

Compact 1/16 DIN Counters with Easy-to-Use Functions, Four- or Six-Digit LCD Displays

- Designed for easy operation
- High-speed response — 5 K counts per second
- Prescale function displays in units of actual physical parameters — length, volume, etc. (except A/SA types)
- H7CR-C and -SC provide large/small discrimination mode ideal for positioning and production control
- Easy-to-read backlit LCD display
- On-line change of set value
- 4-level key protect
- H7CR-S short 64 mm (2.52 in) body



Ordering Information

When placing your order, specify the supply voltage after the part number. For example, **H7CR-B 100 to 240 VAC**.

■ ECONOMY COUNTERS

| | | |
|-------------------------|------------------------------------|-----------------|
| Number of presets | One | |
| Display type | 6 digit LCD, not backlit | |
| Input type | No-voltage | Voltage |
| Contact output | H7CR-A | H7CR-AV |
| Transistor output | H7CR-AS | H7CR-AVS |
| Sensor power supply | Not available | |
| Counter supply voltages | 100 to 240 VAC, 50/60 Hz or 24 VAC | |

■ STANDARD COUNTERS

| | | | | | |
|------------------------------|-------------------|---|------------------|-----------------------|-------------------|
| Number of presets | | One | | Two (Non-independent) | |
| Display type | | 6 digit LCD, backlit | | 6 digit LCD, backlit | |
| Input type | | No-voltage | Voltage | No-voltage | Voltage |
| 12 VDC sensor supply voltage | Contact output | H7CR-B | H7CR-BV | H7CR-BW | H7CR-BWV |
| | Transistor output | H7CR-BS | H7CR-BVS | H7CR-BWS | H7CR-BWVS |
| 24 VDC sensor supply voltage | Contact output | H7CR-BG | H7CR-BVG | H7CR-BWG | H7CR-BWVG |
| | Transistor output | H7CR-BSG | H7CR-BVSG | H7CR-BWSG | H7CR-BWVSG |
| Counter supply voltages | | 100 to 240 VAC, 50/60 Hz or 24 VAC/12 to 24 VDC | | | |

| | | | | | |
|------------------------|----------------|--------------------------|-----------------|-----------------------|------------------|
| Number of presets | | One | | Two (Non-independent) | |
| Display type | | 4-digit LCD, backlit | | 4-digit LCD backlit | |
| Input type | | No-voltage | | No-voltage | |
| Sensor supply voltage | | 12 VDC | 24 VDC | 12 VDC | 24 VDC |
| Output type | Contact output | H7CR-B4 | H7CR-B4G | H7CR-B4W | H7CR-B4WG |
| Counter supply voltage | | 100 to 240 VAC, 50/60 Hz | | | |

■ REVERSIBLE +/- RANGE COUNTERS

| | | | | | |
|------------------------------|-------------------|---|------------------|-----------------------|-------------------|
| Number of presets | | One | | Two (Non-independent) | |
| Display type | | 6-digit LCD, backlit | | 6-digit LCD, backlit | |
| Input type | | No-voltage | Voltage | No-voltage | Voltage |
| 12 VDC sensor supply voltage | Contact output | H7CR-C | H7CR-CV | H7CR-CW | H7CR-CWV |
| | Transistor output | H7CR-CS | H7CR-CVS | H7CR-CWS | H7CR-CWVS |
| 24 VDC sensor supply voltage | Contact output | H7CR-CG | H7CR-CVG | H7CR-CWG | H7CR-CWVG |
| | Transistor output | H7CR-CSG | H7CR-CVSG | H7CR-CWSG | H7CR-CWVSG |
| Counter supply voltages | | 100 to 240 VAC, 50/60 Hz or 24 VAC/12 to 24 VDC | | | |

■ SHORT BODY COUNTERS

| | | | | | | |
|------------------------|----------------------|------------------|------------------|-------------------|----------------------|-------------------|
| Model | Economy | Standard | | | Reversible +/- Range | |
| Number of presets | One | One | | Two | One | Two |
| Display type | 6-digit, not backlit | 6-digit, backlit | 4-digit, backlit | 6-digit, backlit | 6-digit backlit | |
| Input type | No-voltage | | | | | |
| Contact output | H7CR-SAL | H7CR-SBL | H7CR-SB4L | — | H7CR-SCL | — |
| Transistor | H7CR-SASL | H7CR-SBSL | — | H7CR-SBWSL | H7CR-SCSL | H7CR-SCWSL |
| Counter supply voltage | 12 to 24 VDC | | | | | |

■ SOCKET-MOUNT COUNTERS

| | | | | | | |
|------------------------|---|--|----------------------|--|----------------------|--|
| Number of presets | One | | | | | |
| Display type | 6-digit LCD, backlit | | 4-digit LCD, backlit | | 6-digit LCD, backlit | |
| Input type | Power supply reset type | | | | Memory backup type | |
| Contact output | H7CR-8 | | H7CR-84* | | H7CR-11 | |
| Transistor | H7CR-8S | | — | | H7CR-11S | |
| Counter supply voltage | 100 to 240 VAC, 50/60 Hz or 24 VAC/12 to 24 VDC | | | | | |

* Available with 100 to 240 VAC supply voltage only.

■ ACCESSORIES

| Description | | | Part number |
|---|--|--|------------------|
| Sockets | For H7CR-8 and H7CR-8S | Bottom surface or track mounting, top screws | P2CF-08 |
| | | Back mounting, for use with Y92F-30 mounting adapter, bottom screw terminals | P3G-08 |
| | For H7CR-11 and H7CR-11S | Bottom surface or track mounting, top screws | P2CF-11 |
| | | Back mounting, for use with Y92F-30 mounting adapter, bottom screw terminals | P3GA-11 |
| Soft cover with two mounting clips for front panel protection | | | Y92A-48F1 |
| Shock prevention terminal cover protects wiring connections | | | Y92A-48T |
| Mounting track for P2CF sockets | DIN rail, 50 cm (1.64 ft) length | | PFP-50N |
| | DIN rail, 1 m (3.28 ft) length | | PFP-100N |
| | End plate | | PFP-M |
| Panel mounting adapter* | For use with H7CR-8/-11 digital counters | | Y92F-30 |

* Panel mounting adapter is included with H7CR-A/-B/-C digital counters. Order separately for use with H7CR-8/-11 counters.

■ REPLACEMENT PARTS

| Description | Part number |
|-------------------------|----------------|
| Panel mounting adapter* | Y92F-30 |

* Panel mounting adapter is included with H7CR-A/-B/-C digital counters.

Specifications

■ GENERAL CAPABILITIES

| Model | H7CR-A Series | H7CR-B Series | H7CR-C Series |
|---------------------------|--|---|--|
| Classification | Preset counter (economy) | Preset counter (standard) | Preset counter (+/- range) |
| Mounting | Flush mounting | | |
| External connections | Screw terminals | | |
| Degree of protection | IEC: IP54 (panel surface) | | |
| Output modes | N, F | N, F, C, R, K, P, Q, A | K, D, L, H |
| Input modes | Up, down, reversible A (command inputs), reversible B (individual inputs), reversible C (phase difference inputs) | | Reversible A (command inputs), reversible B (individual inputs), reversible C (phase difference inputs) |
| Reset system | External and manual resets | External, manual, and automatic (internal according to C, R, P, and Q mode operation) resets External: closing contacts 6 & 7 Manual: pressing reset button (<i>certain models only</i>) Automatic: available only in modes C, R, P, and Q | External and manual resets External: closing contacts 6 & 7 Manual: pressing reset button (<i>certain models only</i>) |
| Scaling function | None | 0.001 to 99.999 or 9.999 | 0.001 to 99.999 |
| Decimal point adjustments | None | Rightmost 3 digits | |
| Sensor power supply | None | 12 or 24 VDC | |
| Input signals | Count, reset | Count, reset, key protect | |
| Input method | No-voltage input: Via opening and closing of contact Voltage input: Via high and low signal voltage Key protect (standard and +/-range counters): No-voltage inputs only | | |
| Control output | SPST-NO contact or transistor (NPN open collector) output | Single preset types: One SPST-NO contact or transistor (NPN open collector) output Double preset types: Two SPST-NO contacts or transistor (NPN open collector) output | |
| Displays | 7-segment LCD present value and preset displays; LCD character indicators for outputs, power, and modes | | |
| Display type | LCD; 8mm (0.32 in.) H Present Value, 4 mm (0.16 in.) H Set Value | Backlit LCD; 8 mm (0.24 in.) H Present Value, 4 mm (0.16 in.) H Set Value | |
| Digits | 6 digits, 0 to 999,999 | 6 or 4 digits; 0 to 999,999 or 0 to 9,999 | 6 digits positive/5 digits negative, -99,999 to 999,999 |
| Memory backup | Backup time for power interruption: Approx. 10 years at 20°C (68°F); non-replaceable lithium battery | | |

■ H7CR-S, -8, -11

| Model | H7CR-SA | H7CR-SB□□ | H7CR-SC | H7CR-8□ | H7CR-11 |
|---------------------------|--|--|---|--|---|
| Classification | Preset counter (economy) | Preset counter (standard) | Preset counter (+/- range) | Preset counter (standard) | Preset counter (standard) |
| Mounting | Flush mounting | | | Flush or surface mounting | |
| External connections | Screw terminals | | | Socket | |
| Degree of protection | IEC: IP54 (panel surface) | | | | |
| Output modes | N, F | N, F, C, R, K, P, Q, A | K, D, L, H | N, F, C, R, K, P, Q, A | |
| Input modes | Up, Down & Reversible A (command inputs), Reversible B (individual inputs), Reversible C (Phase difference inputs) | | Reversible A (command inputs), Reversible B (individual inputs), Reversible C (phase difference inputs) | Up, Down & Reversible A (command inputs), Reversible B (individual inputs), Reversible C (phase difference inputs) | |
| Reset system | External and manual resets | External, manual, automatic (internal according to C, R, P, and Q operation) resets | External and manual resets | External, manual, power supply, and automatic (internal according to C, R, P, and Q operation) resets | External, manual, automatic (internal according to C, R, P, and Q operation) resets |
| Scaling function | None | 0.001 to 99.999 for 6-digit, 0.001 to 9.999 for 4-digit | | | |
| Decimal point adjustments | None | Rightmost 3 digits | | | |
| Input signals | Count, reset | Count, reset, key protect | | Count, reset | Count, reset, and key protect |
| Input method | No-voltage input: Via opening and closing of contact | | | | |
| Control output | SPST-NO contact or transistor (NPN open collector) output | Single preset types: SPST-NO contact or transistor (NPN open collector) output Double preset types: DPST-NO contact or transistor (NPN open collector) output | | SPST-NO contact or transistor (NPN open collector) output | SPDT-NO contact or transistor (NPN open collector) output |
| Displays | 7-segment LCD present value and preset displays; LCD character indicators for outputs, power, and modes | | | | |
| Display type | Backlit LCD | | | | |
| Digits | 6 digits (0 to 999,999) | 6 or 4 digits; 0 to 999,999 or 0 to 9,999 | 6 digits positive and 5 digits negative (-99,999 to 999,999) | 6 or 4 digits; 0 to 999,999 or 0 to 9,999 | 6 digits (0 to 999,999) |
| Memory backup | Backup time for power interruption: Approx. 10 years at 20°C (68°F); non-replaceable lithium battery | | | | |

■ OUTPUT MODES SUMMARY

| Output mode | Description | | Applicable counter series |
|-------------|--|--|---------------------------------|
| | Single preset counter | Double preset counter | |
| N | Sustained output | Sustained output 2, selectable sustained or one-shot output 1 | H7CR-A, -B, -SA, -SB□, -8□, -11 |
| F | Sustained output, overrun display | Sustained output 2, selectable sustained or one-shot output 1 | |
| C | One-shot output | One-shot output 2, selectable one-shot or sustained output 1 | |
| R | One-shot output | One-shot output 2, selectable one-shot or sustained output 1 | |
| K | One-shot output, overrun display | One-shot output 2, selectable one-shot or sustained output 1 | |
| P | One-shot output | One-shot output 2, selectable one-shot or sustained output 1 | |
| Q | One-shot output, overrun display | One-shot output 2, selectable one-shot or sustained output 1 | |
| A | One-shot output | One-shot output 2, selectable one-shot or sustained output 1 | |
| D | Instantaneous output, count value = preset | Instantaneous outputs when count value = preset | H7CR-C, -SC |
| L | Sustained output, count value ≥ preset | Sustained output 2, count value ≥ preset, sustained output 1, count value ≤ preset | |
| H | Sustained output, count value ≥ preset | Sustained outputs when count values ≥ preset | |
| K | One-shot output, count value = preset | One-shot outputs, count value = preset | |

■ RATINGS

| Model | H7CR-A Series | H7CR-B Series | H7CR-C Series |
|-------------------------------|---|--|--|
| Supply voltage | 100 to 240 VAC, 50/60 Hz or 24 VAC, 50/60 Hz (permissible ripple: 20% max.) | 100 to 240 VAC, 50/60 Hz or 24 VAC/12 to 24 VDC (permissible ripple: 20% max.) | |
| Operating voltage range | 85% to 110% of rated voltage | | |
| Power consumption | Approx. 1.7 VA at 50 Hz, 240 VAC; 0.6 W at 24 VDC | Approx. 6.6 VA at 50 Hz, 240 VAC; 3.2 W at 24 VDC* | |
| Max. counting speed | 30 cps, or 1 or 5 kcps (same setting CP1 and CP2) | | |
| Reset | Min. pulse width for external reset: 20 ms, manual reset | Min. pulse width for external reset: 1 or 20 ms, manual reset | |
| Key protect | Not applicable | Response time: 1 second | |
| One-shot durations | 10, 50, 100, 200, or 500 ms | 10, 50, 100, 200, or 500 ms (separate settings for presets 1 and 2) | |
| Inputs (count, reset) | No-voltage inputs ON impedance: 1kΩ max. (approx. 2 mA when 0 kΩ) ON residual voltage: 2 V max.; 1 V max. for H7CR-□4 OFF impedance: 100 kΩ min. Voltage inputs High level: 4.5 to 30 VDC Low level: 0 to 2 VDC Input resistance: Approx. 4.7 kΩ | | |
| Key protect input | Not applicable | No-voltage input | ON impedance: 1 kΩ max. ON residual voltage: 1 V max. OFF impedance: 100 kΩ min. |
| Control output | Contacts: 3 A, 250 VAC; general use (p.f. = 1) Transistor: Open collector; 100 mA at 30 VDC max. residual voltage 2 V max. (approx. 1 V) | | |
| Sensor power supply | Not applicable | 100 mA, 12 VDC±10 (5% ripple max.) 50 mA, 24 VDC±10 (5% ripple max.) | |
| Ambient operating temperature | -10° to 55°C with no icing (14° to 131°F) | | |
| Storage temperature | -25° to 65°C (-13° to 149°F) with no icing | | |
| Ambient operating humidity | 35% to 85% RH | | |

*Upon power application, a surge current of approx. 5 A at 240 VAC and 8 A at 24 VAC or 24 VDC flows for 2 ms.

H7CR-S, -8, -11

| Model | H7CR-SA | H7CR-SB□ | H7CR-SC | H7CR-8□ | H7CR-11 |
|-------------------------------|---|--|-----------|--|--|
| Type | Economy | Standard | +/- range | Socket mount | Socket mount |
| Supply voltage | 12 to 24 VDC (20% max. permissible ripple) | | | 100 to 240 VAC, 50/60 Hz or 24 VAC/12 to 24 VDC (20% max. permissible ripple) | |
| Operating voltage range | 85% to 110% of rated voltage | | | | |
| Power consumption | Approx. 1.3 W at 24 VDC | | | Approx. 2.8 VA at 50 Hz, 240 VAC (approx. 5 A (24 VDC/240 VAC) surge current for 2 ms upon power application) Approx. 1.3 W at 24 VDC (approx. 8 A (24 VDC/24 VAC) surge current for 2 ms upon power application) | |
| Max. counting speed | 30 cps, or 1 or 5 kcps (same setting CP1 and CP2) | | | | |
| Reset | Min. pulse width for external reset: 20 ms | Min. pulse width for external reset: 1 or 20 ms | | Min. pulse width for external reset: 1 or 20 ms, power reset: 0.5 s | Min. pulse width for external reset: 1 or 20 ms |
| Key protect | Not applicable | Response time: 1 second | | | |
| One-shot durations | 10, 50, 100, 200, and 500 ms | 10, 50, 100, 200, and 500 ms (separate settings for presets 1 and 2) | | 10, 50, 100, 200, and 500 ms | |
| Inputs (count, reset) | No-voltage inputs | ON impedance: 1kΩ max. (approx. 2 mA when 0 kΩ) ON residual voltage: 2 V max. OFF impedance 100 kΩ min. | | | |
| Key protect input | Not applicable | No-voltage input ON impedance: 1 kΩ max. (approx. 2 mA when 0 kΩ) ON residual voltage: 1 V max. OFF impedance: 100 kΩ min. | | Not applicable | No voltage input ON impedance: 1 kΩ max. (approx. 2 mA when 0 kΩ) ON residual voltage: 1 V max. OFF impedance: 100 kΩ min. |
| Control output | Contacts: 3 A, 250 VAC; general use (p.f. = 1) Transistor: Open collector; 100 mA at 30 VDC max. residual voltage 2 V max. (approx. 1 V) | | | | |
| Ambient operating temperature | -10° to 55°C (14° to 131°F) with no icing | | | | |
| Storage temperature | -25° to 65°C (-13° to 149°F) with no icing | | | | |
| Ambient operating humidity | 35% to 85% RH | | | | |

Approved by the following standards:

UL

CSA

SEV

CE (EMC)

■ CHARACTERISTICS

| | |
|-----------------------|--|
| 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 terminal and exposed non-current-carrying metal parts) |
| Impulse voltage | Between power terminals: 1 kV for 24 or 12-24 VDC power supply, 3 kV for others Between current-carrying terminal and exposed non-current-carrying metal parts: 1.5kV for 24 or 12-24 VDC power supply, 4.5 kV for others |
| Noise immunity | \pm 2 kV between power terminals, \pm 600 V between input terminals (square-wave noise via noise simulator; pulse width: 1 μ s; 1-ns rise) |
| Static immunity | Malfunction: 8 kV; destruction: 15 kV |
| Vibration | Mechanical durability: 10 to 55 Hz with 0.75-mm (0.03 in) single amplitude/55 to 150 Hz with 10 G 32 min each in three directions Malfunction durability: 10 to 55 Hz with 0.5-mm (0.02 in) single amplitude/55 to 150 Hz with 10 G 32 min each in three directions |
| Shock | Mechanical durability: 30 G Malfunction durability: 10 G |
| Life | Mechanical: 10 million operations min. Electrical: 100,000 operations min. (at 3 A, 250 VAC general in use (p.f. = 0.7 to 0.8)) |
| Weight | Economical counters: AC types, approx. 230 g (8.1 oz.); DC types, approx. 150 g (5.3 oz.) Standard and +/- range counters: Approx. 170 g (6 oz.) |

Input/Output Functions

■ INPUTS

| | |
|---------------------------|--|
| CP1/CP2 (count inputs) | <ul style="list-style-type: none"> Count signal inputs. Up, Down, and Reversible (command, individual, or phase difference) inputs accepted. Maximum counting speed: 5 kcps. |
| Reset | <ul style="list-style-type: none"> Present value reset (to zero in Up or Up/Down modes, to preset with 1-stage models in Down mode and to preset 2 for 2-stage models in Down mode). Count inputs are not acknowledged while reset input is ON. Reset indicator lit while reset input is ON. |
| Key protect | <ul style="list-style-type: none"> Reset, Right Shift and Up keys are inoperative while key protect input is ON. Although Display key remains effective, only monitoring of settings is possible. Keys protected indicator lit while key protect input is ON. Effective when power supply is turned off. |

Count Input vs. Reset Input

When the RESET input is ON or the RESET key input is ON, the count input is prohibited and the present value is reset. However, when the key protect input is ON and the key protect level is KP-2 or KP-4, no RESET key input is accepted.

Reset Time

Set to 1 ms if high-speed resetting is necessary. Set the reset time to 20 ms if you need to prevent false signals caused by electrical noise from affecting the counter.

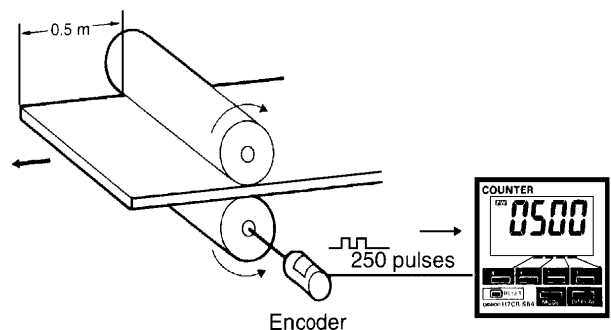
■ OUTPUTS

| | |
|-----------------|--|
| Outputs 1 and 2 | Outputs made according to designated output mode when corresponding preset is reached. |
|-----------------|--|

Using Prescale Function

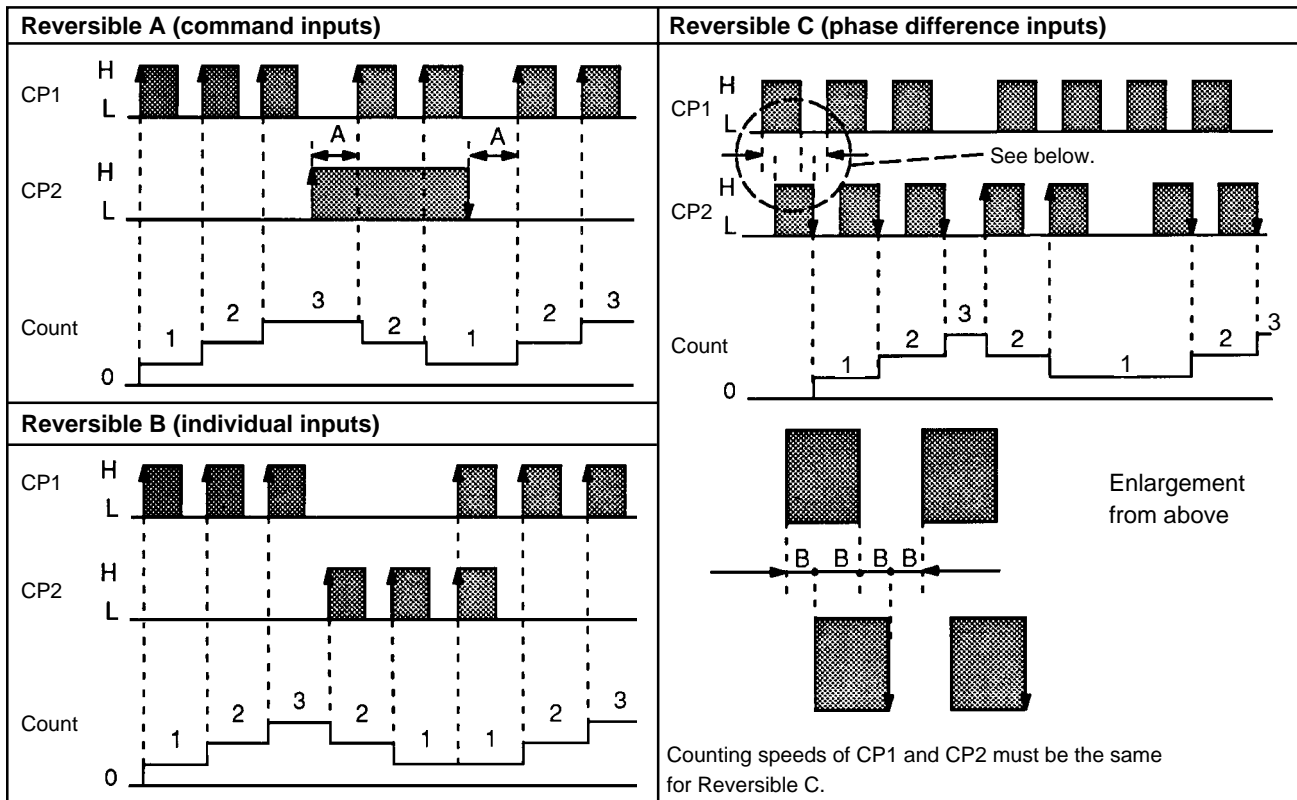
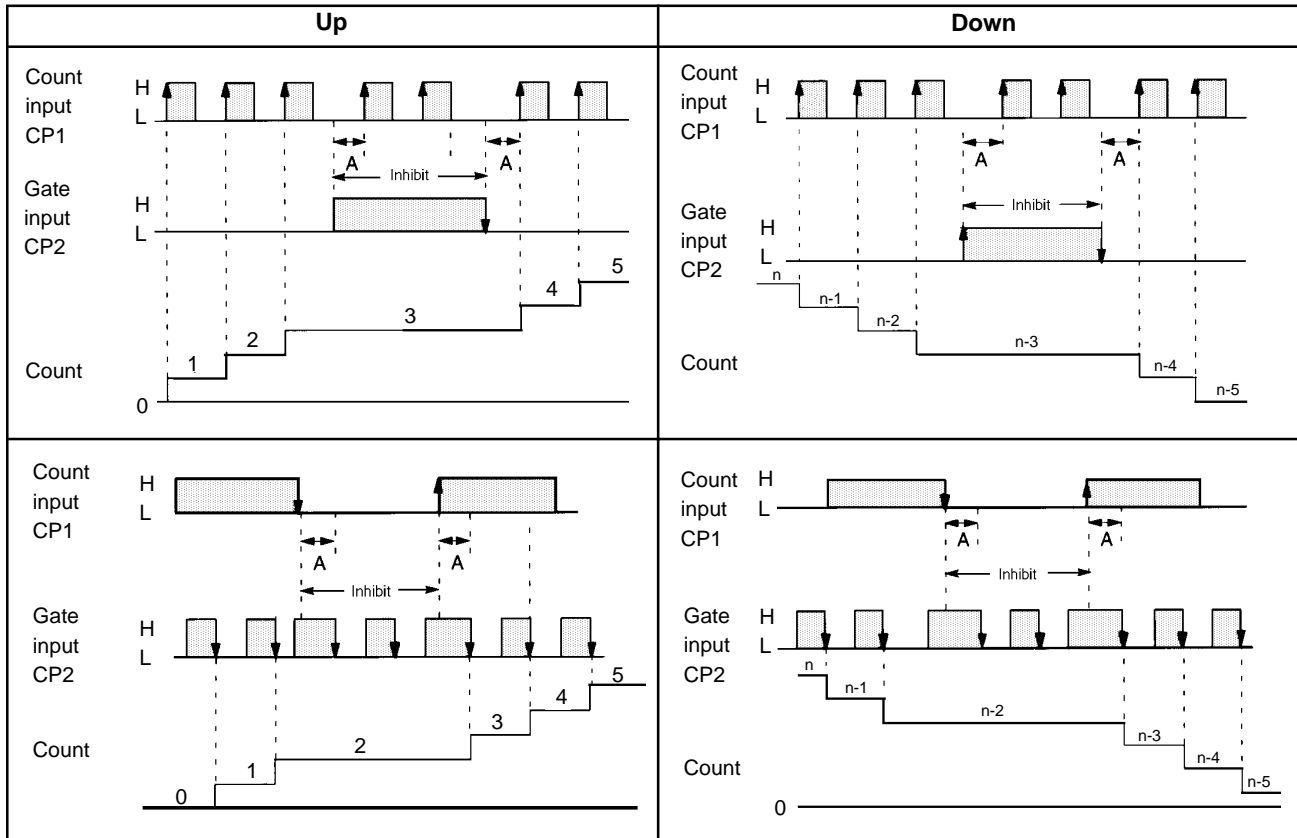
The prescale function converts the number of input counts into a user-selectable value. The example below shows a system that uses 250 encoder pulses to determine when an object has advanced 0.5 meters. Here is how to convert pulses into a unit of measure appropriate for your application:

- Set the decimal point between the third and fourth digits.
- Set a prescale value of 0.002. This is calculated by dividing the unit of measure (0.5) by the number of pulse counts (250).



Timing Charts

INPUT MODES

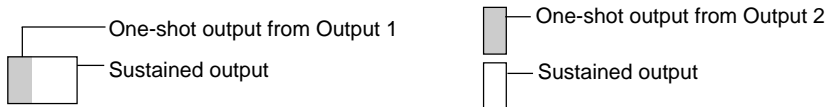
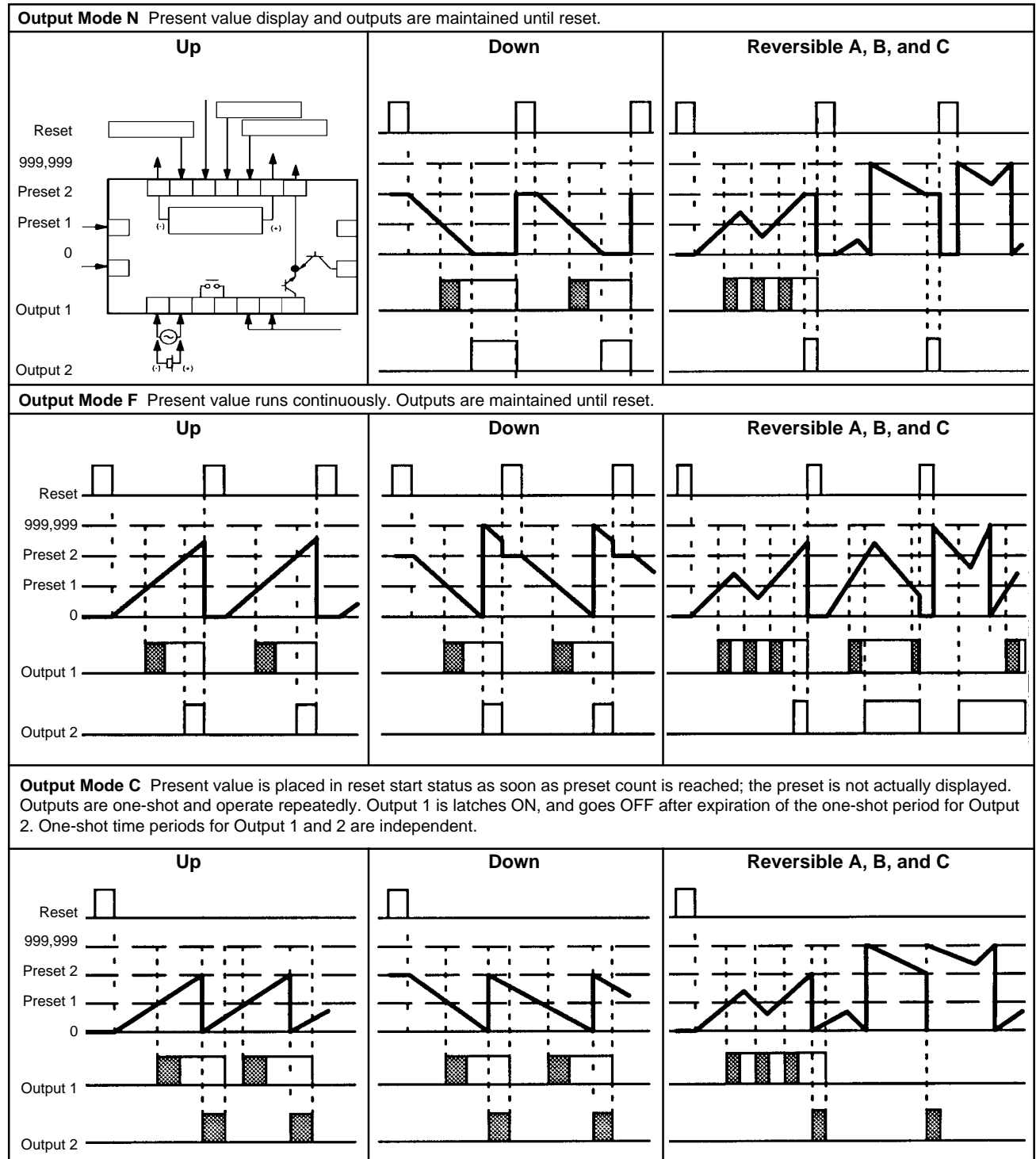


A: Minimum signal width

B: Must be at least 1/2 of minimum signal width. Signals may not be counted if the minimums for A and B are not met.

■ H7CR-A AND H7CR-B COUNTER OUTPUT OPERATIONS

Bold line represents present value; Output 2 operation applies for single-preset models. H7CR-A models have only Mode N and F.

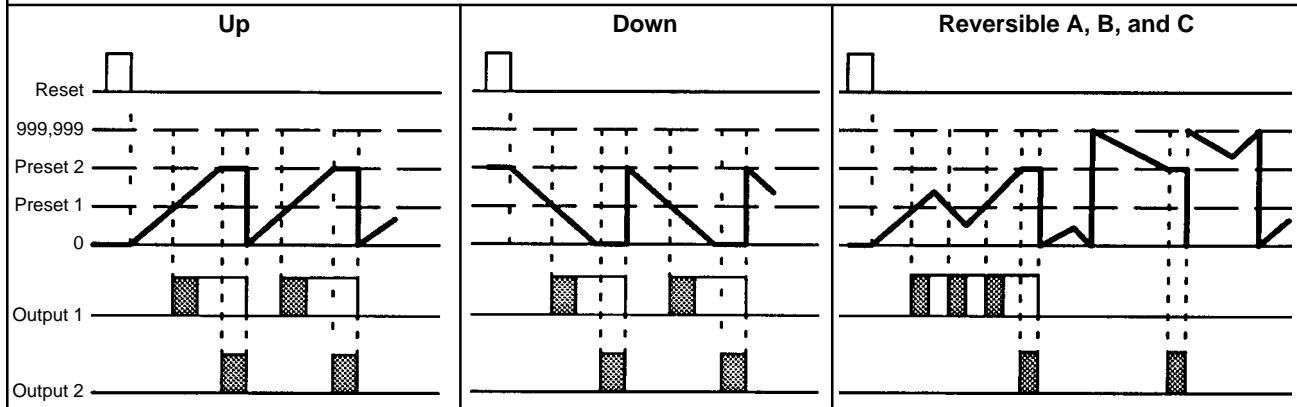


One-shot outputs can be set to 10, 50, 100, 200 or 500 ms.

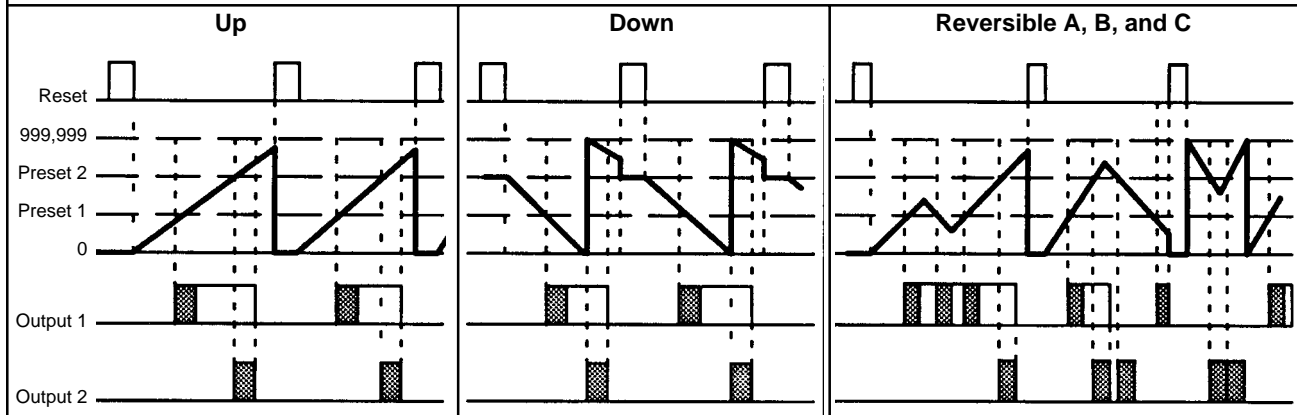
Standard Counter Output Operation (Continued)

(Bold line represents present value; Output 2 operation applies for single-preset models.)

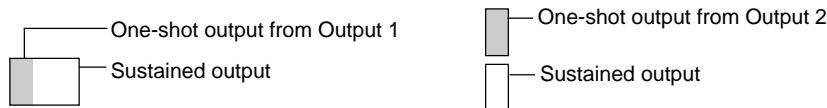
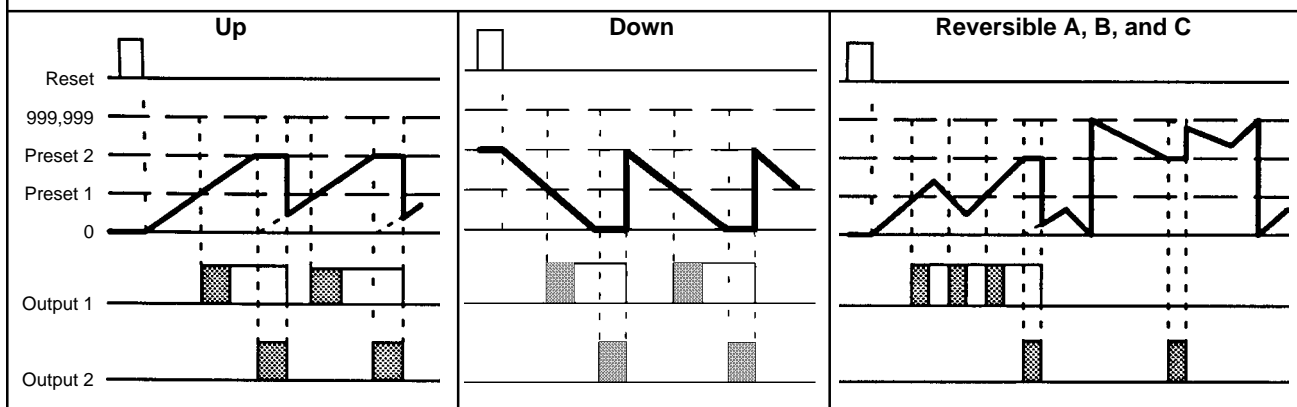
Output Mode R Present value display returns to reset start status after expiration of one-shot time period. Outputs are one-shot and operate repeatedly. Output 1 latches ON at preset 1, and goes OFF after expiration of the one-shot period for Output 2. One-shot time periods for Output 1 and 2 are independent.



Output Mode K Present value runs continuously. Output 1 latches ON at preset 1, and goes OFF after expiration of the one-shot period for Output 2. One-shot time periods for Output 1 and 2 are independent.



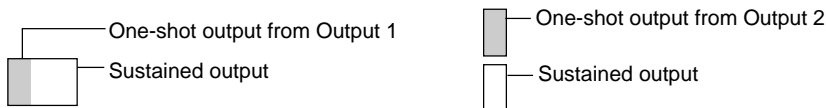
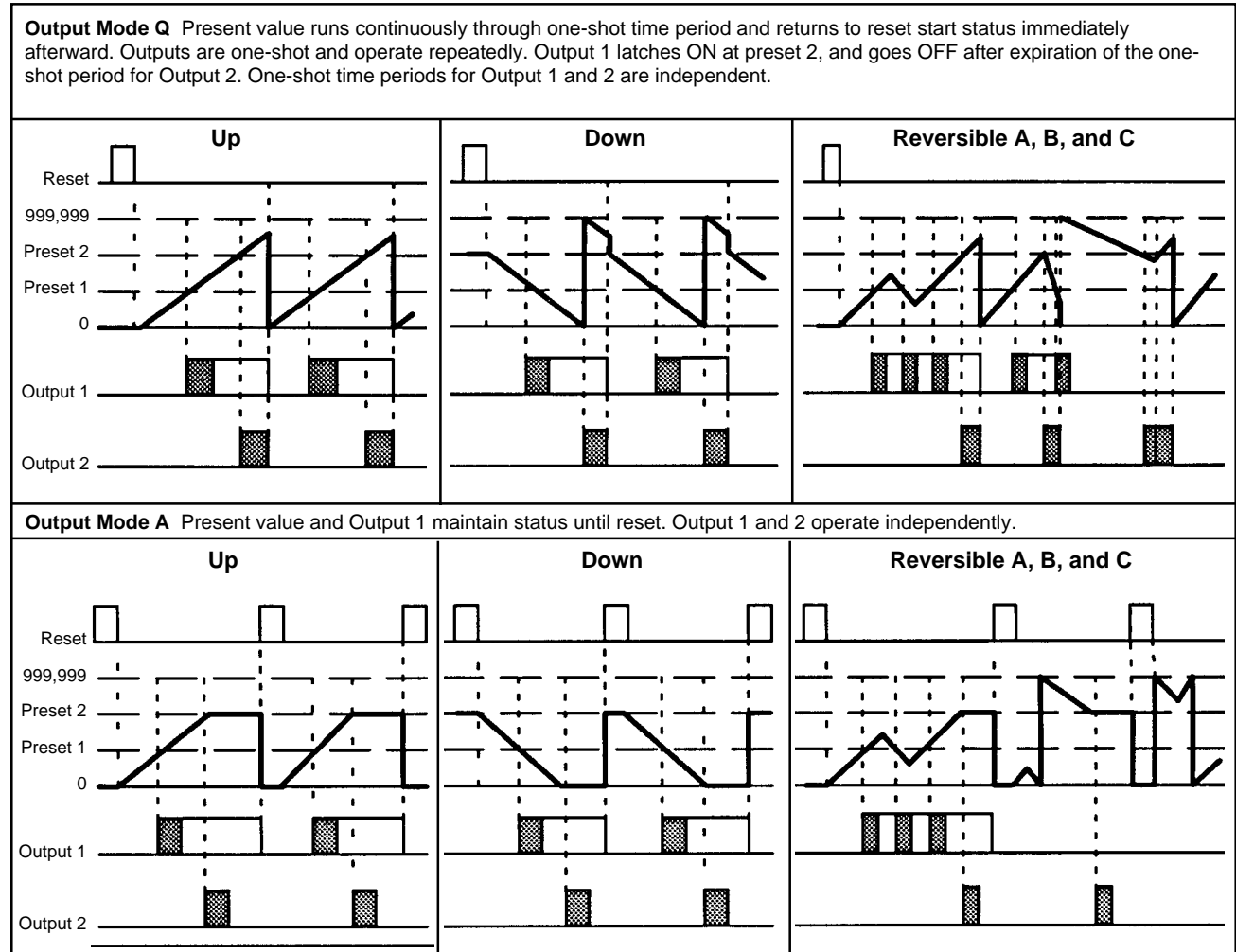
Output Mode P Present value display does not change during one-shot time period, but reset start status returns as soon as preset count is reached. Outputs are one-shot and operate repeatedly. Output 1 latches ON at preset 1, and goes OFF after expiration of the one-shot period for Output 2. One-shot time periods for Output 1 and 2 are independent.



One-shot outputs can be set to 10, 50, 100, 200 or 500 ms.

Standard Counter Output Operation (Continued)

(Bold line represents present value; Output 2 operation applies for single-preset models.)

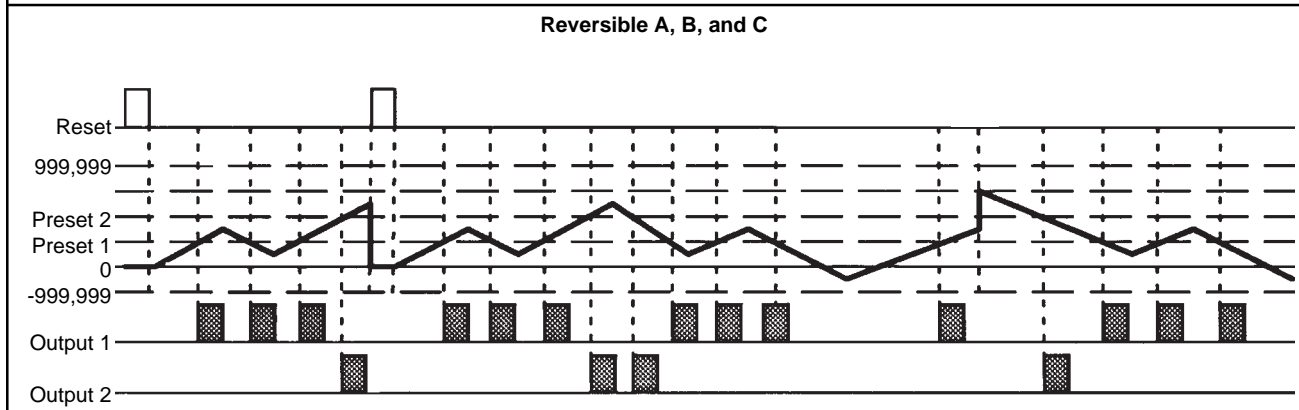


One-shot outputs can be set to 10, 50, 100, 200 or 500 ms.

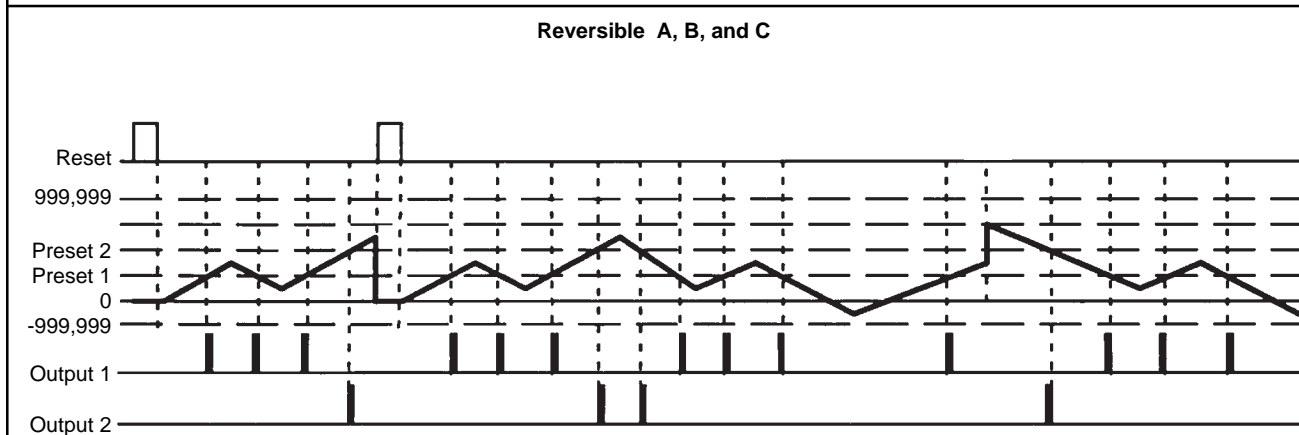
■ H7CR-C REVERSIBLE +/- RANGE COUNTER OUTPUT OPERATION

(Bold line represents present value; Output 2 operation applies for single preset models.)

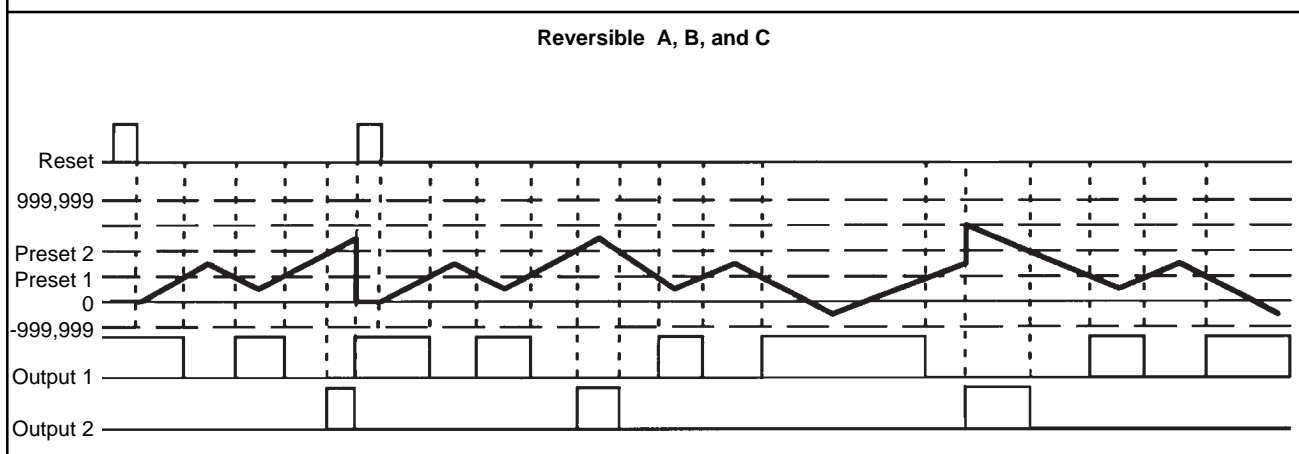
Output Mode K Present value increments and decrements within displayable range. Output 1 goes ON for one-shot whenever present value is equal to preset 1; Output 2 goes ON for one-shot whenever present value is equal to preset 2.



Output Mode D Present value increments and decrements within displayable range. Output 1 is ON whenever present value is equal to preset 1; Output 2 is ON whenever present value is equal to preset 2.



Output Mode L Present value increments and decrements within displayable range. Output 1 is ON whenever present value is less than or equal to preset 1; Output 2 is ON whenever present value is greater than or equal to preset 2.



▬ One-shot output

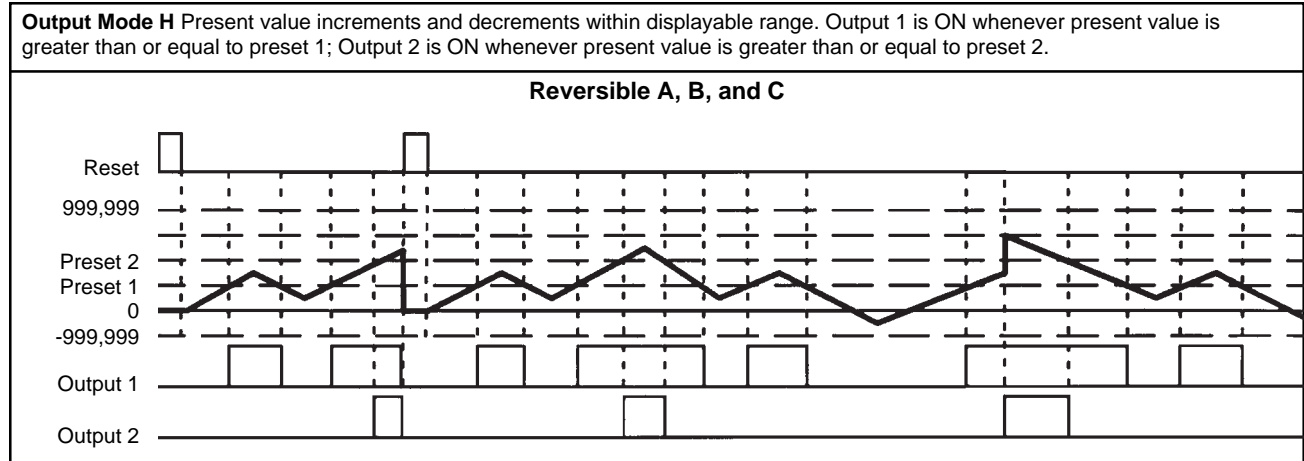
┆ Instantaneous (equals) output

▭ Sustained output/level input

One-shot outputs can be set to 10, 50, 100, 200 or 500 ms.

+/- Range Counter Output Operation (Continued)

(Bold line represents present value; Output 2 operation applies for single preset models.)



One-shot outputs can be set to 10, 50, 100, 200 or 500 ms.

Notes

Counting inputs are not acknowledged while the reset input is ON.

The compensation input is valid only when the present value is being incremented.

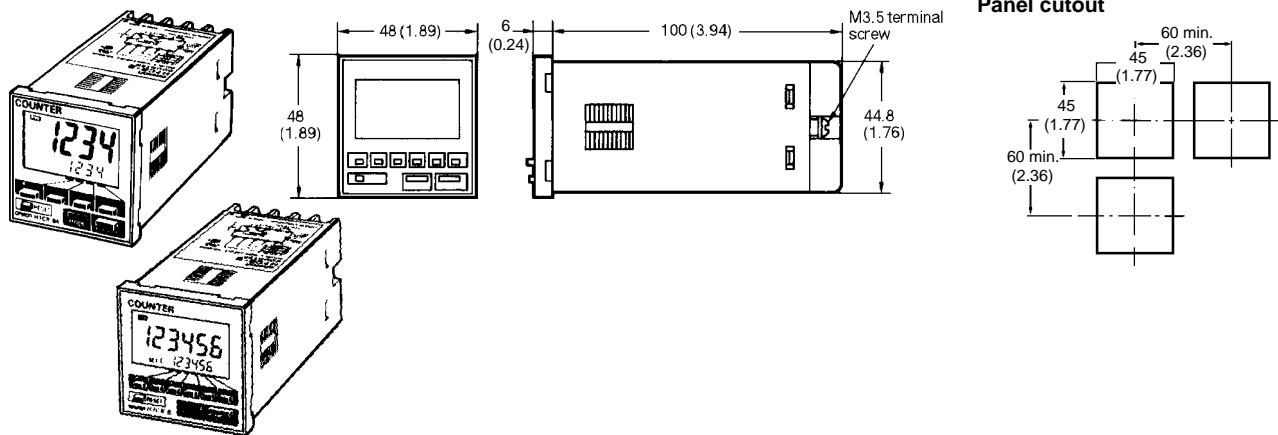
One-shot outputs, when ON, are turned OFF when the reset input goes ON, but are left ON for the one-shot time period when the compensation inputs goes ON. One-shot outputs, when ON, are reset and the one-shot output is restarted if a preset designating the output is reached.

Dimensions

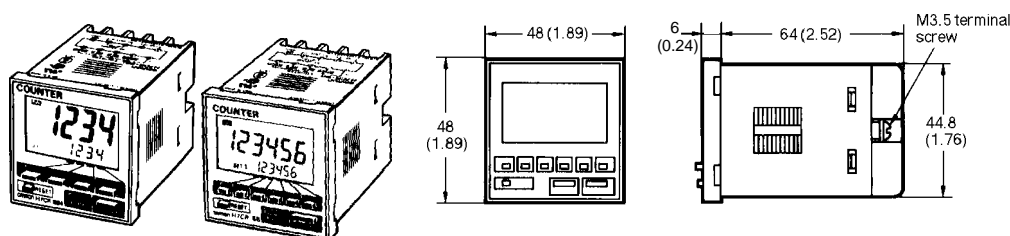
Unit: mm (inch)

■ COUNTERS

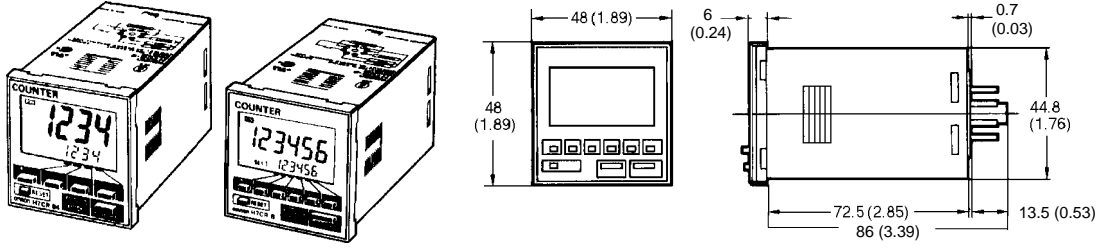
H7CR-A, H7CR-B and H7CR-C



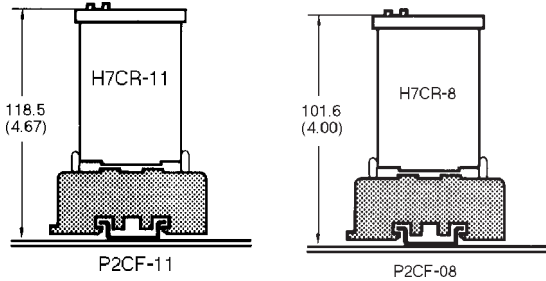
H7CR-S □ Short Body



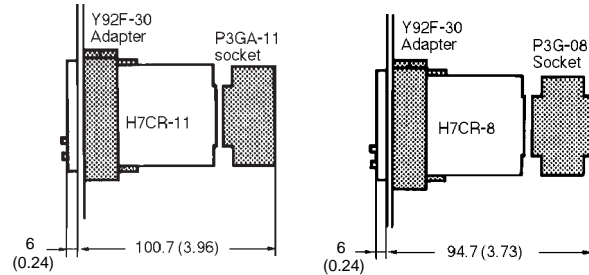
H7CR-8□, H7CR-11 Socket-Mount Types



Track and surface mounting height



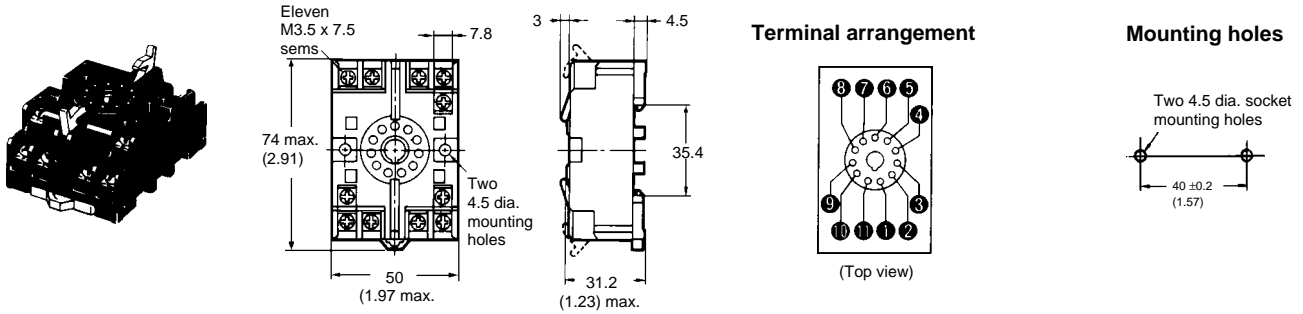
Panel mounting depth



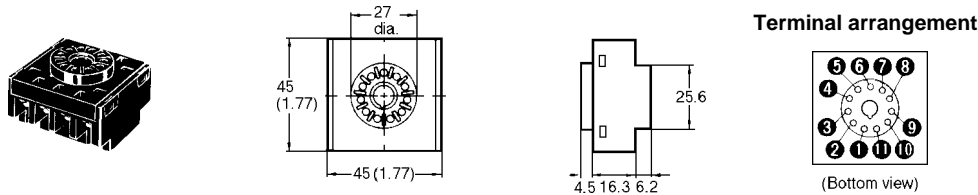
SOCKETS

11-Pin Sockets for H7CR-11□

P2CF-11 Bottom surface or track mounting socket

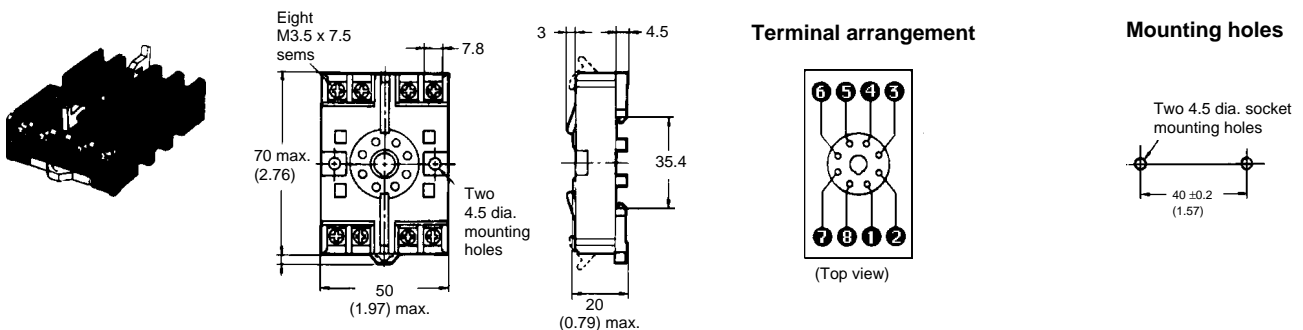


P3GA-11 Back mounting socket



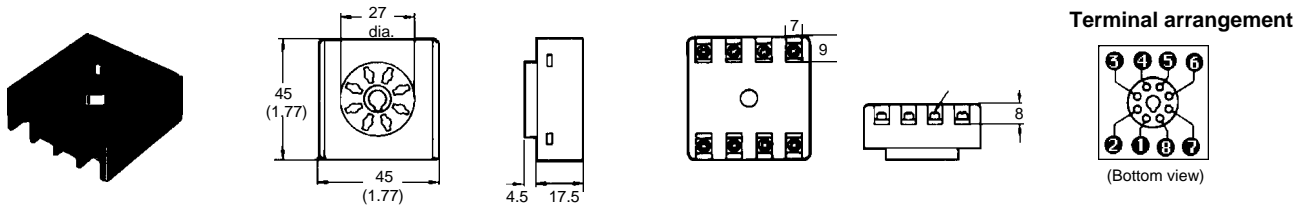
8-Pin Sockets for H7CR-8□

P2CF-08 Bottom surface or track mounting socket



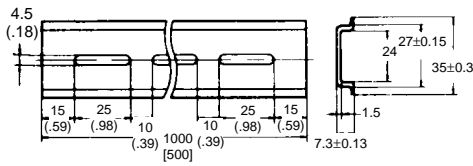
SOCKETS (Continued)

P3G-08 Back mounting socket

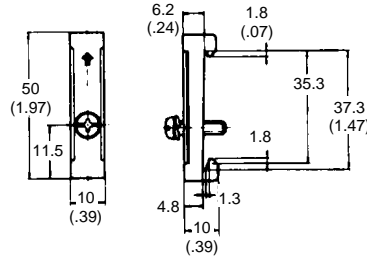


■ MOUNTING TRACK AND ACCESSORIES

PFP-50N, PFP-100N DIN Rail Track

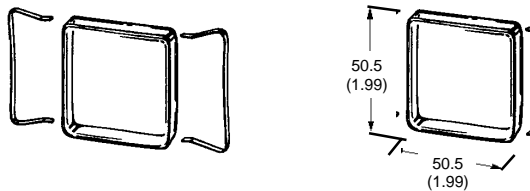


PFP-M End Plate



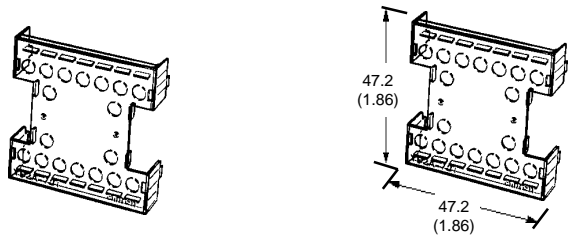
Y92A-48F1 Soft Plastic Cover

Two mounting clips help the soft plastic cover Y92A-48F1 fit snugly over the front of the timer to protect against dirt and water. Timer settings can be changed when the cover is on. The cover is intended for use in areas where unusual service conditions do not exist.



Y92A-48T Terminal Cover

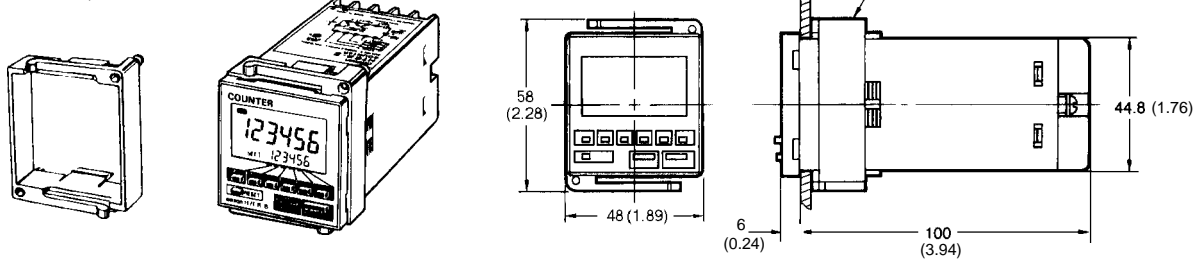
The terminal cover protects wiring connections on the Standard and Short Body models.



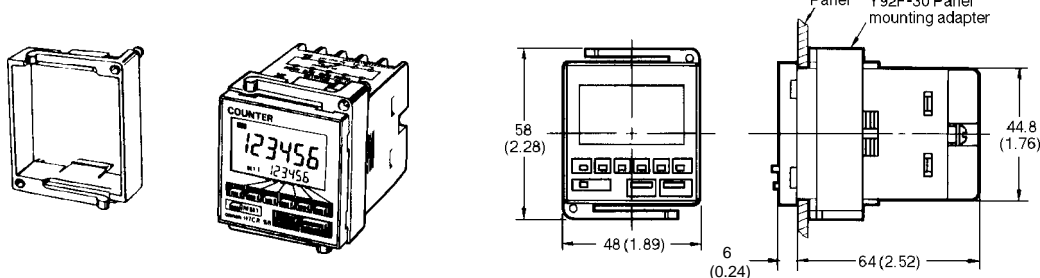
■ PANEL MOUNTING ADAPTER Y92F-30

Panel mounting adapter Y92F-30 is supplied with each counter. Installation instructions are on the next page.

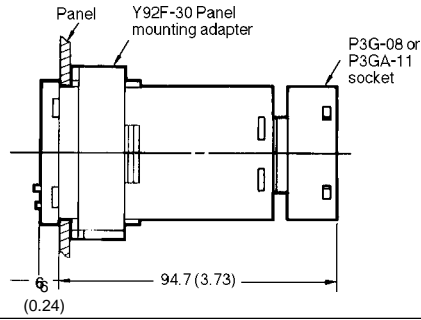
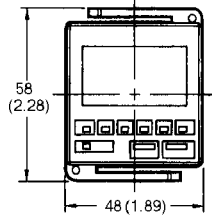
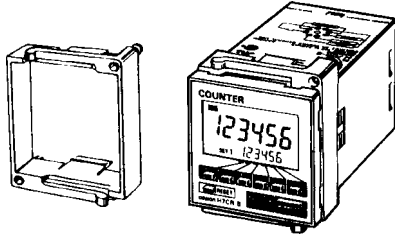
H7CR-A, H7CR-B and H7CR-C



H7CR-S



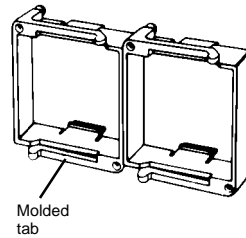
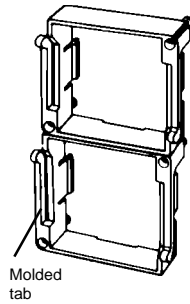
H7CR-8□, H7CR-11



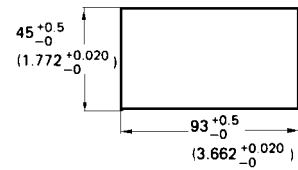
Panel Mounting H7CR Counters

Insert the counter through the panel cutout. Push the Y92F-30 adapter from the rear of the counter as far forward toward the panel as possible. Then, tighten the two retaining screws. To release the adapter, lift the tab at the rear of the adapter.

Several counters may be mounted close together using Y92F-30 adapter as shown here. When mounting two or more counters in a vertical line, arrange the adapters so that their molded tabs are positioned on the right and left sides. When mounting two or more counters in a horizontal line, arrange the adapters so that their molded tabs are positioned on the top and bottom sides.



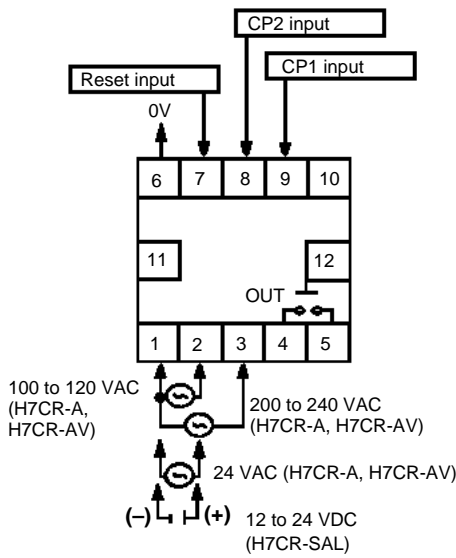
Panel cutout for side-by-side mounting of two counters



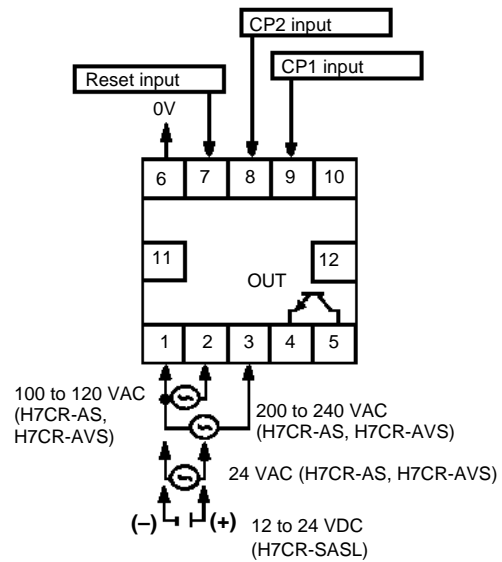
Connections

■ H7CR-□A SERIES (ECONOMY)

Single Preset Contact Output

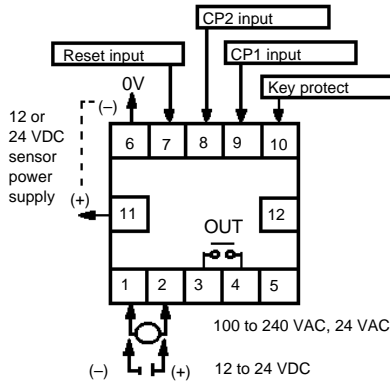


Single Preset Transistor (NPN) Output



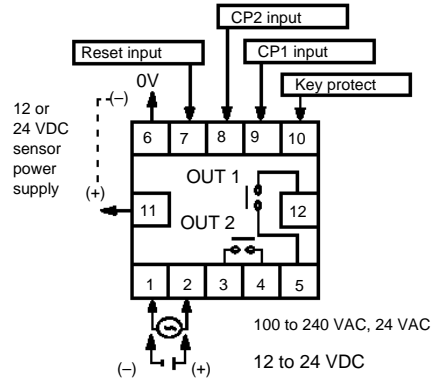
■ H7CR-□B (STANDARD) AND H7CR-□C (REVERSIBLE +/-) SERIES

Single Preset Contact Output



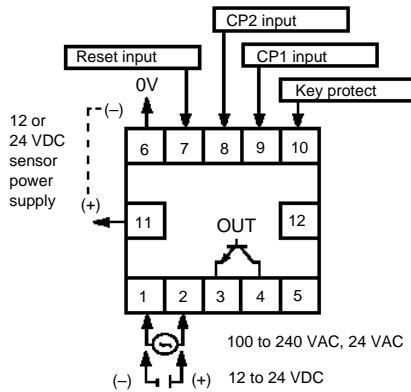
Applicable models include the following:
 H7CR-B H7CR-BG H7CR-SBL, -SB4L
 H7CR-BV H7CR-BVG H7CR-SCL
 H7CR-C H7CR-CG H7CR-B4
 H7CR-CV H7CR-CVG H7CR-B4G

Double Preset Contact Output



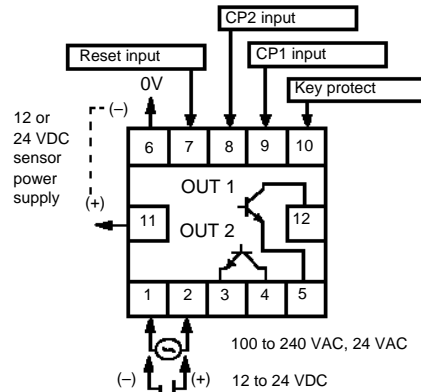
Applicable models include the following:
 H7CR-BW H7CR-BWG H7CR-B4W
 H7CR-BWV H7CR-BWVG H7CR-B4WG
 H7CR-CW H7CR-CWG
 H7CR-CWV H7CR-CWVG

Single Preset Transistor (NPN) Output



Applicable models include the following:
 H7CR-BS H7CR-BSG H7CR-SBSL
 H7CR-BVS H7CR-BVSG H7CR-SCSL
 H7CR-CS H7CR-CSG
 H7CR-CVS H7CR-CVSG

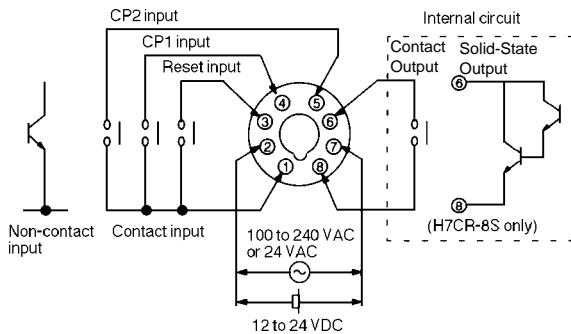
Double Preset Transistor (NPN) Output



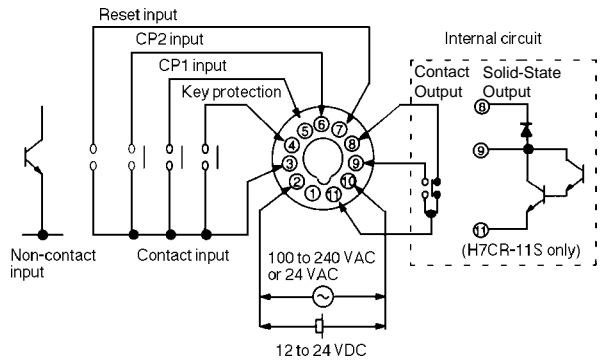
Applicable models include the following:
 H7CR-BWS H7CR-BWSG H7CR-SBWSL
 H7CR-BWVS H7CR-BWVSG H7CR-SCWSL
 H7CR-CWS H7CR-CWSG
 H7CR-CWVS H7CR-CWVSG

■ H7CR-8, H7CR-11 SOCKET-MOUNT STANDARD TYPES

Single Preset H7CR-8, H7CR-84, H7CR-8S



Single Preset with Memory Backup H7CR-11, H7CR-11S

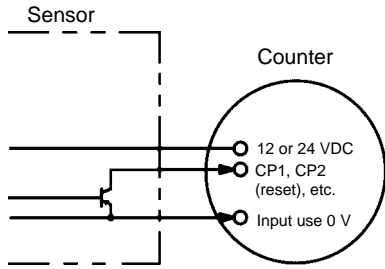


■ CONNECTIONS

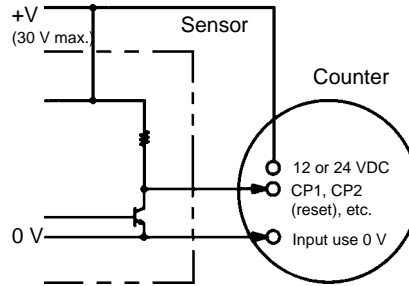
The inputs of the H7CR are non-voltage (short circuit or open) inputs and voltage inputs. (Non-voltage inputs only H7CR-S, -8 and -11.)

Non-voltage inputs

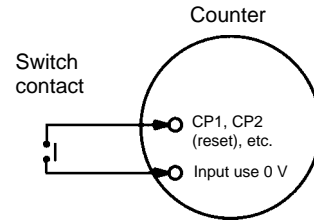
Solid-State Input (NPN transistor)



Solid-State Input (NPN output sensor powered by built-in DC power source)



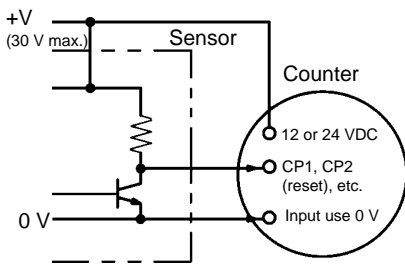
Contact Input



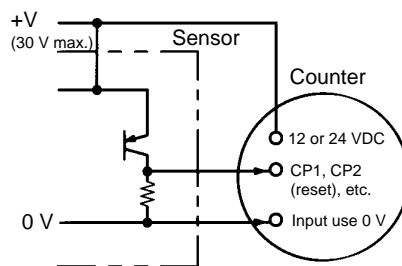
| Input signal | Ratings |
|-------------------|--|
| Non-contact input | High level when transistor is ON Residual voltage: 2 V max. Impedance when ON: 1 kΩ max. |
| | Low level when transistor is OFF Impedance when OFF: 100 kΩ max. |
| Contact input | Use contacts capable of switching 2 mA at 5 VDC |

Voltage inputs

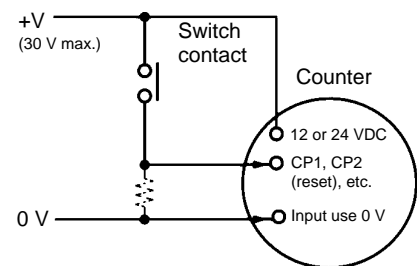
Solid-State Input (NPN transistor)



Solid-State Input (PNP transistor)

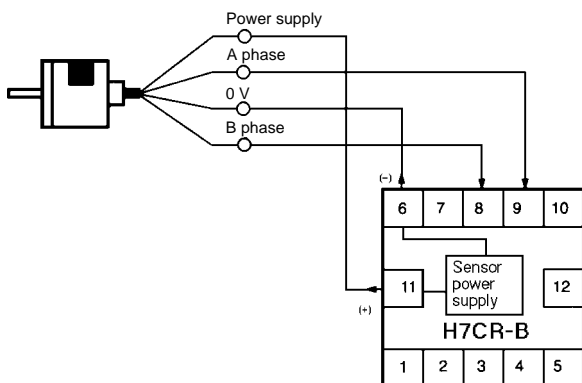


Contact Input



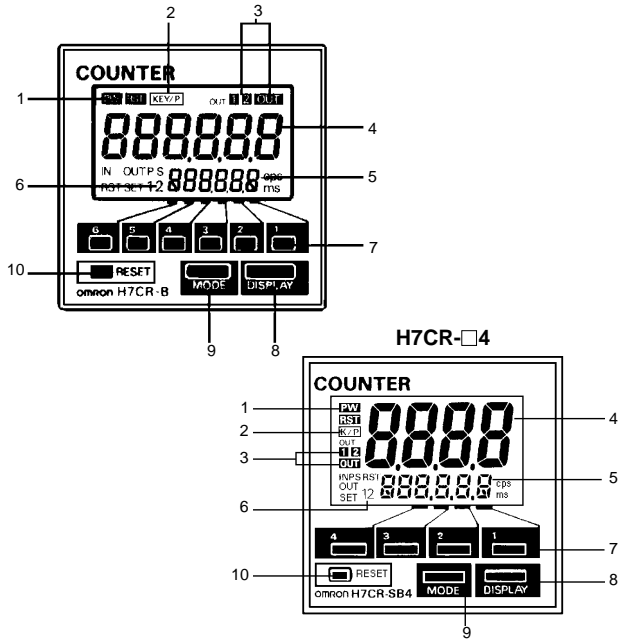
| Input signal | Ratings |
|---------------|---|
| Voltage input | High level when transistor is ON: 4.5 to 30 VDC |
| | Low level when transistor is OFF: 0 to 2 VDC |
| Contact input | Use contacts capable of switching 2 mA at 5 VDC |

Rotary encoder input



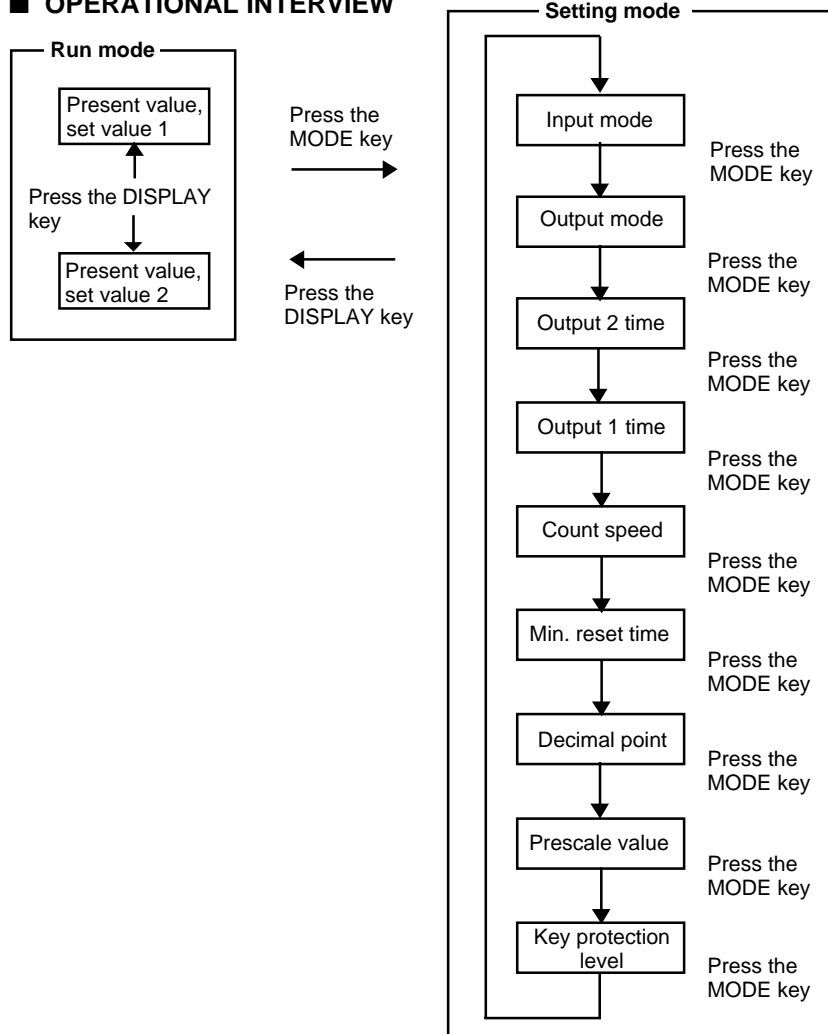
Operation

■ NOMENCLATURE



| Key | Description |
|-----|--|
| 1 | Power indicator |
| 2 | Key protection indicator |
| 3 | Control output indicator: displays "OUT" for single preset counters, displays "OUT1" or "OUT2" for double preset counters |
| 4 | Present value display, leading zeroes suppressed |
| 5 | Set value display indicates data in function setting mode |
| 6 | Set value indicator identifies preset 1 or preset 2 |
| 7 | Increment keys 1 to 6 (1 to 4) change the corresponding digit of the set value when the counter is in the function setting mode. Increment key 6 on H7CR-C and H7CR-SC also can be used to designate + or - value. |
| 8 | Display key switches to the setting displays. For double preset counters, it switches between set values 1 and 2. |
| 9 | Mode key switches from run mode to function setting mode. Changes items in the function setting mode. |
| 10 | Reset key resets the present value and outputs. |

■ OPERATIONAL INTERVIEW



■ FACTORY SETTINGS

The following settings are made at the factory. Be sure to change any settings before operating the counter. Settings and display are possible with or without power supplied, although power supply is required for inputs and outputs to operate.

Outputs are not possible with the presets set to zero. The display and settings are powered by an internal battery so they are unaffected by external power interruptions.

H7CR-A, H7CR-B, H7CR-C

| Model | H7CR-A (Economy type) | H7CR-B (Standard type) | H7CR-C (+/- Range type) |
|----------------------|------------------------|---|------------------------------------|
| Present value | 0 | 0 | 0 |
| Presets | 0 | 0 | 0 |
| Input modes | Up | Up | Reversible C (phase difference) |
| Output mode | N | N (hold outputs on preset 1 for double preset) | K |
| Output 2 time | HOLD | HOLD | 500 ms |
| Output 1 time | — | HOLD | 500 ms |
| Counting speeds | 30 cps | 30 cps | 30 cps |
| Min. reset time | 20 ms (not adjustable) | 20 ms | 20 ms |
| Decimal point | Not applicable | Far right (no fractions) | Far right (no fractions) |
| Scale factor | 1.000 (not adjustable) | 1.000 | 1.000 |
| Key protection level | — | KP-1 | KP-1 |

H7CR-S, H7CR-8, H7CR-11

| Model | H7CR-A (Economy type) | H7CR-B (Standard type) | H7CR-C (+/- Range type) | H7CR-8, -11 (Socket) |
|----------------------|------------------------|---|------------------------------------|--------------------------|
| Present value | 0 | 0 | 0 | 0 |
| Presets | 0 | 0 | 0 | 0 |
| Input modes | Up | Up | Reversible C (phase difference) | Up |
| Output mode | N | N (hold outputs on preset 1 for double preset) | K | N |
| Output 2 time | HOLD | HOLD | 500 ms | HOLD |
| Output 1 time | — | HOLD | 500 ms | — |
| Counting speeds | 30 cps | 30 cps | 30 cps | 30 cps |
| Min. reset time | 20 ms (not adjustable) | 20 ms | 20 ms | 20 ms |
| Decimal point | Not applicable | Far right (no fractions) | Far right (no fractions) | Far right (no fractions) |
| Scale factor | 1.000 (not adjustable) | 1.000 | 1.000 | 1.000 |
| Key protection level | — | KP-1 | KP-1 | KP-1 (H7CR-11 only) |

■ SUMMARY OF SETTING PROCEDURES

Settings and operation are easily achieved as shown below. The settings that are possible for each model vary. After changing modes, the counter is ready to accept setting changes to default items.

Run Mode

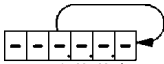
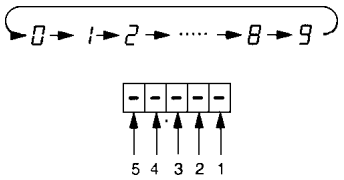
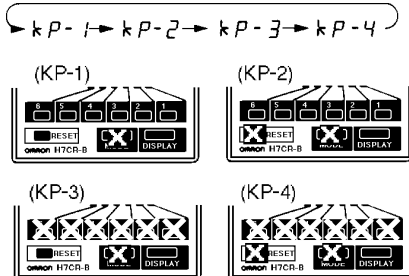
| Item | Applicable Counters | Description | Setting values |
|------------------------------|------------------------------------|---|---|
| Preset 1, Preset 2 set value | H7CR-B, H7CR-SB H7CR-C, H7CR-SC | Determine the timing of the outputs in comparison to the present count value according to the output mode. The DISPLAY key switches between set value 1 and 2 in double preset models. Use the increment keys (1 to 6) to change a digit. | Sequence when changing a digit using the increment keys (1 to 6). Minus sign displayed for leftmost digit of H7CR-C and H7CR-SC (+/- range counters) by using increment key 6. |

Setting Mode

| Item | Applicable Counters | Description | Setting values |
|-----------------------------------|--|---|--|
| Input mode (default) | H7CR-A, H7CR-SA H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Determines the input mode: Up, Down, Reversible A, Reversible B, Reversible C Press the Up key until the desired mode is displayed. | Increment keys 1 to 6 change the display. Up Down Reversible A Reversible B Reversible C *There is no Up or Down mode for H7CR-C and H7CR-SC (+/- range) counters. |
| Output mode and OUT 2 output time | H7CR-A, H7CR-SA H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Determines the operation of the control outputs. Refer to "Output Operations" tables for details. Also determines the output time for control output (OUT2) in single preset counters. | Increment keys 1 to 6 change output mode. H7CR-A, -SA H7CR-B, -SB, -8, -11 H7CR-C, -SC 2-stage model only. Press keys 1 to 6 to change the Output 2 time. (Applicable to output modes C, R, K, P, Q, and A only). |
| OUT 1 output time | H7CR-B, H7CR-SB H7CR-C, H7CR-SC (double preset models only) | Designates the output time for output 1 (double preset models only). Press the increment keys to set the desired time for output 1. | Increment keys 1 to 6 change output time. Hold *Hold mode is available only on H7CR-BW and H7CR-SBW counters. (Applicable to output modes C, R, K, P, Q, and A only.) |
| Counting speed | H7CR-A, H7CR-SA H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Changes the input filter for counting inputs. Used to prevent counting errors caused by input interference. Press the increment keys to set the desired speed. A "k" on the display indicates kilocycles (1000 cycles). | Increment keys 1 to 6 change count speed. |
| Minimum reset times | H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Determines the minimum time required for the reset input. Press any increment key to switch between 1 and 20 ms. | Increment keys 1 to 6 change reset time. 1 ms 1 ↔ 20 20 ms |

Note: Settings changed in the Setting mode are effective only after returning to the Run mode.

Setting Mode continued

| Item | Applicable Counters | Description | Setting values |
|----------------------|---|--|---|
| Decimal point | H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Determines the position of the decimal point on the display. Press the Increment keys 1 to 6 to move the decimal from left to right. | Increment keys 1 to 6 move decimal point.  |
| Scale factor | H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-8, H7CR-11 | Used to convert counts to other units, (e.g., to display millimeters when each input pulse represents 0.02 mm, input a scale factor of 0.02). Values from 0.001 to 99.999 are possible. Press the Increment keys to set the desired value. | Increment keys 1 to 5 change the scaling  |
| Key protection level | H7CR-B, H7CR-SB H7CR-C, H7CR-SC H7CR-11 | Blocks certain keys to prevent accidental operation. The key protection level, kP-1 to kP-4, determines which keys are locked out when the key protection input is ON. The locked keys are crossed out in the diagrams at right. | Increment keys 1 to 4 change key protection level.  |

Note: Settings changed in the Setting mode are effective only after returning to the Run mode.

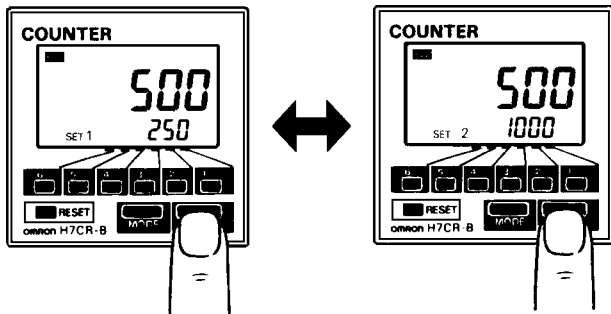
EXAMPLES

Run Mode

Changing the Set Value

When changing the set value while the counter is operating, an output will be produced if the set value ever equals the present value. To avoid triggering the output, begin by setting a higher digit to a larger number.

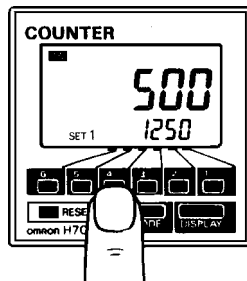
1. Press the DISPLAY key to change the displayed values for preset 1 and 2 during operation.



2. Change the set value from 250 to 1,250.

Pressing increment keys 1 to 6 advances the corresponding column value by 1.

Nonsignificant zeros are not normally shown on the set value display.



Output Delay

The following table shows the delay from when the present value passes the set value until the output is produced. The delay is the result of output control time, signal transmission time, relay switching time etc.

Actual measurements in N and K modes:

| Control output | Max. counting speed | Output delay* |
|----------------|---------------------|-----------------|
| Contact | 30 cps | 18 to 24 ms |
| OUT1, | 1 kcps | 4.7 to 5.8 ms |
| | 5 kcps | 4.4 to 5.4 ms |
| OUT2 | 1 kcps | 0.59 to 0.81 ms |
| | 5 kcps | 0.29 to 0.44 ms |
| Transistor | 30 cps | 13.5 to 20 ms |
| OUT1, | 1 kcps | 0.59 to 0.81 ms |
| | 5 kcps | 0.29 to 0.44 ms |
| OUT2 | 5 kcps | 0.29 to 0.44 ms |

* The variation in delays is due to different modes and conditions. For systems where the delay is a problem, take actual measurements under operating conditions.

Setting Mode

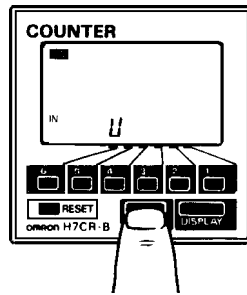
Changing Setting in the Function Setting Mode

1. Press the MODE key to switch from RUN mode to SETTING mode.

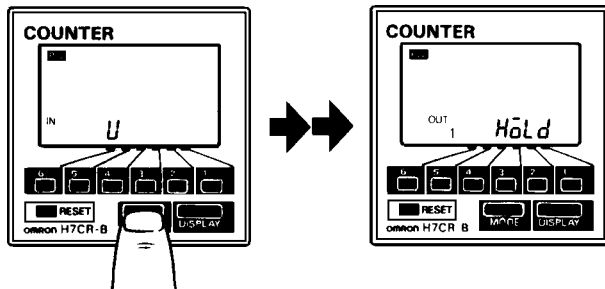
The counter will continue operation if switched from RUN mode to function setting mode during operation.

The MODE key will be locked if the key protection function is enabled.

Settings changed in the function setting mode are not effective until RUN mode is entered. As the operating conditions will change in this case, always reset operation with the RESET key or a reset input.



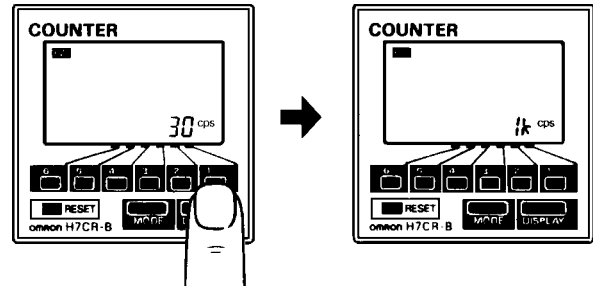
2. Press the MODE key to scroll successively through the items that can be set. Release the MODE key to select the desired item.



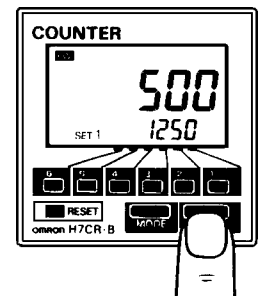
3. Changing the counting speed or another selected item:

Press the MODE key until the desired item appears.

Change the item setting by pressing increment keys 1 to 6.



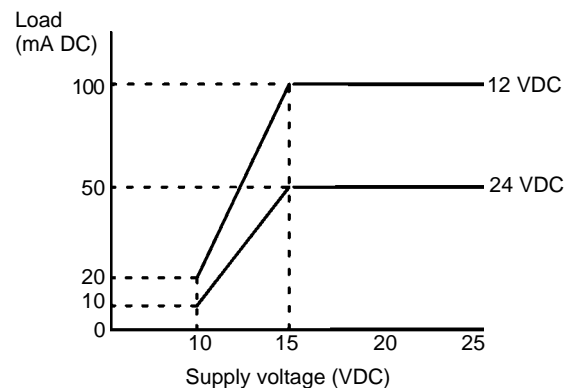
Press the DISPLAY key to return to RUN mode from SETTING mode.



Precautions

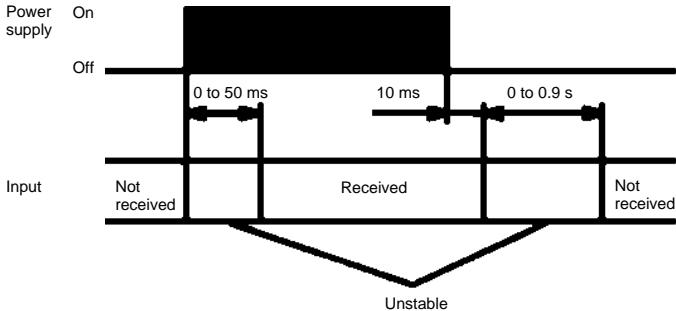
EXTERNAL POWER SUPPLY

The capacity of the counter's external power supply is 50 mA at 24 VDC or 100 mA at 12 VDC. For models with 24 VAC/12 to 24 VDC specifications, loads must be established between the following limits.



■ POWER SUPPLY

When the power turns OFF then ON, the input signal may or may not be received. The diagram below shows when the input signal will be received, will not be received or will be unstable. The unstable period will vary with power supply voltage, and the load conditions on external power supplies.



For 100 to 240 VAC and 24 VAC/12 to 24 VDC counters, be sure that the capacity of the external power supply is adequate, because the power supply may not provide a surge current sufficient to start the counter due to the switching regulator contained in the counter's internal circuitry.

Connect the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value immediately.

■ TRANSISTOR OUTPUT

The transistor output in H7CR counters is optically isolated from the internal circuitry by a photocoupler, so either NPN or PNP output is possible.

■ SELF DIAGNOSTIC FUNCTIONS

The displays at right appear when irregularities occur. When the problems causing these conditions have been cleared, the preset count value and all outputs will be reset in the same way as when the Reset key is pressed.

| Display | Meaning | Outputs | Recovery |
|---------|-----------------------------|--------------|--|
| ---- | Present value below minimum | Not changed. | Press RESET key for 1 second or reset input. |
| FFFFF | Present value above maximum | | |
| E1 | CPU error | OFF | Press RESET key for 1 second. |
| E2 | Memory error | | |

----: Displayed for +/- range counters H7CR-C and H7CR-SC when max. negative value is exceeded.

FFFFF: Displayed for +/- range counters H7CR-C and H7CR-SC when max. positive value is exceeded.

■ OPERATING ENVIRONMENT

Although the front of the counter resists water and oils and can be used where subject to these, extended exposure to large amounts of either can adversely affect internal components.

The counter, input signal lines, and the input device must be separated as far as possible from any sources of electrical

noise, such as high-voltage power lines. Shielded input signal lines can also be effective in suppressing noise.

To prevent damage, the exterior of the counter must not be exposed to organic solvents (e.g., paint thinner or benzene), strong alkalis, or strong acids.

■ OTHER

Always isolate the counter from external circuits or short all terminals before measuring dielectric strength between electric circuits and non-charged metal parts or performing similar testing with the counter mounted in a control panel. This is to prevent internal circuit damage that might occur if the test voltage enters the counter interior due to withstand-voltage or insulation failure in control panel devices.

The counter contains a lithium battery, and must never be incinerated. Dispose of the counter as a noncombustible item.

Applications of Operating Modes

■ SINGLE OPERATING MODES

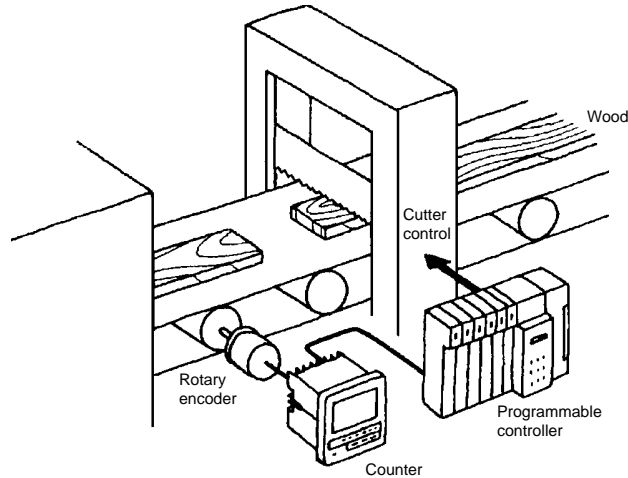
Single operating modes are basic modes, among which, Mode N is the most basic (input the RESET signal to restart).

Mode N

The displayed count-up value is on hold.

Example: Cutting Objects to Specified Size

The object is advanced for a specified distance measured by encoder pulses to determine correct length for cutting.



Mode A

Select Mode A for a one-shot output of the count-up signal used in Mode N. The displayed count-up value is on hold. Mode A can be used for a start signal for sequence control equipment.

Mode F

Go to Mode F to monitor the number of overrun objects. The process value is displayed normally. It is possible to monitor the number of overrun objects upon interruption of the operation after a specified number of objects are counted.

Mode K

Select Mode K for the one-shot output of the count-up signal used in Mode F. Mode K can be used as a start signal for sequence control equipment.

■ REPETITIVE OPERATING MODES

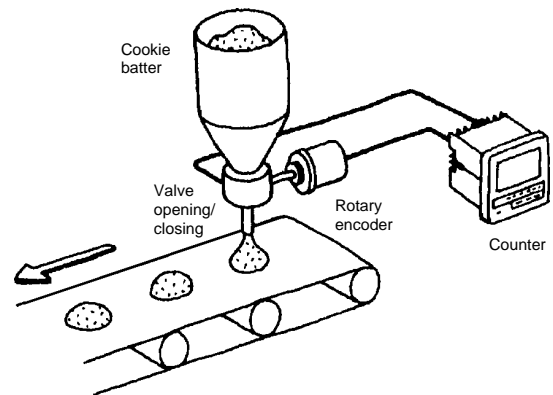
Modes R and C are typical of repetitive operating modes (the counter internally resets itself after each counting operation and then restarts). The counter begins the next counting operation after the present output is processed.

Mode R

The displayed count-up value is on hold.

Example: Portion Control of Material or Ingredients

The valve is closed when the supplied quantity of cookie batter or blended ingredient has reached a specified amount.



Mode Q

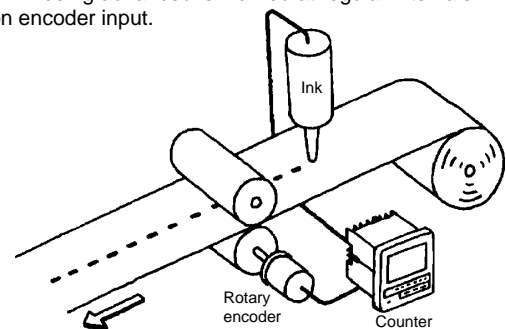
Choose Mode Q to view the process value continuously. There is no difference in operation between Mode R and Mode Q.

Mode C

The counting operation restarts upon counting up. The process value is displayed continuously.

Example: Marking Material at Regular Intervals

A roll of film being advanced is marked at regular intervals based on encoder input.



Mode P

Choose Mode P to put the count-up value on hold (display is on hold while the one-shot output is ON). There is no difference in operation between Mode C and Mode P.

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches, divide by 25.4.

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