Allen-Bradley

Multifunction Digital Timer

700-HX

User Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Allen-Bradley is a trademark of Rockwell Automation

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61010-1 safety requirements for electrical equipment for measurement, control and laboratory use--Part 1 General Safety Requirements.

This equipment is classified as open equipment and must be mounted as instructed in an enclosure during operation to provide safety protection.

Manual Objectives

The purpose of this manual is to provide you with the additional information necessary to apply the 700-HX Multifunction Digital Timer. Described in this manual are methods for applying and troubleshooting this product.

Who Should Use This Manual

This manual is intended for qualified personnel responsible for setting up and servicing these devices. You must have previous experience with and a basic understanding of wiring diagrams, configuration procedures, related equipment, and safety precautions.

Counter/Timer Mode Explanation

In this manual we refer to the **Timer Output Modes** with the following designations:

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: One Shot

F: Cumulative

Z: ON/OFF-duty adjustable repeat cycle

toff: Repeat cycle OFF start

ton: Repeat cycle ON start

Note: In this manual the 700-HX Multifunction Digital Timer will be referred to as "700-HX."

For Further Information

Relays and Timers Selection Guide

- Publication 700-SG003A-EN-P

Product Overview

Bill of Material

Your 700-HX Multifunction Digital Timer product package includes the following items:

Item No.	Description	Quantity
700-HX	Digital Timing Relay	1
—	6-Language Instruction Sheet	1
—	Rubber Gasket	1

Basic Product Information

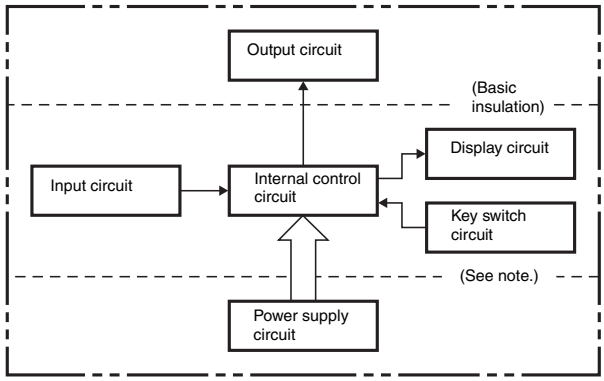
Cat. No.	Input Voltage	Output Modes	Timing Ranges	Sockets	Output	Pins
700-HX86SA17	100…240V AC	A mode: Signal ON-Delay 1 A-1 mode: Signal ON-Delay 2 A-2 mode: Power ON-Delay 1 A-3 mode: Power On-Delay 2 B mode: Repeat Cycle 1 B-1 mode: Repeat Cycle 2 D mode: Signal OFF-delay E mode: One Shot F mode: Cumulative Z mode toff ton	0.000…9.999 s 0.000…99.99 s 0.000…999.9 s 0.000…9999 s 0.000…99 min. 59 s 0.000…999.9 min. 0.000…9999 min. 0.000…99 h 59 min. 0.000…999.9 h 0.000…9999 h	700-HN100 700-HN125	SPDT	8
700-HX86SU24	12…24V DC 24V AC					

Accessories (Order Separately)

Cat. No.	Description	Pkg. Qty.
700-HN100	Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting Guarded Terminal Construction 8-pin for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10.	10
700-HN125	Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting Open Style Construction 8-pin for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10. No retainer clip required.	10
199-DR1	DIN Rail Mounting Pack Standard 35 x 7.5 mm DIN Rail, 1 meter long, 10 rails per package. Order must be for 10 rails or multiples of 10.	10
700-HN108	Specialty Socket 8-pin backwired socket with solder terminals for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10.	10
700-HN130	Frame Adapter For flush or door mounting of all Bulletin 700-HR and -HX timers.	1
700-HN132	Protective Cover Helps prevent tampering of timing and mode settings. Provides a degree of protection against water and dirt from entering the front of the relay. For use with all Bulletin 700-HRs and -HX timing relays.	1
700-N40	Pre-printed identification tags— contains 10 sheets of pre-printed and blank tags. Each sheet contains 13 sets of the markings CR…9CR, TR…9TR, M…9M, F, R, 1S, and 117 blank tags. Tags are peel-off with sticky backing for easy placement on relays.	10
700-N41	Blank identification tags— contains 10 sheets of blank identification tags for customer specialized printing. Each sheet contains 546 blank tags. Tags are peel-off with sticky backing for easy placement on relays.	10

Product Features

Block diagram



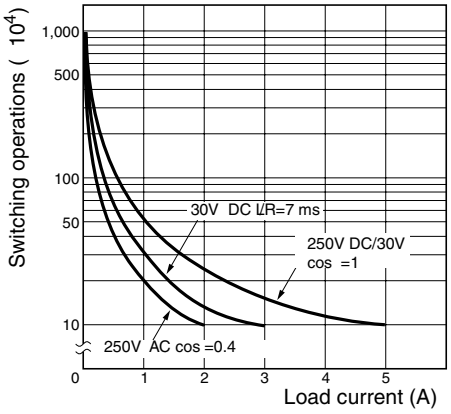
Note: Power circuit is not insulated from the input circuit.

I/O Functions

Inputs	**Start signal**	**Stops timing in A-2 and A-3 (power ON delay) modes. Start 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 ❶	**Inhibits timer operation.**
Outputs	**Control output (OUT)**	**Outputs take place according to designated operating mode when timer reaches corresponding set value.**

❶ Gate capability not available.

Engineering Data (Reference Values)



Reference:A maximum current of 0.15 A can be switched at 125V DC (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 5V DC (failure level: P).

Specifications

Electrical Ratings		
Pilot Duty Rating		**NEMA B300**
Rated supply voltage		**100 to 240V AC, 24V AC/12 to 24V DC (50/60Hz) (permissible ripple: 20%(p-p) max.)**
Operating voltage range		**85%…110% of rated supply voltage**
Power consumption	**100…240V AC**	**4.3 VA**
	24V AC/12…24V DC	**3.4 VA/1.7 W**
Inrush Current	**100…240V AC**	**3 A**
	24V AC/12…24V DC	**5 A**
►][◄ 120V AC		**30 A**
Make 240V AC		**15 A**
◄][► 120V AC		**3 A**
Break 240V AC		**1.5 A**
Hp at 120V AC		**1/4 Hp**
Hp at 240V AC		**1/3 Hp**
Mechanical		
Mounting method		**Flush mounting, surface mounting, DIN mounting**
Display		**7-segment, negative transmissive LCD; Present value (red, 8 mm high characters); Set value (green, 4 mm high characters)**
Digits		**4 digits**
Timer	**Time ranges**	**0.000…9.999 s, 0.00…99.99 s, 0.0…999.9 s, 0…9999 s, 0 min. 0.0 s…99 min. 59 s, 0.0…999.9 min., 0 h 00 min.…99 h 59 min., 0.0 h…999.9 h, 0 h…9999 h**
	Timer modes	**Elapsed time (Up), remaining time (Down), selectable**
	Output modes	**A, A-1, A-2, A-3, B, B-1, D, E, F, Z, ton or toff**

Electrical Ratings		
Inputs	Input signals	Start, reset
	Input method	No-voltage input via:NPN transistor or switching of contact
	Start, reset, gate	Minimum input signal width: 1 or 20 ms (selectable)
	Power reset	Minimum power-opening time: 0.5 s (Except for A-3, B-1, and F mode)
Control output		SPDT contact output: 5 A at 250V AC, resistive load (cosine=1) Minimum applied load: 10 mA at 5V DC (failure level: P, reference value)
External Power Supply		No
Key Protect		Yes
Memory backup		EEP-ROM (overwritten 100,000 times min.), which can store data for 20 years min.
Accuracy of Operating Time and Setting Error ❶		Power-ON start: +-0.01% +-50 ms max.* * to be rated against set value Signal start: +- 0.005 +-30 ms max. * * to be rated against set value Signal start at transistor output model: +- 0.005% +-3 ms max. ❷ If the set value is within the sensor waiting time (250 ms max.)

❶ The values are based on the set value.
❷ The value is applied for a minimum pulse width of 1 ms.

Characteristics

Insulation resistance		100 MΩ min. (at 500V DC)
Dielectric strength		2000V AC, 50/60Hz for 1 min. between current-carrying terminals and non-current-carrying metal parts (1000V AC for 24V AC/12 to 24V DC type), 1000V AC, 50/60 Hz for 1 min. between non-continuous contacts
Noise immunity		'+-1.5 kV (between power terminals) for 100 to 240V AC, +-480V for 24V AC/12 to 24VDC, and +-600V (between input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity		±8 kV (malfunction), ±15 kV (destruction)
Vibration resistance	Malfunction	10…55 Hz with 0.35 mm single amplitude each in three directions for 10 min.
Shock resistance	Malfunction	98 m/s^2 (approx. 10 G) each in three directions
Life expectancy	Mechanical	10 million operations min.
	Electrical	100,000 operations min. (5 A at 250V AC, resistive load)
EMC		(EMI) EN61326 Emission Enclosure: EN55011 Group1 class A Emission AC mains: EN55011 Group1 class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level2) 8 kV air discharge (level3) Immunity RF-interference: EN61000-4-3: 10 V/m

Approved standards	**UL508, CSA C22.2 No.14 Conforms to EN61010-1/IEC61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (Finger Protection), conforms to NEMA output rating (N/F)**
Enclosure ratings	**Panel surface:IP66 and NEMA Type 4 (indoors) ❶**
Weight	**Approx. 100 g**

❶An attached waterproof packing is necessary to ensure IP66 waterproofing between the 700-HX and installation pan.

Nomenclature

Indicator

① Reset Indicator (orange)

② Key Protection Indicator (orange)

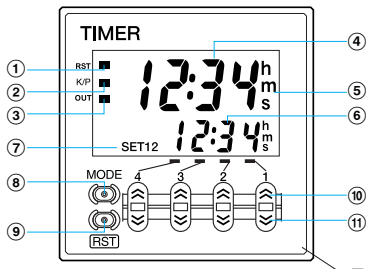
③ Control Output Indicator (orange)

④ Present Value
Character height: 11.5 mm

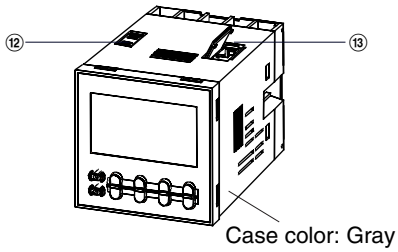
⑤ Time Unit Display (orange):
(If the time range is 0 min, 0 h, 0.0 h, or 0 h 0 min, this display flashes to indicate timing operation.)

⑥ Set Value (green)
Character height: 6 mm

⑦ Set Value 1, 2 Display



Front View



Operation Key

⑧ Mode Key
(Changes modes and setting items)

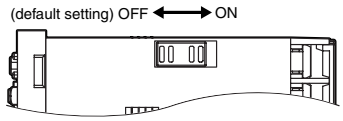
⑨ Reset Key
(Resets present value and output)

⑩ Up Keys 1 to 4

⑪ Down Keys 1 to 4

Switches

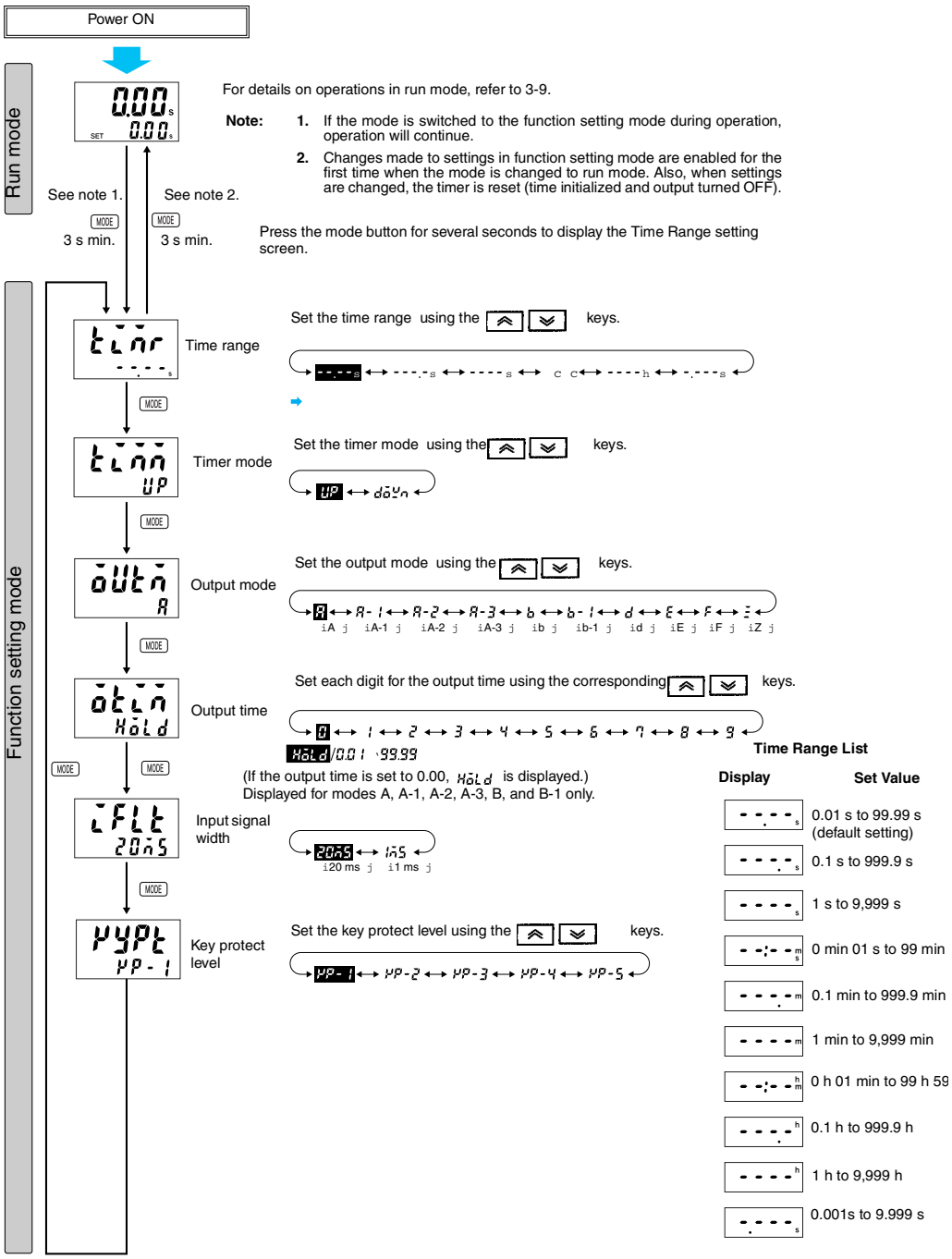
⑫ Key-protect Switch



⑬ DIP Switch

Functions

Settings for Advanced Functions



Explanations of Functions

Time Range (tᵢᵐr)

Set the range to be timed in the range 0.000 s… 9,999 h. Use the operation keys if these settings are required.

Timer Mode (tᵢᵐᵐ)

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

Output Mode (oUtᵐ)

Set the output mode. The possible settings are A, A-1, A-2, A-3, B, B-1, D, E, F, and Z. (For details on output mode operation, refer to "Timing Charts" on page 3-10.)

Output Time (otᵢᵐ)

When using one-shot output, set the output time for one-shot output (0.01… 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, HōLd is displayed, and the output is held.

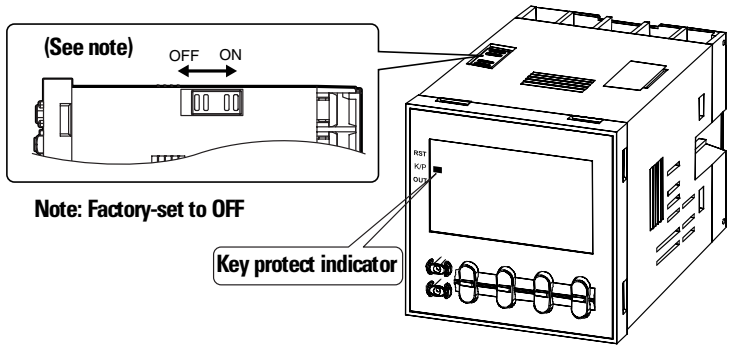
Input Signal Width (ᵢFLt)

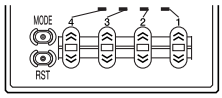
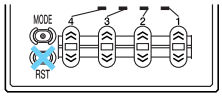
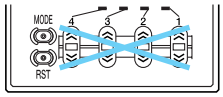
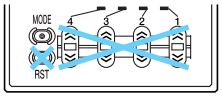
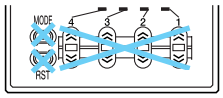
Set the minimum signal input width (20 ms or 1 ms) for signal and reset inputs. The same setting is used for all external inputs (signal and reset). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

Key Protect Level (ᴷYPt)

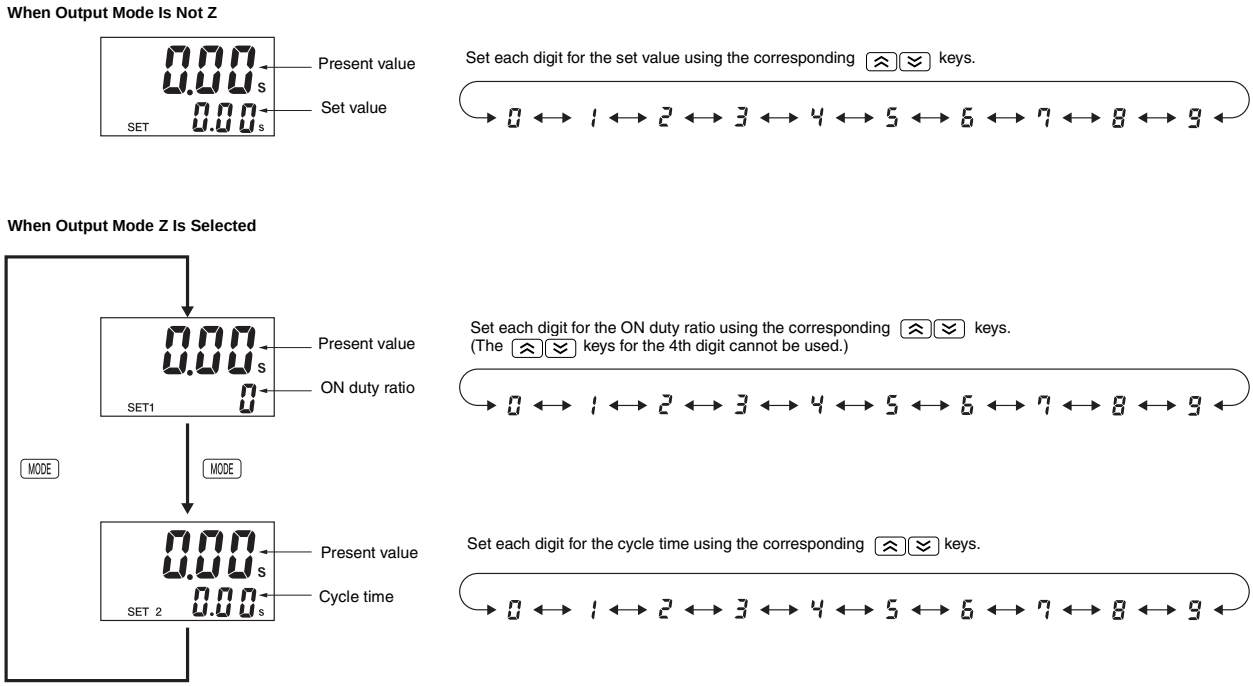
Set the key protect level.

When the key-protect switch in 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. Confirm the ON/OFF status of the key-protect switch after the 700-HX is mounted to the panel.



Level	Meaning	
KP-1 (default setting)		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode.
KP-2		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the reset key.
KP-3		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the up and down keys.
KP-4		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the reset, up and down keys.
KP-5		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of any operation keys.

Operation in Run Mode



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.

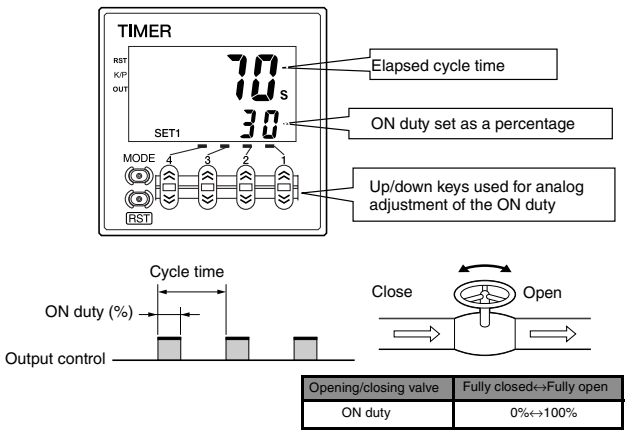
Set the ON duty ratio used in ON/OFF-duty adjustable Repeat Cycle (Z) as a percentage.

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

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.

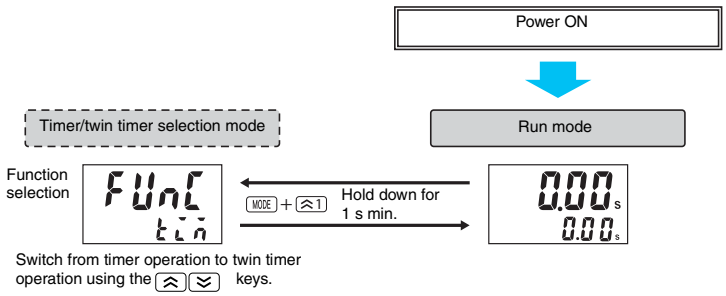
Set the cycle time used in ON/OFF-duty adjustable Repeat Cycle (Z).



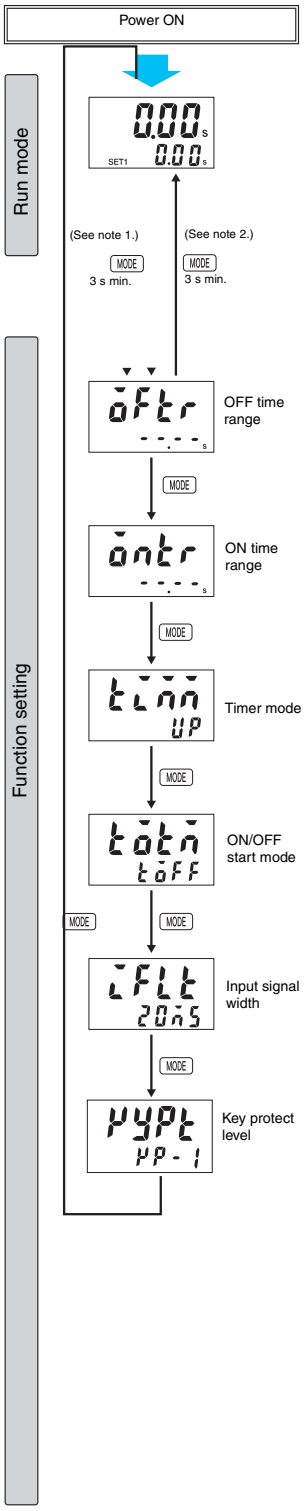
Operation (Twin Timer Function)

Switching from Timer to Twin Timer

The 700-HX is factory-set for timer operation. To switch to twin timer operation, use the procedure given below. For details, refer to page 3-1.



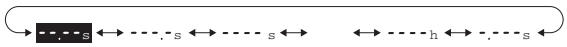
Settings for Advanced Functions



For details on operations in run mode, refer to page 3-4.

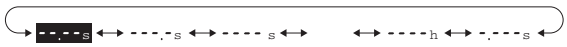
Note:
1. If the mode is switched to the function setting mode during operation, operation will continue.
2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the timer is reset (time initialized and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

Set the OFF time range using the ▲ ▼ keys.



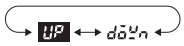
➡ For details, refer to *Time Range List*, below

Set the ON time range using the ▲ ▼ keys.



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

Set the timer mode using the ▲ ▼ keys.



Elapsed time — Remaining time

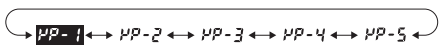
Set the twin timer output mode using the ▲ ▼ keys.

(Repeat Cycle OFF start) — (Repeat Cycle ON start)

Set the input signal width using the ▲ ▼ keys.

20 ms — 1 ms

Set the key protect level using the ▲ ▼ keys.



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 9,999 s
--:--ms	0 min 01 s to 99 min 59 s
----m	0.1 min to 999.9 min
----m	1 min to 9,999 min
--:--hm	0 h 01 min to 99 h 59 min
----h	0.1 h to 999.9 h
----h	1 h to 9,999 h
----s	0.001 s to 9.999 s

Explanation of Functions (Twin Timer Function)

OFF Time Range (oFtr)

Set the time range for the OFF time in the range 0.000 s… 9,999 h. Use the operation keys if another type of setting is required.

ON Time Range (ontr)

Set the time range for the ON time in the range 0.000 s …9,999 h. Use the operation keys if another type of setting is required.

Timer Mode (tmmd)

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 (tont)

Set the output mode. Set either Repeat Cycle OFF start or Repeat Cycle ON start. (For details on output mode operation, refer to 3-10.)

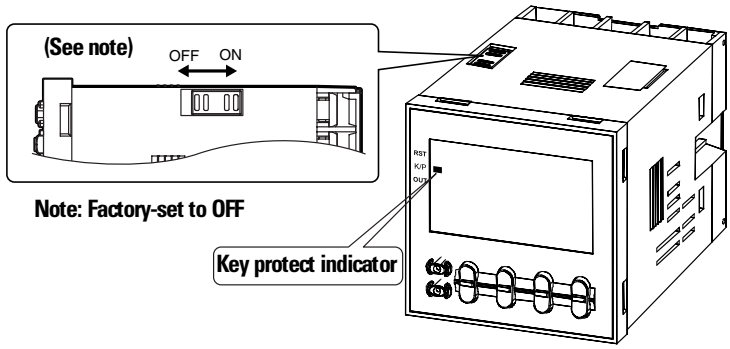
Input Signal Width (imLt) (Setting possible using DIP switch.)

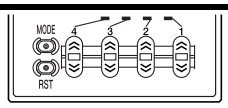
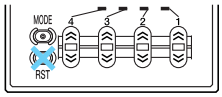
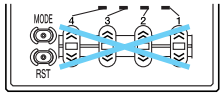
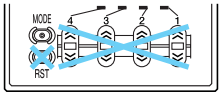
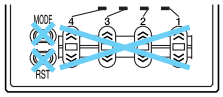
Set the minimum signal input width (20 ms or 1 ms) for signal, reset, and gate inputs. The same setting is used for all external inputs (signal and rese). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

Key Protect Level (KYPt)

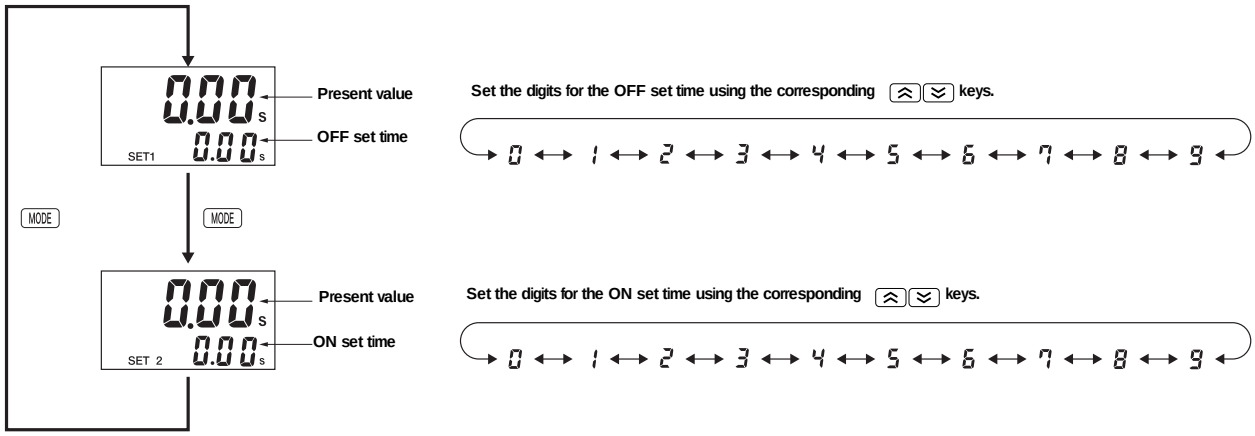
Set the key protect level.

When the key-protect switch in 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. Confirm the ON/OFF status of the key-protect switch after the 700-HX is mounted to the panel.



Level		Meaning
KP-1 (default setting)		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode.
KP-2		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the reset key.
KP-3		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the up and down keys.
KP-4		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of the reset, up and down keys.
KP-5		Prohibits changing the mode to timer/twin timer selection mode or function setting mode. The 700-HX can only be used in run mode. Also prohibits use of any operation keys.

Operation in Run Mode



Present Value and OFF Set Time

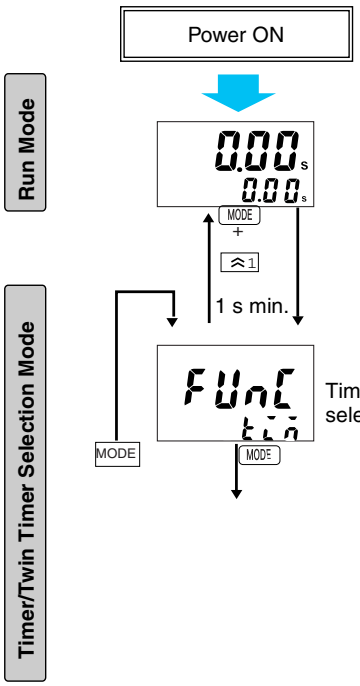
The present value is displayed in the main display and the OFF set time is displayed in the sub-display. “SET1” lights at the same time.

Present Value and ON Set Time

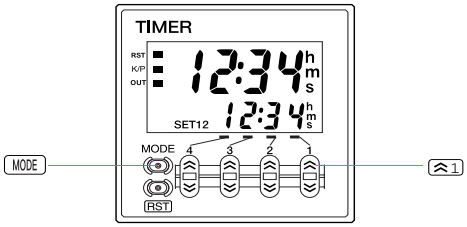
The present value is displayed in the main display and the ON set time is displayed in the sub-display. “SET2” lights at the same time.

Operation in Timer/Twin Timer Selection Mode

Select whether the 700-HX is used as a timer or a twin timer in timer/twin timer selection mode.



Timer/Twin timer selection



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

Select either timer operation or twin timer operation using the keys.

Note: The 700-HX is factory-set for timer operation.

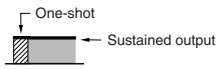
Note:

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 700-HX is automatically reset (present value initialized, output turned OFF).

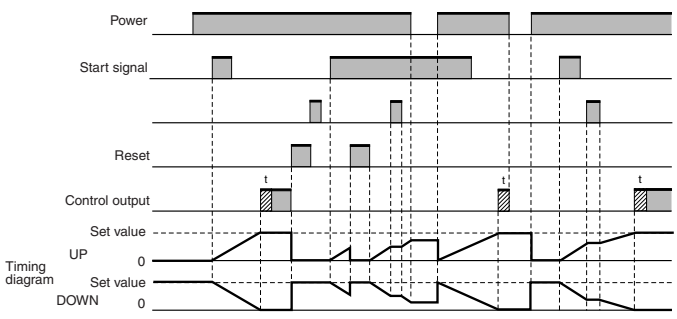
Timing Charts

The gate input is not included in the 700-HX.



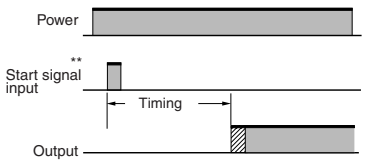
One-shot outputs can be to set to 0.1 s, 0.5 s, 1s, 5 s, 10 s, 20 s.

Output mode A Mode: Signal ON-Delay (Timer resets when power comes ON.)



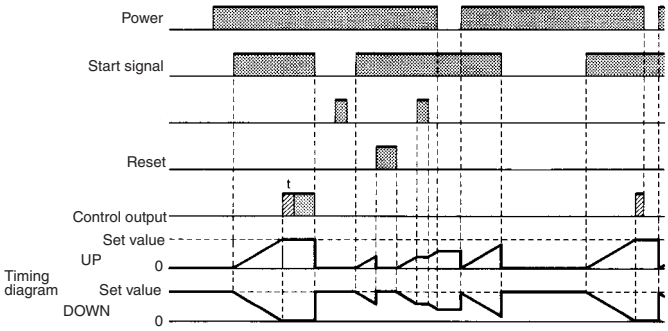
Timing starts when the start signal goes ON.
While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.
The control output is controlled using a sustained or one-shot rime period.

Basic Operation



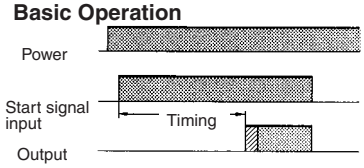
* Output is instantaneous when setting is 0.
** Start signal input is enabled during timing.

Output Mode A-1: Signal ON-Delay 2 (Timer resets when power comes ON.)



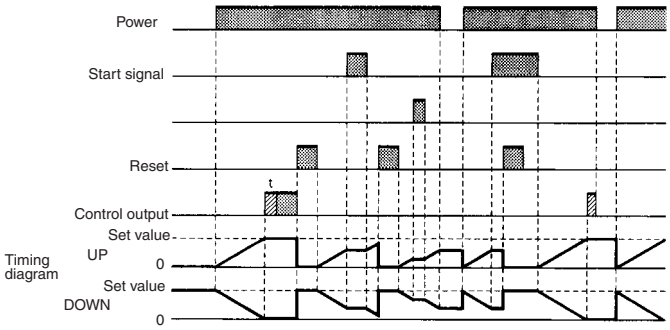
Timing starts when the start signal goes ON, and is reset when the start signal goes OFF.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.
The control output is controlled using a sustained or one-shot time period.

Basic Operation



*Output is instantaneous when setting is 0.

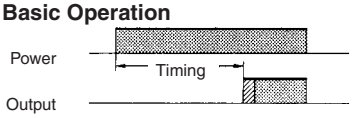
Output mode A-2: Power ON Delay 1 (Timer resets when power comes ON)



Timing starts when the reset input goes OFF
The start signal disables the timing function .

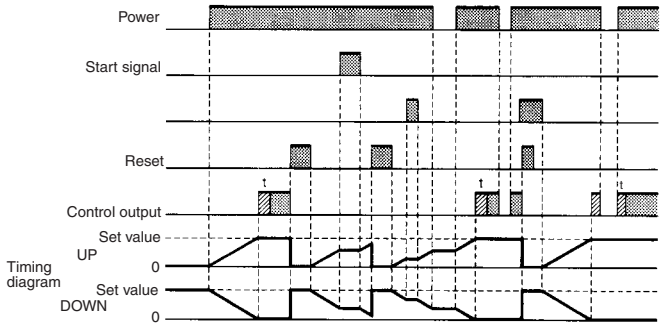
The control output is controlled using a sustained or one-shot time period.

Basic Operation



*Output is instantaneous when setting is 0.

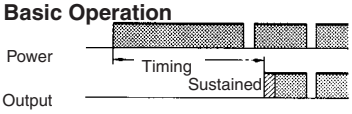
Output mode A-3 Power ON Delay 2 (Timer does not reset when power comes ON)



Timing starts when the reset input goes OFF.
The start signal disables the timing function .

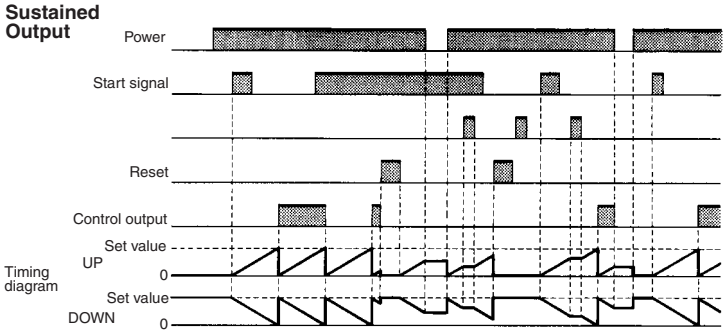
The control output is controlled using a sustained or one-shot time period.

Basic Operation



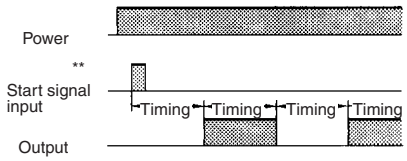
*Output is instantaneous when setting is 0.

Output mode B: Repeat Cycle 1 (Timer resets when power comes ON.)



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.

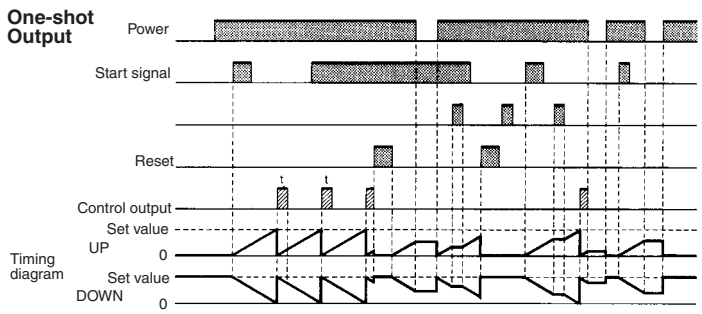
Basic Operation



* 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).

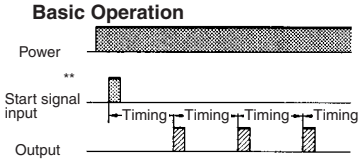
** Start signal input is disabled during timing.

Output mode B: Repeat Cycle 1 (Timer resets when power comes ON.)



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.

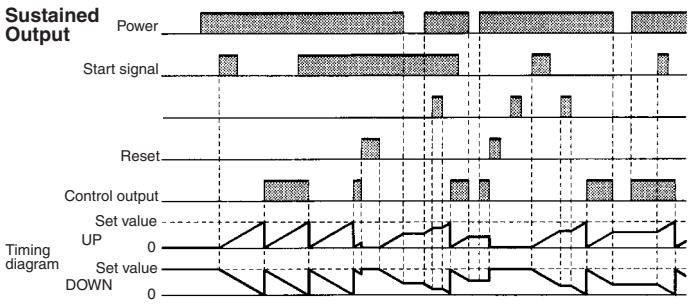
Basic Operation



* 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).

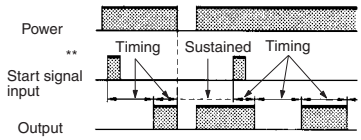
** Start signal input is disabled during timing.

Output Mode B-1: Repeat Cycle 2 (Timer does not reset when power comes ON)



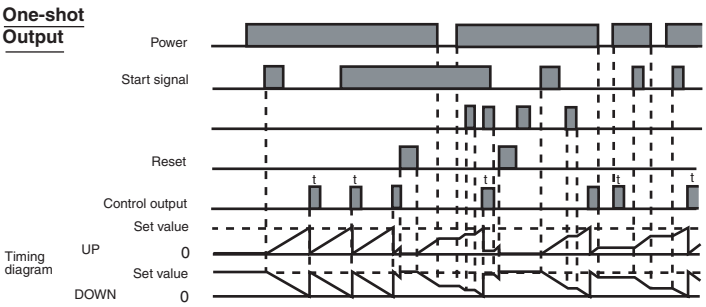
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



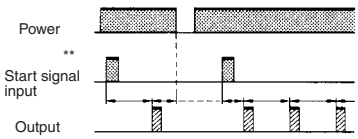
* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).

** Start signal input is disabled during timing.



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.

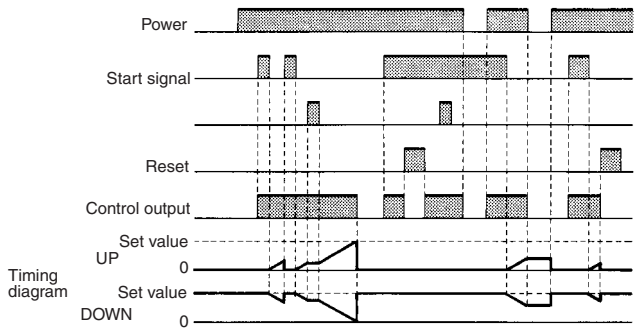
Basic Operation



* 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).

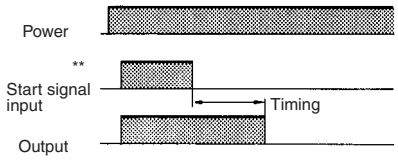
** Start signal input is disabled during timing.

Output mode D: Signal OFF-delay (Timer resets when power comes ON.)



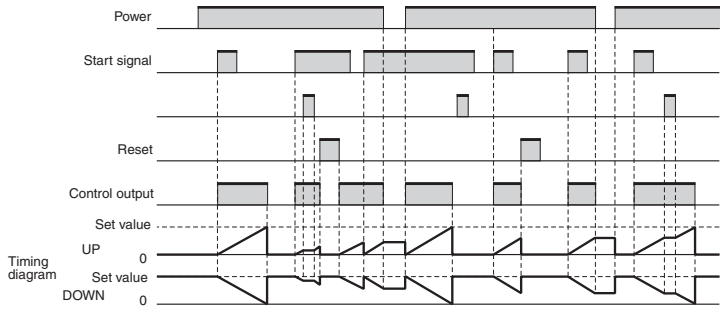
The control output is ON when the start signal is ON (except when the power is OFF or the reset is ON).
The timer is reset when the time is up.

Basic Operation



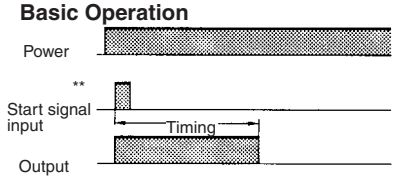
* Output functions only during start signal input when setting is 0.
** Start signal input is enabled during timing.

Output mode E: One Shot (Timer resets when power comes ON.)



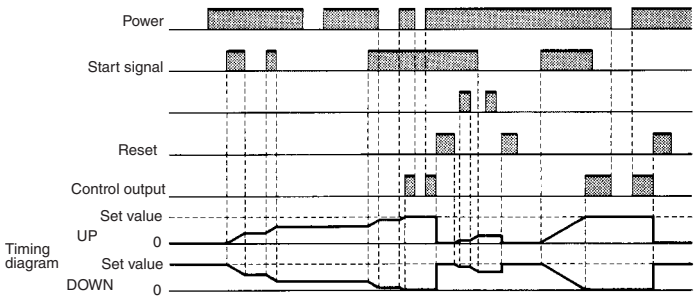
Timing starts when the start signal comes ON.
The control output is reset when time is up.
While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation



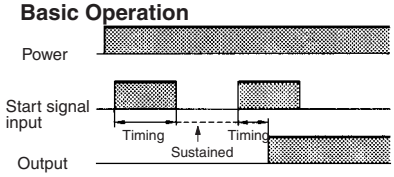
* Output is disabled when the setting is 0.
** Start signal input is enabled during timing.

Output Mode F: Cumulative (Timer does not reset when power comes ON)



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.

Basic Operation

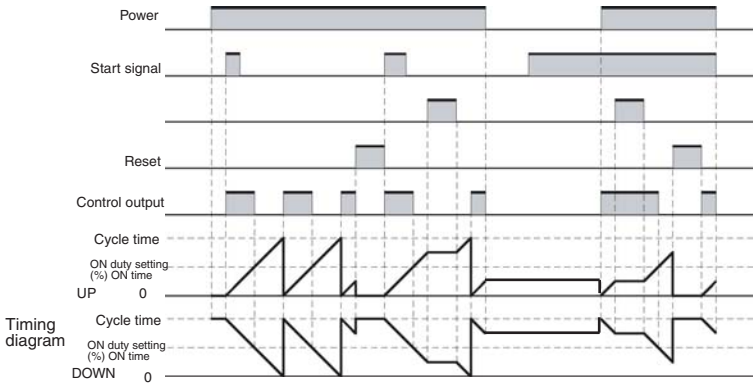


*Output is instantaneous when setting is 0.

Z Mode

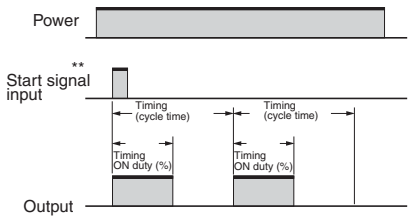
Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value. The set value shows the ON duty (%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF. When the cycle time is not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

Z mode: ON/OFF-duty Adjustable Repeat Cycle



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.

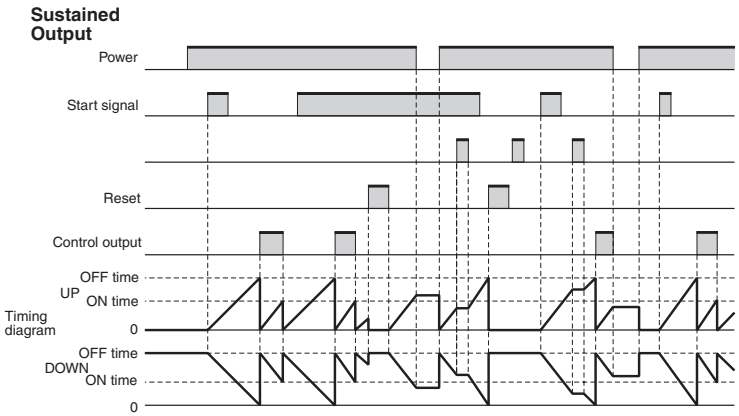
Basic Operation



* 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 enabled during timing.

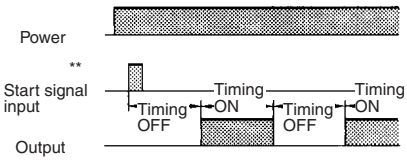
Twin Timer Operation

Output mode TOFF: Twin Timer OFF start



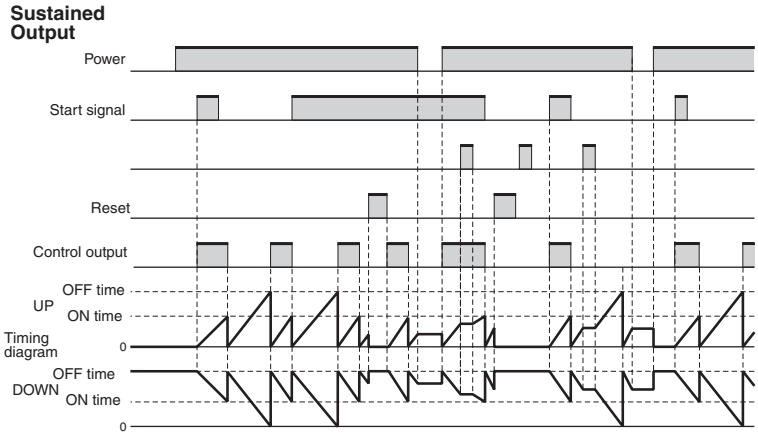
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



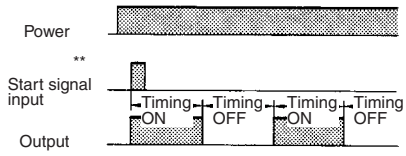
* Normal output operation will not be possible if the ON/OFF set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

Output mode TON: Twin Timer ON start



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

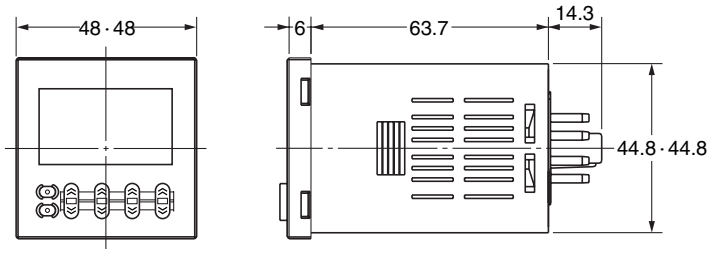


* Normal output operation will not be possible if the ON/OFF set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

Dimensions

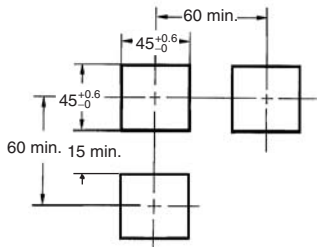
700-HX Flush Mounting/ Socket Mounting

Note: All units are in millimeters unless otherwise noted.



Panel Cutouts

Panel cutouts are as shown below (according to DIN43700).

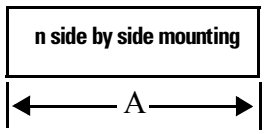


Note:

1. The mounting panel thickness should be 1…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.



$A = (48n - 2.5)^{+1}_{0}$

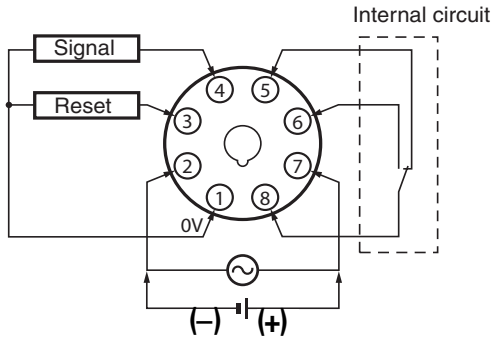
With 700-HN132 attached:

$A = (51n - 5.5)^{+1}_{0}$

Installation

Terminal Arrangement

700-HX

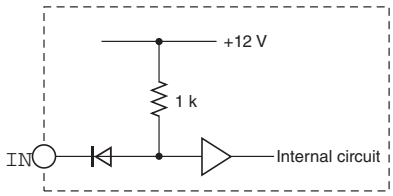


The power supply and input circuit are not insulated. Terminals one and two of the 700-HX are connected internally.

Note: Do not connect unused terminals as relay terminals.

Input Circuits

Start and reset Input

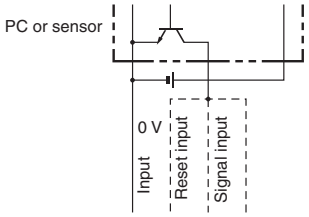


Input Connections

The input of the 700-HX is no-voltage input only.

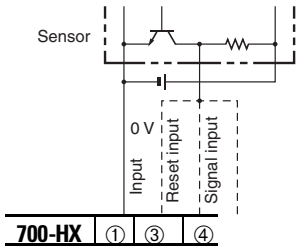
No-voltage Inputs (NPN Inputs)

Open Collector
(Connection to NPN open collector output sensor)



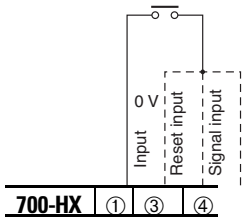
Operate with transistor ON

Voltage Output
(Connection to a voltage out put sensor)



Operate with transistor ON

Contact input

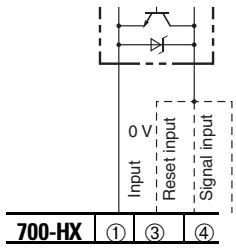


Operate with relay ON

No-voltage Input Signal Levels

No-contact input	**Short-circuit level** **Transistor ON** **Residual voltage: 2 V max.** **Impedance when ON: 1 KΩ max.** **(the leakage current is 5 to 20 mA when the impedance is 0Ω)**
	Open level **Transistor OFF** **Impedance when OFF: 100 KΩ minimum.**
Contact input	**Use contact which can adequately switch 1 mA at 5V** **Maximum applicable voltage: 30V DC max.**

Two-wire Sensor



Applicable Two-wire Sensor

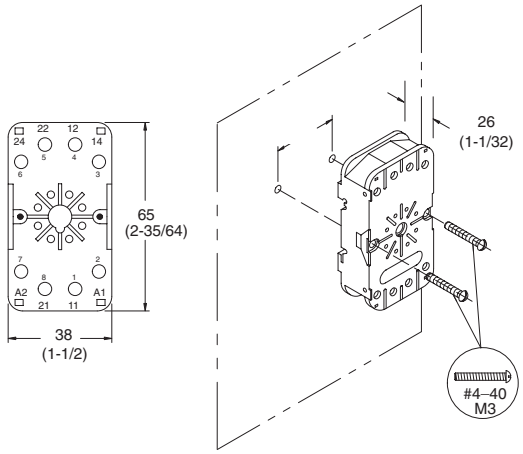
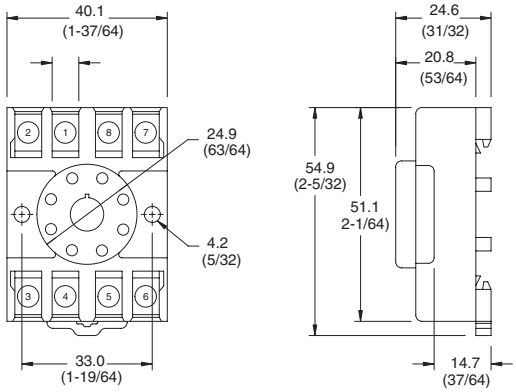
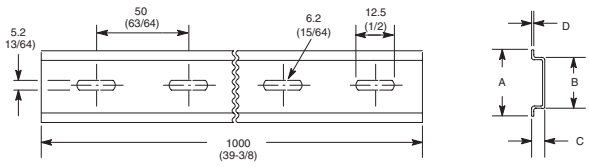
Leakage current: 1.5 mA max.

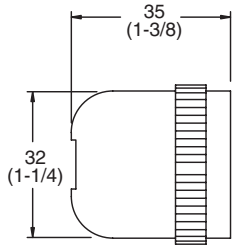
Switching capacity: 5 mA minimum

Residual voltage: 3V DC max.

Operating voltage: 10V DC

Accessories

	Description	Diagram
 Cat. No. 700-HN100	**Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting Guarded Terminal Construction** **8-pin for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10.**	
 Cat. No. 700-HN125	**Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting Open Style Construction** **8-pin for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10. No retainer clip required.**	
 Cat. No. 199-DR1	**DIN Rail Mounting Pack** **Standard 35 x 7.5 mm DIN Rail, 1 meter long, 10 rails per package. Order must be for 10 rails or multiples of 10.**	

	Description	
 Cat. No. 700-HN108	**Specialty Socket** 8-pin backwired socket with solder terminals for use with Bulletin 700-HX timing relays. Order must be for 10 sockets or multiples of 10.	
 Cat. No. 700-HN130	**Frame Adapter** For flush or door mounting of all Bulletin 700-HR and -HX timers.	
 Cat. No. 700-HN132	**Protective Cover** Helps prevent tampering of timing and mode settings. Provides a degree of protection against water and dirt from entering the front of the relay. For use with all Bulletin 700-HRs and -HX timing relays.	
 Cat. No. 700-N40	**Pre-printed identification tags —** Contains 10 sheets of pre-printed and blank tags. Each sheet contains 13 sets of the markings CR…9CR, TR…9TR, M…9M, F, R, 1S, and 117 blank tags. Tags are peel-off with sticky backing for easy placement on relays.	
 Cat. No. 700-N41	**Blank identification tags —** Contains 10 sheets of blank identification tags for customer specialized printing. Each sheet contains 546 blank tags. Tags are peel-off with sticky backing for easy placement on relays.	

Precautions

ATTENTION

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

ATTENTION

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.

ATTENTION

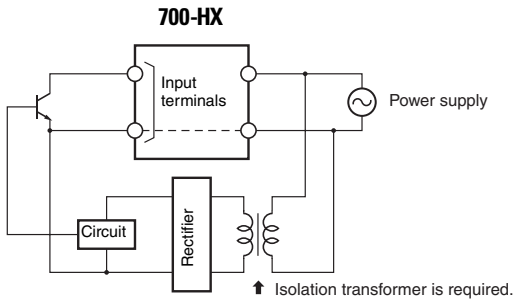
Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.

ATTENTION

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

Power Supplies

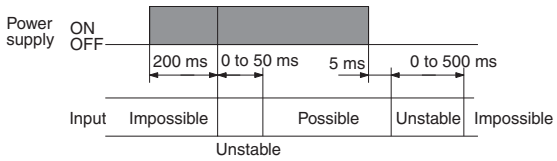
For the power supply of an input device of the 700-HX, use an isolating transformer with the primary and secondary windings mutually isolated and the secondary winding not grounded.



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 700-HX has a transformer-less 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. 5 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.

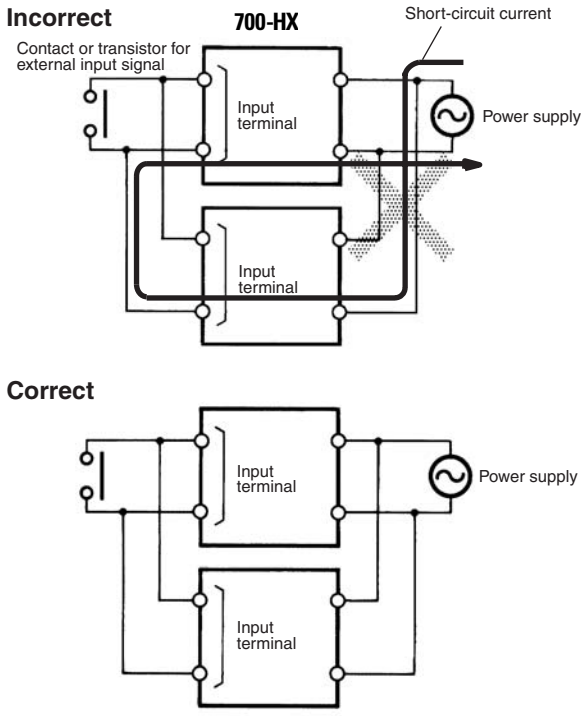
Timer Control with Power Start

To allow for the startup time of peripheral devices (sensors, etc.), the 700-HX starts timing operation between 200 ms…260 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…250. (Normal operation is possible for set value of 250 ms or more.) In applications in which a set value of 249 ms or less is required, use start timing with signal input.

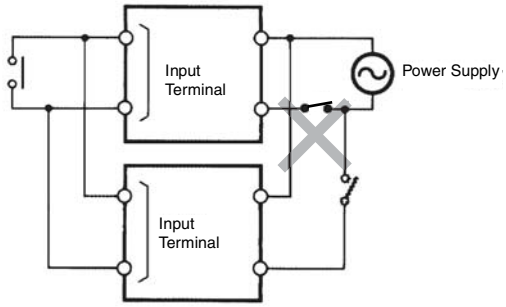
When the 700-HX is used with power start in F mode (i.e., accumulative operation with output on hold), there will be a timer error (approximately 100 ms each time the 700-HX is turned ON) due to the characteristics of the internal circuitry. Use the 700-HX with signal start if timer accuracy is required.

Input/Output

The 700-HX uses transformer-less 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 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.



Self-diagnostic Function

The following displays will appear if an error occurs.

Confirm the error type using the display, and take the appropriate countermeasures.

Main display	Sub- display	Error	Correction
E2	No display	Memory (RAM)	Reset the power supply. If normal operation is still not restored, replacement or repair is necesary. If normal operation is restored, the cause may have been noise.
E2	sum	Memory (EEP) ❶	Reset to the factory settings using the reset key.
E1	No display	CPU	Either press the reset key or reset the power supply.

❶ This includes times when the life of the EEPROM has expired.

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 ≥ set value

Remaining time mode: Elapsed time ≥ 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.

Operation with a Set Value of 0

Operation with a set value of 0 will vary with the output mode. Refer to 3-10.

Power Failure Backup

All data is stored in the EEPROM when there is 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.

Wiring

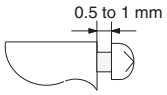
Wiring input lines in the same conduit as power lines or other high-voltage lines may result in malfunction due to noise. Wire the input lines separately, away from lines carrying high-voltages. In addition, make the input wiring as short as possible and use shield lines or metal wiring conduits.

Mounting

Dense mounting may result in a reduction in the service life of internal parts.

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

The 700-HX 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 gasket between the timer and installation panel and secure the waterproof gasket with the 700-HN130 flush-mounting adapter.

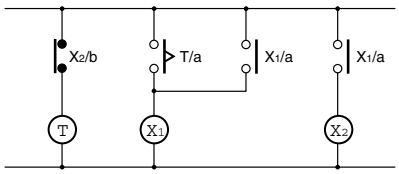


It is recommended that the space between the screw head and the adapter should be 0.5 to 1 mm.

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 in which 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 700-HX has been stored at a temperature of less than –10°C, allow the 700-HX to stand at room temperature for at least 3 hours before use.
- Leaving the 700-HX 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.



⊗ **Auxiliary relay (e.g. 700-HC Relay)**

Insulation

There is no insulation between power supply and input terminals.

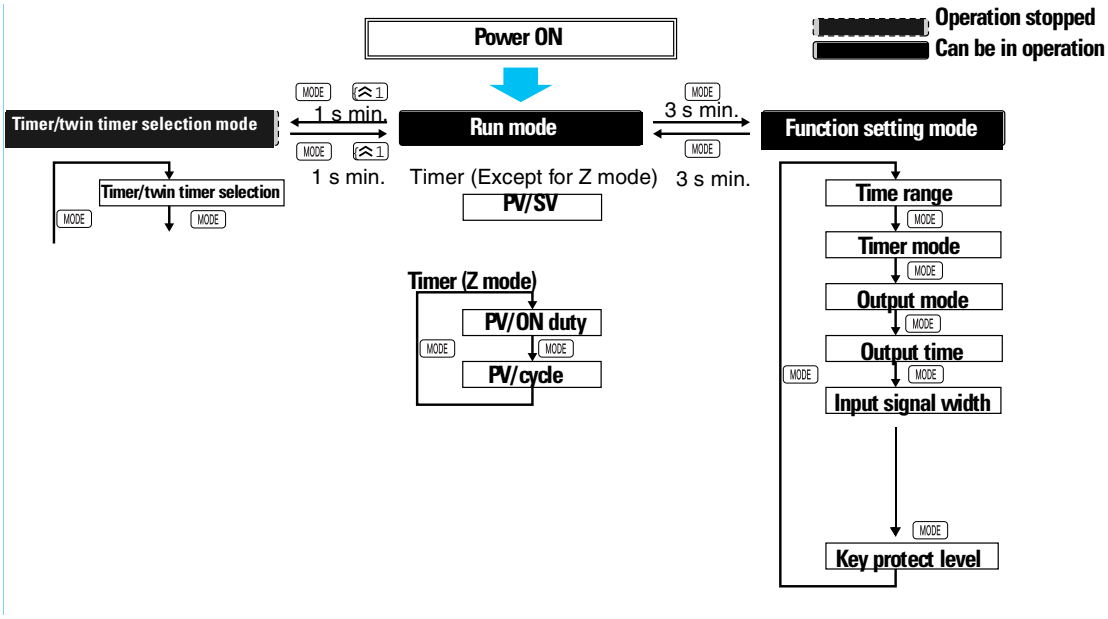
Basic insulation between power supply and output terminals.

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

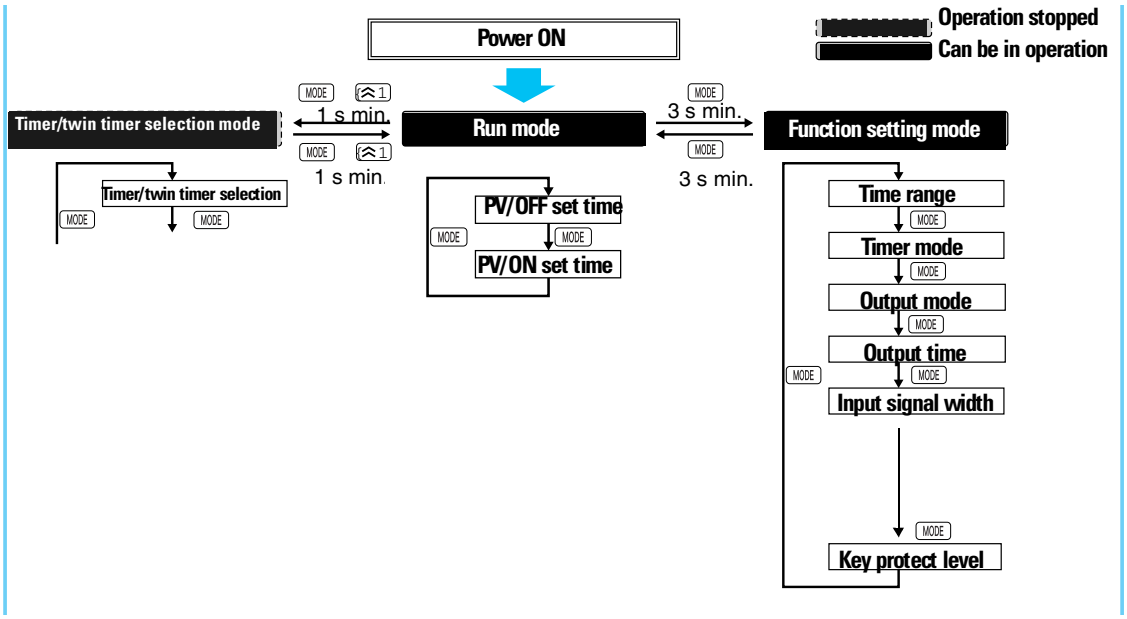
Input and output terminals are connected to devices with basic insulation that is suitable for the maximum operating voltage.

Using the Operation Keys

Timer Operation



Twin Timer Operation



NOTE: All setting changes are performed using keys

The flowcharts on the previous page outline the procedure for all models. For details on specific models, refer to 3-9 (timer operation) or 3-14 (twin timer operation).

List of Settings

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

Timer/Twin Timer Selection Mode

Parameter name	Parameter	Setting range	Dafault value	Unit	Set value
Timer/Twin Timer selection	FUnC	tim tWin	tim	---	

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 … 99.99 (Time range: --,--s)	0.00	s	
			0.0 … 999.9 (Time range: ---,-s)	0.0	s	
			0 … 9999 (Time range: ----s)	0	s	
			0:00 … 99:59 (Time range: --min--s)	0:00	min; s	
			0.0 … 999.9 (Time range: ---,-min)	0.0	min	
			0 … 9999 (Time range: ----min)	0	min	
			0:00 … 99:59 (Time range: --h--min)	0:00	h; min	
			0.0 … 999.9 (Time range: ---,-h)	0.0	h	
			0 … 9999 (Time range: ----h)	0	h	
			0.000 … 9.999 (Time range: -,---s)	0.000	s	
	Present value		Same as set value	Same as left	Same as left	

Run Mode when Output Mode = Z

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

Function Setting Mode

Parameter name	Parameter	Setting range	Dafault value	Unit	Set value
Time range	tCHr	--,--s/---,-s/----s/--min--s/---,-min/----min/--h--min/---,-h/----h/-,---s		---	
Timer mode	tCHn	UP dOWn	UP	---	
Output mode	oUtn	A A-1 A-2 A-3 b b-1 d E F	A	---	
Output time	otCn	HoLd 0.01 to 99.99	HoLd	s	
Input signal width	CFLt	20mS 1mS	20mS	---	
Key protect level	KyPt	KP-1 KP-2 KP-3 KP-4 KP-5	KP-1	---	

Settings for Twin Timer Operation

Run Mode

Parameter name		Parameter	Setting range	Dafault value	Unit	Set value
Present value, OFF set time	OFF set time		0.00 ...99.99 (Time range: --,--s)	0.00	s	
			0.0 ... 999.9 (Time range: ---,-s)	0.0	s	
			0 ... 9999 (Time range: ----s)	0	s	
			0:00 ... 99:59 (Time range: --min--s)	0:00	min; s	
			0.0 ... 999.9 (Time range: ---,-min)	0.0	min	
			0 ... 9999 (Time range: ----min)	0	min	
			0:00 ... 99:59 (Time range: --h--min)	0:00	h; min	
			0.0 ... 999.9 (Time range: ---,-h)	0.0	h	
			0 ... 9999 (Time range: ----h)	0	h	
			0.000 ... 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	Dafault value	Unit	Set value
OFF time range	oFtr	--,--s/---,-s/----s/--min--s/---,-min/----min/--h--min/---,-h/----h/-,---s	--,--s	---	
ON time range	ontr	--,--s/---,-s/----s/--min--s/---,-min/----min/--h--min/---,-h/----h/-,---s	--,--s	---	
Timer mode	tiMM	UP/dAYn	UP	---	
ON/OFF start mode	tAtM	tAFF/tAn	tAFF	---	
Input signal width	iFLt	20mS/ 1mS	20mS	---	
Key protect level	PyPt	PP- 1/PP-2/PP-3/PP-4 PP-5	PP- 1	---	

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