> <td></td> <td>×</td> </tr> <tr> <td>Prescaling menu</td> <td></td> <td></td> <td>×</td> </tr> <tr> <td>Setup menu</td> <td></td> <td>×</td> <td>×</td> </tr> <tr> <td>Option menu</td> <td></td> <td></td> <td>×</td> </tr> </tbody> </table>			Setting menu	Setting			0	1	2	Set value menu			×	Prescaling menu			×	Setup menu		×	×	Option menu
Setting menu	Setting																							
	0	1	2																					
Set value menu			×																					
Prescaling menu			×																					
Setup menu		×	×																					
Option menu			×																					

Note: If there is no key operation for 5 seconds, the setting is automatically registered.

■ Troubleshooting

When an error occurs, error details will be displayed in the PV display. Take the appropriate countermeasures according to the error displayed.

Error display	Error contents	Output status				Countermeasure
		Comparative output	BCD output	Communications output	Linear output	
$\bar{n}1Err$ (M1.ERR) $\bar{n}2Err$ (M2.ERR)	Memory error	OFF	OFF (all outputs in "H" status)	OFF	OFF	Reset the power. If the same error occurs, repair is necessary.
$\bar{n}3Err$ (M3.ERR)		OFF	OFF (all outputs in "H" status)	OFF	OFF	
$Err-\bar{o}$ (ERR-O) $CHG-\bar{o}$ (CHG-O)	Output error	OFF	OFF (all outputs in "H" status)	OFF	OFF (minimum value)	Reset the power. If the same error occurs, repair is necessary. If normal operation is restored, it is possible that the original error was caused by the influence of noise. Check that there are no sources of noise in the vicinity.
(Display value flashes.)	The input range and display range were exceeded.	Continues	Continues The OVER signal turns ON.	Continues The OVER or UNDER signal turns ON.	Continues	Take steps to ensure that the input values and display values are within the allowable ranges.
$r\bar{n}t$ (RMT) (Flashes for 3 s.)	The remote/local section is set to remote.	Continues	Continues	Continues	Continues	If an attempt to change a setting using key operations is made with the remote/local selection set to remote, this error will flash for 3 s. To enable settings to be changed, set the remote/local selection to local.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. N088-E1-02

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

Motor Timer H2C

DIN-sized (48 x 48, 45 x 75 mm) Motor Timer with Variable Time Ranges

- Five time ranges are selectable per timer unit.
- Easy-to-monitor neon lamp for timing operation indication (for 110, 120, 220, 240 VAC types only).
- Easy-to-set large transparent knob and easy-to-read single pattern scale facilitate time setting.
- Equipped with timing operation indicator and moving pointer.
- Conforms to EN61812-1 and IEC60664-1 4 kV/1 for Low Voltage, and EMC Directives (except for H2C-F□).



Model Number Structure

Model Number Legend

H2C-□ □
1 2

1. External Connection/Attachment

- None: 11-pin socket
- S: 11-pin socket/time setting ring
- 8: 8-pin socket
- F: Front screw

2. Operation/Resetting System

- None: Time-limit operation/self-resetting
- R: Time-limit operation/electric resetting

Ordering Information

List of Models

Operation/resetting system	Internal connection	Terminal	Time-limit contact	Instantaneous contact	Attachment	Model
Time-limit operation/self-resetting	Parallel motor and clutch connection	8-pin socket	SPDT	SPDT	---	H2C-8
		11-pin socket			H2C	
	Separate motor and clutch connection	11-pin socket	---	Y92A-Y1 Time Setting Ring	H2C-S	
Time-limit operation/electric resetting		Front screw	SPDT	---	---	H2C-F
		8-pin socket			---	H2C-8R
		11-pin socket			SPDT	H2C-R
		11-pin socket			Y92A-Y1 Time Setting Ring	H2C-SR
		Front screw			---	H2C-FR

Note: Specify both the supply voltage and time range code (A, B, or C) in addition to the model number when ordering.

Example: H2C-S 24 VAC B
 └───┬─── Time range code
 └───┬─── Supply voltage

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
Time Setting Ring (See note 1.)		Y92A-Y1
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
Protective Cover		Y92A-48B
Track Mounting/Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin, screw terminal	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 2.)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 2.)
Hold-down Clip (See note 3.)	For PL08 and PL11 Sockets	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Supplied with H2C-S/-SR models.

2. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.






3. Hold-down Clips are sold in sets of two.

Specifications

■ Time Ranges

Five time ranges are available for each timer by turning the time range selector every 60 degrees.

Note: Rated time is displayed on the window.

Time range code	Position of time range selector				
					
A	1.25 to 30 s	7.5 s to 3 min	1.25 to 30 min	7.5 min to 3 h	1.25 to 30 h
B	0.2 to 6 s	2 to 60 s	0.2 to 6 min	2 to 60 min	0.2 to 6 h
C	0.5 to 12 s	5 to 120 s	0.5 to 12 min	5 to 120 min	0.5 to 12 h

■ Ratings

Item	H2C
Rated supply voltage (motor and clutch)	24, 48, 100, 110, 115, 120, 200, 220, or 240 VAC (50/60 Hz) (see note)
Operating voltage range	85% to 110% of rated supply voltage
Power consumption	4.2 VA max. (3.96 W max.)
Reset voltage	10% max. of rated supply voltage
Reset time	Minimum power-opening time: 0.5 s Minimum pulse width: 0.5 s
Control outputs	6 A at 250 VAC, resistive load (cosφ = 1)
Mounting method	Flush mounting (except for H2C-F/-FR models), surface mounting, DIN track mounting

Note: The front panel of the timer is color coded to identify the following supply voltage classifications:

100 to 120 V: Blue

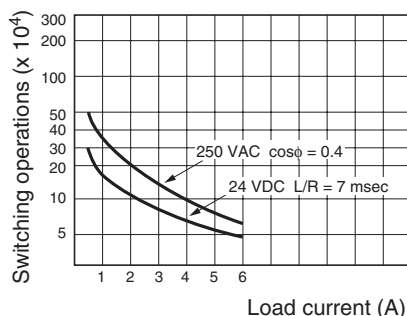
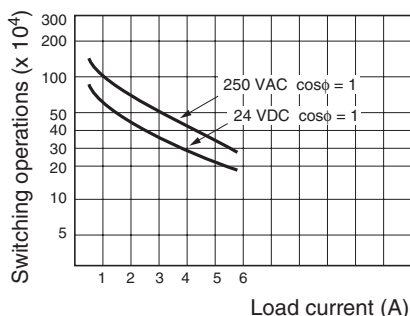
200 to 240 V: Red

Other classes: Black

■ Characteristics

Accuracy of operating time	±0.5% FS max. (±1% max. at 0.2 to 6 s for the time range code B or at 0.5 to 12 s for the time range code C)
Setting error	±2% FS max.
Reset time	0.5 s max.
Influence of voltage	±1% FS max.
Influence of temperature	±2% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min (between current-carrying and non-current-carrying parts) 2,000 VAC, 50/60 Hz for 1 min (between contact and control circuit and between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)
Vibration resistance	Destruction: 10 to 55 Hz with 0.375-mm single amplitude for 1 h each in three directions Malfunction: 10 to 55 Hz with 0.25-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 1,000 m/s ² Malfunction: 150 m/s ²
Ambient temperature	Operating: -10°C to 50°C Storage: -25°C to 65°C
Ambient humidity	Operating: 45% to 85%
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 500,000 operations min. (3 A at 250 VAC, resistive load at 1,800 operations/h) See <i>Life-test Curve</i> for other details.
Motor life expectancy	20,000 h
Approved standards	UL917, CSA C22.2 No.14. Conforms to EN61812-1 and IEC60664-1 4 kV/1 (except for H2C-F□ models). Output category according to EN60947-5-1 (except for H2C-F□ models).
EMC (except for H2C-F□ models)	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	H2C series: approx. 180 g H2C-F series: approx. 270 g

■ Life-test Curve

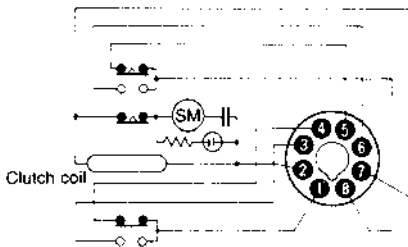


Connections

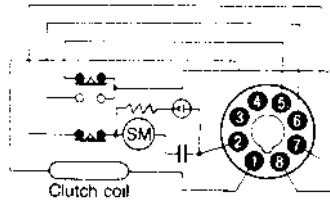
Terminal Arrangement

Note: The connections diagrams are for when the clutch is in the excited, reset state.

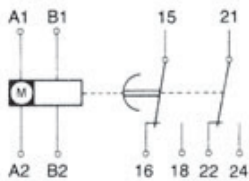
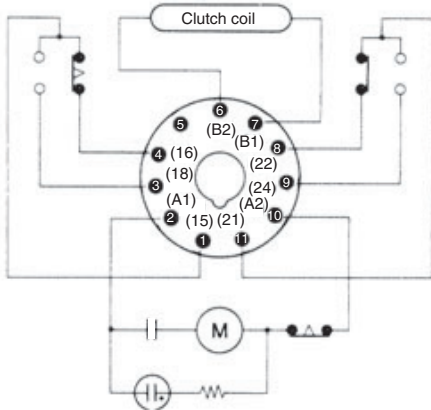
H2C-8



H2C-8R

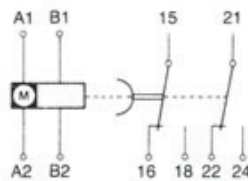
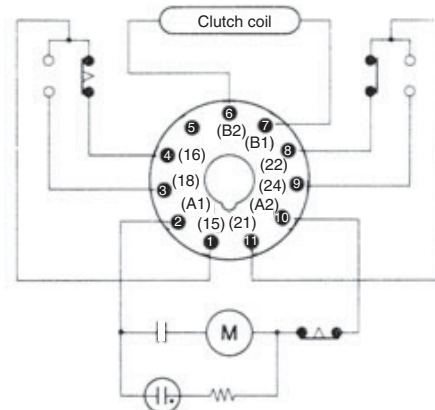


H2C(-F)/H2C-S



(DIN 46 199-5)

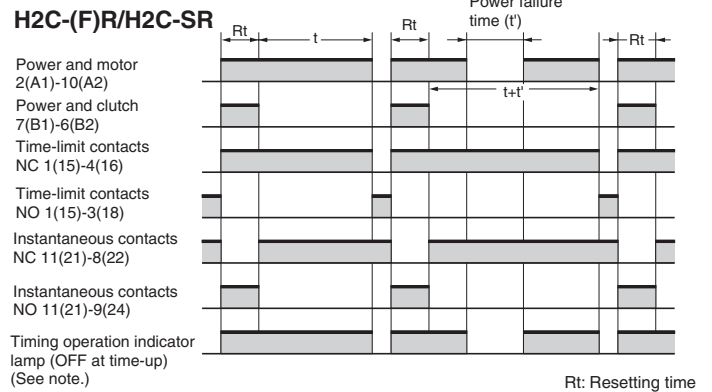
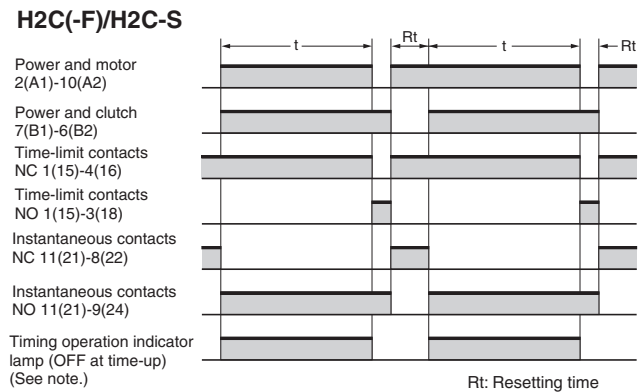
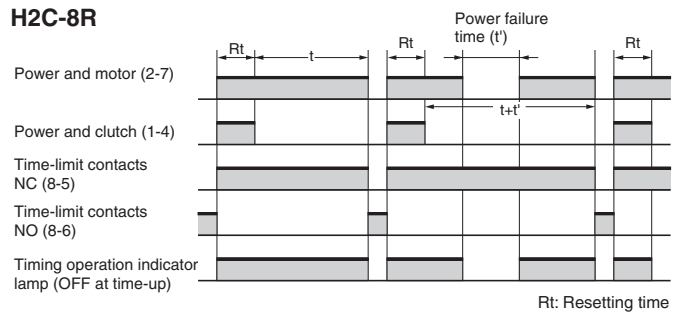
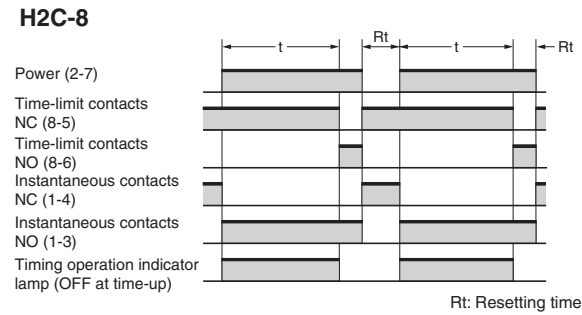
H2C(-F)R/H2C-SR



(DIN 46 199-5)

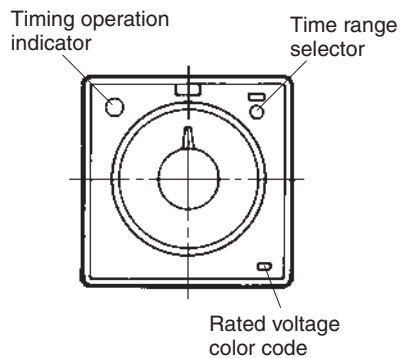
Operation

■ Timing Chart



Note: For the types rated at 24 and 48 VAC, the timing operation indicator is not equipped.

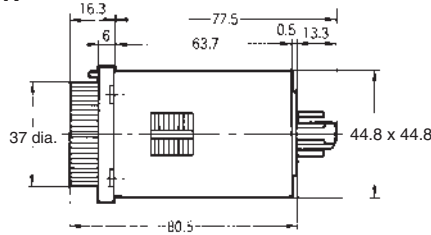
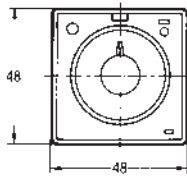
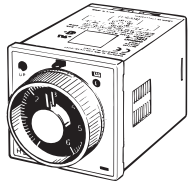
Nomenclature



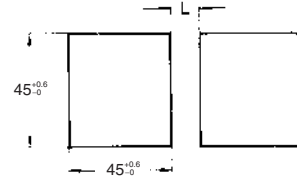
Dimensions

Note: All units are in millimeters unless otherwise indicated.

H2C/H2C-S/H2C-R/H2C-SR/H2C-8/H2C-8R

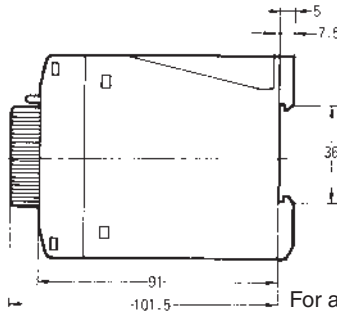
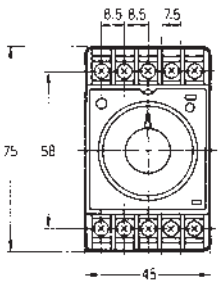
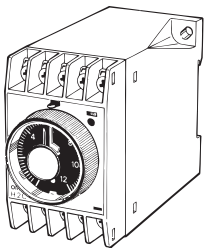


For Flush Mounting

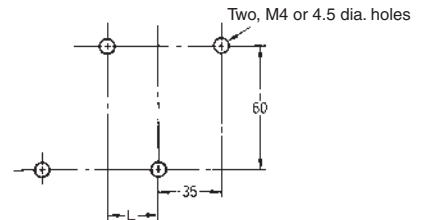


For a load current of 3 A max., dimension L becomes 3 mm min. with an interval of 0 mm between timers.
 For a load current of 6 A max., dimension L becomes 8 mm min. with an interval of 5 mm between timers.
 When using in locations with high ambient temperatures, ensure that there is an interval of at least 5 mm between timers.

H2C-F/H2C-FR

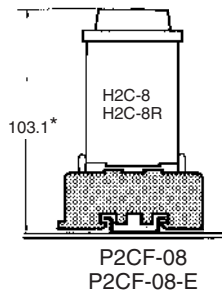
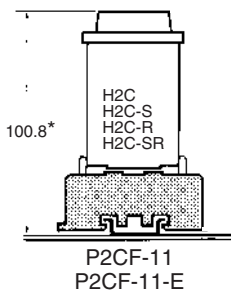


Mounting Holes

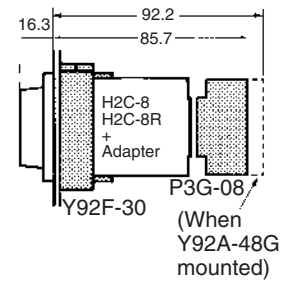
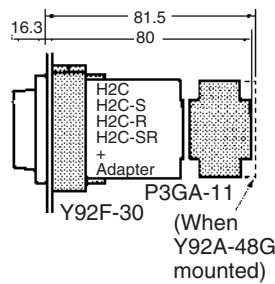


For a load current of 1 A max., dimension L becomes 10 mm min. with an interval of 0 mm between timers.
 For a load current of 3 A max., dimension L becomes 15 mm min. with an interval of 5 mm between timers.
 For a load current of 6 A max., dimension L becomes 20 mm min. with an interval of 10 mm between timers.

Dimensions with Front Connecting Socket P2CF-08-□/ P2CF-11-□



Dimensions with Back Connecting Socket P3G-08/P3GA-11

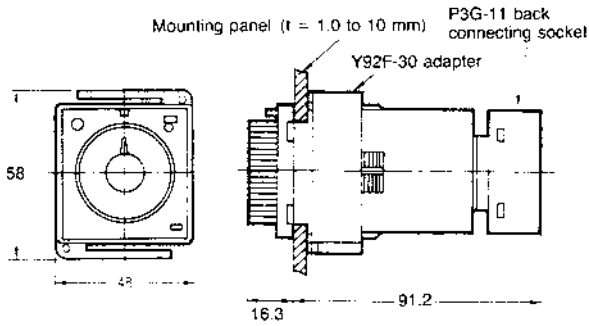


*These dimensions vary with the kind of DIN track (reference value).

■ Accessories (Order Separately)

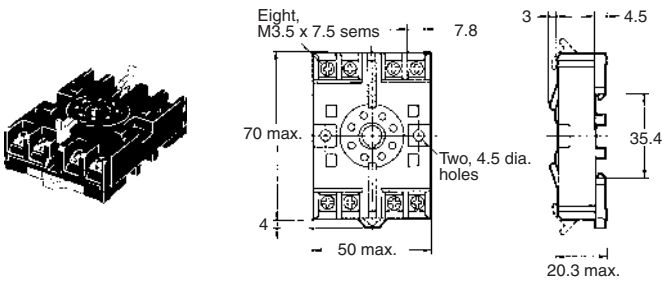
Adapter for Flush Mounting

Y92F-30

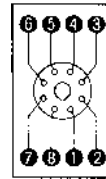


Track Mounting/Front Connecting Socket

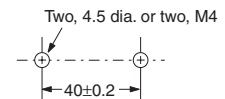
P2CF-08



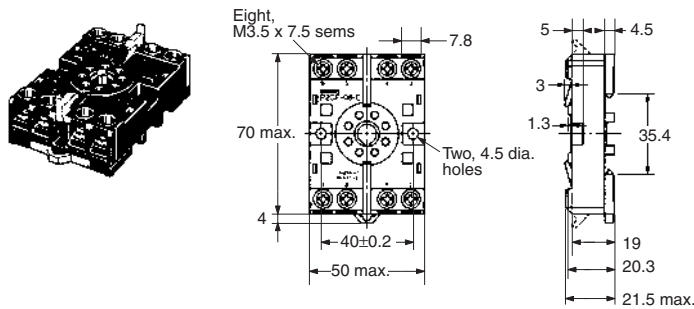
Terminal Arrangement/
Internal Connections
(Top View)



Surface Mounting Holes

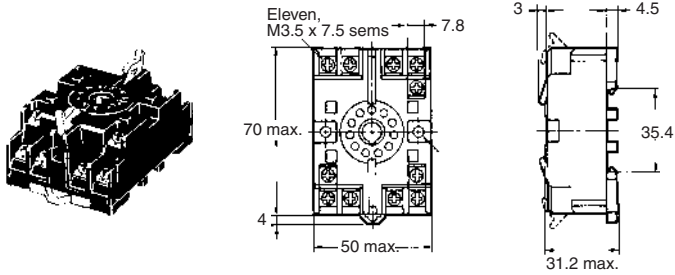


P2CF-08-E (Finger Safe Terminal Type)
Conforming to VDE0106/P100

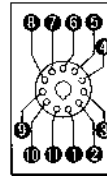


Track Mounting/Front Connecting Socket

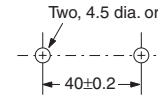
P2CF-11



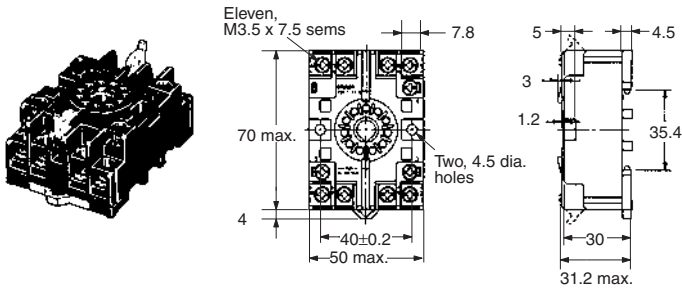
Terminal Arrangement/
Internal Connections
(Top View)



Surface Mounting Holes

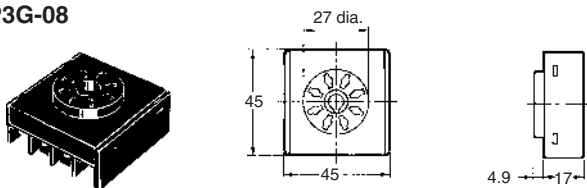


P2CF-11-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

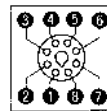


Back Connecting Socket

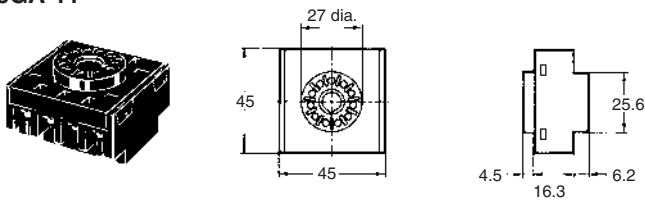
P3G-08



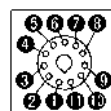
Terminal Arrangement/
Internal Connections
(Bottom View)



P3GA-11



Terminal Arrangement/
Internal Connections
(Bottom View)

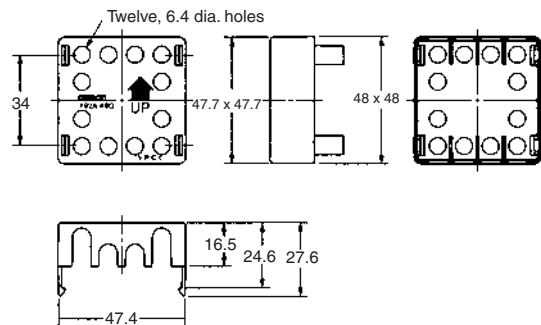
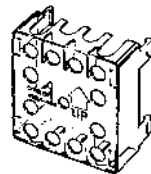


Finger Safe Terminal Cover

Conforming to VDE0106/P100

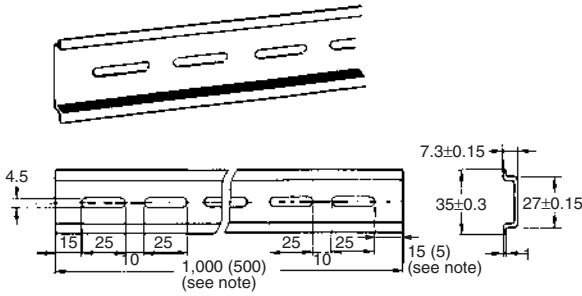
Y92A-48G

(Attachment for P3G-08/
P3GA-11 Socket)

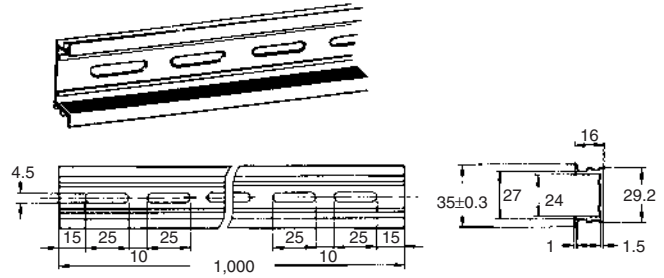


Mounting Track

PFP-100N, PFP-50N



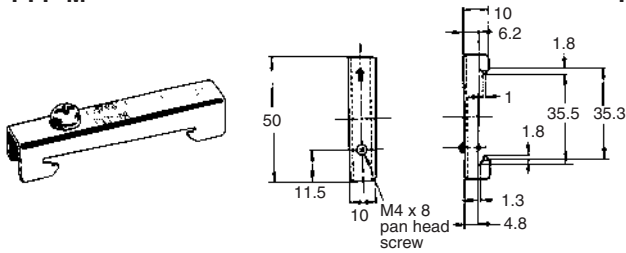
PFP-100N2



Note: The value shown in parentheses are for the PFP-50N.

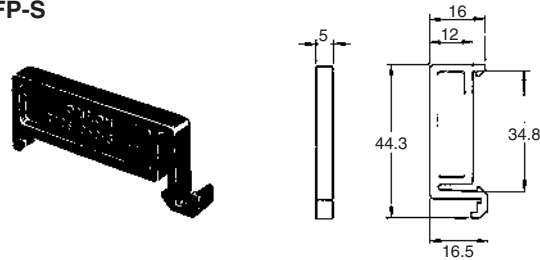
End Plate

PFP-M



Spacer

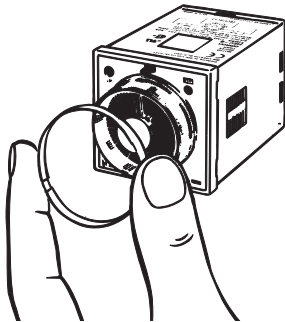
PFP-S



Time Setting Ring

Y92A-Y1

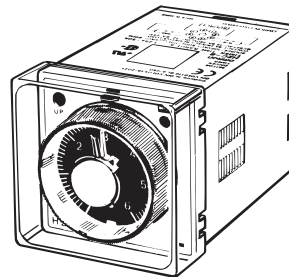
The time setting ring locks the time setting knob to store the set time to facilitate its resetting. A maximum of two time setting rings are connectable per timer.



Protective Cover

Y92A-48B

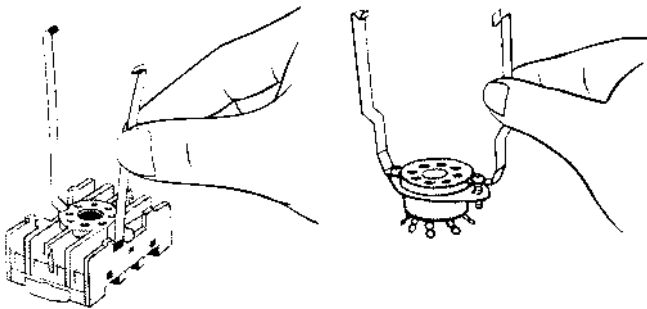
The protective cover shields the front panel, particularly the time setting section, from dust, dirt, and water, as well as prevents the set value from being altered due to accidental contact with the time setting knob.



Timer Hold-down Clips

Y92H-2
(for PF085A/PF113A
Connecting Socket)

Y92H-1
(for PL08/PL11
Connecting Socket)

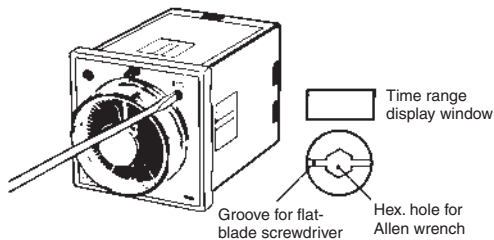


Precautions

How to Change the Time Range

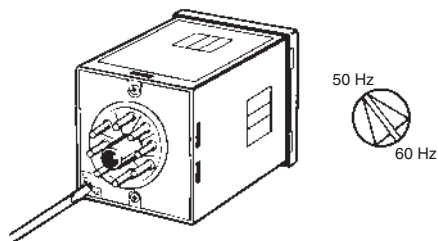
Caution
Be sure to turn the power off before changing the time specification. Changing the time range while the timer is in operation may cause a malfunction.

Change the time range by turning the knob clockwise using a flat-blade screwdriver or an Allen wrench. There are five possible settings. The selected time is displayed in the time range display window above the knob.



How to Select Power Frequency

NOTICE: Power frequency
Before using the timer, set the frequency selector located at the rear panel to the proper power frequency (50 to 60 Hz). Note that if the frequency selector is set incorrectly, time measurement may not be performed accurately against the set time.



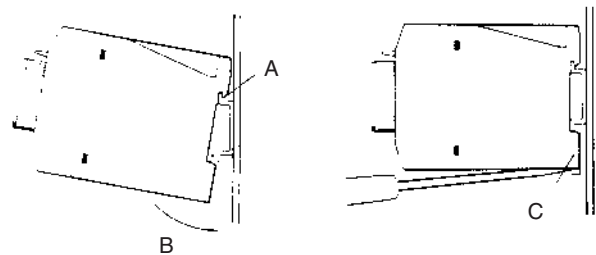
How to Mount the Timer on Mounting Track

Mounting

First hook portion A of the timer to the mounting track, then depress the timer in direction B.

Dismounting

Pull out portion C with a round-blade screwdriver and remove the timer from the mounting track.



Electrical Set

The motor and clutch do not need to be reset simultaneously. Use the voltage applied to the clutch for resetting with the H2C-□R. Do not allow power to be continuously applied to the motor and clutch for extended periods of time.

Others

Do not turn the operation time setting knob beyond the range of the scale. To achieve higher accuracy in setting, measure the operation time while turning the operation time setting knob.

The deviation and setting error for the operation time shows the percent of FS. The absolute value of the deviation and setting error will not change even if the set time is changed. The time specifications should therefore be selected to use the operation time as close to FS as possible.

At high temperatures, the operation voltage will be 90% or less if voltage is applied continuously after timeout. Be sure to keep the voltage within the allowable voltage fluctuation range.

Precautions for EN61812-1

The H2C (except for H2C-F□) as a built-in timer conforms to EN61812-1, provided that the following conditions are satisfied.

Handling

Before dismounting the H2C from the Socket, make sure that no voltage is imposed on any terminal of the H2C.

Applicable Sockets: P2CF-□□, P2CF-□□-E, PF085A, PL□□.

Wiring

Basic insulation is ensured between the motor circuit, clutch circuit, and control output circuit. (However, the H2C-8 motor circuit and clutch circuit use the same input.) Basic insulation is also ensured between the output circuits of models with instantaneous output.

Basic insulation: Overvoltage category III, pollution degree 1 (See note.)

Operating parts: Reinforced insulation (double insulation) (with a clearance of 5.5 mm and a creepage distance of 5.5 mm at 240 VAC)

Output parts: Basic insulation (with a clearance of 3.0 mm and a creepage distance of 3.0 mm at 240 VAC)

Note: Overvoltage category II, pollution degree 1 if the Timer is mounted to the PL11 Socket.

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

Accuracy of Operating Time

Differences of operating times measured when the Timer repeats operation under the same condition with a given setting time.

Formula for calculation (with operating time measured more than 5 times):

Accuracy of operating time

$$= \pm \frac{1}{2} \times \frac{T_{\text{max.}} - T_{\text{min.}}}{TMs} \times 100 (\%)$$

where,

T max.: Maximum value of operating times measured at the same set time

T min.: Minimum value of operating times measured at the same set time

TMs: Maximum scale time (TMs is a set value in the case of a Digital Timer)

If there are setting changes in the H3CA or other types of Analog Timer while they are in time-limit operation, the following operation will result.

$$T = T_1 + T_2 \times \frac{T_3 - T_1}{T_3}$$

T: Final time-up time

T₁: Time elapsed

T₂: New setting

T₃: Previous setting

Ambient Humidity

The ambient humidity at which a device can be used in the continuously operated state.

Ambient Temperature (Operating)

The ambient temperature at which a device can be used in the continuously operated state.

Ambient Temperature (Storage)

The ambient temperature at which a device, without power applied, may be stored safely.

Dielectric Strength

The maximum voltage a dielectric can withstand without rupturing.

Electrical Life Expectancy

The life expectancy of a Timer when the control output of the Timer is operated to switch the specified voltage/current load connected to the control output.

The electrical or mechanical life of the Timer is generally indicated by the operating times of control output. The electrical life is indicated by the operating time of the control output connected to a load and the mechanical life is indicated by the operating time of the control output with no load. The electrical life is shorter than the mechanical life. The lighter the load is, the longer the electrical life will be. Therefore, to prolong the electrical life of the Timer, use the Timer to switch heavy loads via relays instead of directly switching them with the control output.

Electrical Reset

To reset Timer by applying a required voltage to the reset circuit.

Holding Time

The period of time from the completion of the time-limit operation to the start of the reset operation.

Impulse Withstand Voltage (AC)

A voltage imposed between the operating power supply terminals or between a charged terminal and non-charged metal part to check the withstand surge voltage of the Timer. The impulse withstand voltage imposed between the operating power supply terminals is 3 kV and that imposed between a charged terminal and non-charged metal part is 4.5 kV with both using a $\pm 1.2 \times 50\text{-}\mu\text{s}$ standard waveform.

Influence of Temperature

A change in operating time when the ambient temperature changes within a permissible range.

Formula for calculation (with operating time measured more than 5 time):

Variation due to temperature change

$$= \pm \frac{TMx_2 - TMs_2}{TMs} \times 100 (\%)$$

where,

TM₂: Average value of operating times measured at 20°C

TMx₂: Average value of operating times measured at a temperature which causes the maximum deviation from TM₂ within the specified ambient temperature range.

TMs: Maximum scale time (TMs is a set value in the case of the Digital Timer)

Influence of Voltage

A change in operating time when the voltage of the control power source changes within the permissible fluctuation range.

Formula for calculation:

Variation due to voltage change

$$= \pm \frac{TMx_1 - TM_1}{TMs} \times 100 (\%)$$

where,

TM₁: Average value of operating times measured at rated voltage

TMx₂: Average value of operating times measured at a voltage which causes the maximum deviation from TM₁ within the permissible fluctuation range.

TMs: Maximum scale time (TMs is a set value in the case of the Digital Timer.)

Insulation Resistance

The resistance offered by an insulating material to the flow of current resulting from an impressed DC voltage.

Life Expectancy (Mechanical)

The life expectancy of a Timer when the control output of the Timer is operated under no load condition.

Manual Reset

To mechanically reset the Timer by manual operation.

Noise Immunity

The mechanical and physical resistance of the Timer against external noise.

The noise resistance of the Timer is checked with a noise simulator, a coil load, an oscillating relay, and static electric noise.

OFF Time

The period of time between the moment that the Timer starts returning to its initial state and the moment that the operating voltage is applied to the operating circuit. Therefore, the OFF time of the Timer is larger than the resetting time.

Glossary

OFF Time Characteristics

A change in operating time when the operating time in a given OFF time and the OFF time are changed.

Formula for calculation:

OFF time characteristic

$$= \pm \frac{TM_{X3} - TM_3}{TM_s} \times 100 (\%)$$

TM₃: Average value of operating times measured with a 1-second OFF time.

TM_{X3}: Average value of operating times measured with an OFF time that causes the maximum deviation from TM_{X3} within the specified OFF-time range of one hour from the specified resetting time.

TM_s: Maximum scale time (TM_s is a set value in the case of the Digital Timer.)

OFF-time characteristics are determined by the charging and discharging of a capacitor and resistor used in combination as an Electronic Timer. The characteristics vary by ±1.5% to ±5%.

Operating time accuracy, setting error, influence of voltage, influence of temperature, and OFF-time characteristics are items used to express the precision of the Timer. Any of these items may be ignored depending on the particular specifications of the model.

The Motor Timer and Electronic Timer indicate these items by percentage values. The Count Timer indicates these items by differential time values because the differential range of the Timer's operating time is almost definite due to the operating principle of the Timer. Furthermore, the Count Timer total setting error can be indicated to express all these items in the case of the Count Timer.

ON Time

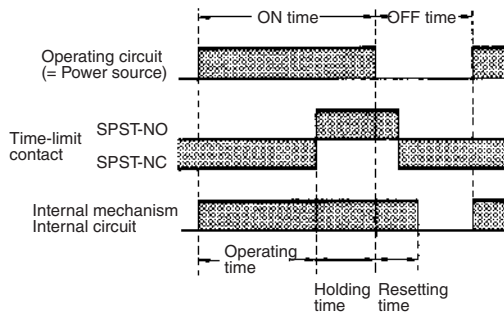
The period of time during which a required voltage is being applied to the operating circuit.

Operating Time

The period of time from the application of a required voltage to the operating circuit until the completion of the time-limit contact operation.

Resetting Time

The period of time from the interruption of the voltage supplied to the operating circuit during or after the time-limit operation until the return of the Timer to its initial state.



The resetting time of the Timer is the period of time during which all the internal components including the contacts, pointer, and the circuit components, such as the capacitor, of the Timer are reset.

If the Timer is in operation with an insufficient OFF time (i.e., the OFF time is less than the rated resetting time), the normal operation of the Timer cannot be expected. In such cases, the Timer may operate with insufficient operating time, operate instantaneously, or not operate at all. Be sure that the OFF time of the Timer is the same as or more than the rated resetting time.

Self-reset

To automatically reset the Timer by interrupting the voltage being supplied to the operating circuit.

Setting Error

A difference between the actual operating time and scale time.

Formula for calculation (measurement position can be any scale position as long as it is set to 1/3 min. of the maximum scale time):

Setting error

$$= \frac{TM - Ts}{TM_s} \times 100 (\%)$$

where,

TM: Average value of measured operating times

Ts: Set time

TM_s: Maximum scale time (TM_s is a set value in the case of the Digital Timer)

Shock Resistance (Destruction)

The threshold of shock beyond which an abnormality is expected to occur in the appearance or function of a device.

Shock Resistance (Malfunction)

The threshold of shock beyond which a device can no longer operate properly by satisfying the prescribed ratings.

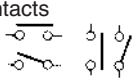
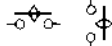

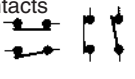
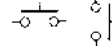
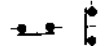
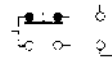
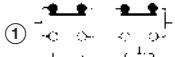
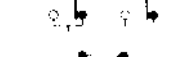

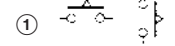



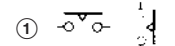



Vibration Resistance (Destruction)

The threshold of vibration beyond which an abnormality is expected to occur in the appearance or function of a device.

Vibration Resistance (Malfunction)

The threshold of vibration beyond which a device can no longer operate properly by satisfying the prescribed ratings.

■ Symbols Used in Internal Connection Diagram of Timers

Name and symbol	Description	Name and symbol	Description
NO contacts 	Normally open contacts (A pair of contacts which are normally open when no relay input is applied.)	Time-limit operation, time-limit resetting contacts ①  ② 	① NO contacts ② NC contacts
NC contacts 	Normally closed contacts (A pair of contacts which are normally closed when no relay input is applied.)	Manually operated, automatic resetting contact ①  ②  ③ 	Contacts which reset upon release of the hand, and used as the contacts to operate pushbutton switches. ① NO contacts ② NC contacts ③ Transfer contacts
Transfer contacts ①  ②  ③ 	Transfer contacts (NO and NC contacts which have a common contact terminal are collectively called "transfer contacts.") A variety of contacts shown in ① and ② are all transfer contacts with NC contact arranged either on the right side or on the upper side.		
Time-limit operating contacts ①  ② 	① NO contacts ② NC contacts	Synchronous motor 	A miniature motor which operates in synchronization with power frequency.
		Relay 	An electromagnetic relay
Time-limit resetting contacts ①  ② 	① NO contacts ② NC contacts	LED 	Used to indicate the operating state of the Timer.
		Neon lamp 	Used to indicate the operating state of the Timer.