

# Multifunction Counter H7BX

**DIN 72×72 mm Multifunction Counter with a Bright, Easy-to-view, Negative Transmissive LCD.**



- Highly visible display with backlit transmissive LCD.
- Selectable display color (red/green) enables checking output status at a distance.
- Easy operation with a key for each digit.
- Perform all basic settings with a DIP switch.
- Provides a total and preset counter, batch counter, dual counter, and tachometer (See note.).
- Wide range of inputs accepted for NPN/PNP inputs (multi-inputs) and 2-wire DC sensors.
- Complies with UL, CSA, and CE marking.
- Degree of protection: IP54 equivalent (front section only).



**NEW**

 Be sure to read *Safety Precautions* on page 25.

**Note:** The functions that can be selected depend on the model.

## Ordering Information

### List of Models

External power supply	Output type	Supply voltage	1-stage	2-stage
12 VDC	Contact and NPN transistor output	100 to 240 VAC	H7BX-A	H7BX-AW
		24 VAC/12 to 24 VDC	H7BX-AD1	H7BX-AWD1

### Accessories (Order Separately)

Name	Model
Soft Cover	Y92A-72F1
Hard Cover	Y92A-72
Terminal Cover (See note.)	Y92A-72T

**Note:** Supplied with the H7BX.

## Specifications

### ■ Ratings

Item	Model	H7BX-A/AD1	H7BX-AW/AWD1
Type		Preset counter	Preset counter/tachometer
Supported configurations		1-stage preset counter, total and preset counter (See note 1.) (selectable)	1-stage preset counter, 2-stage preset counter, total and preset counter (See note 1.), batch counter, dual counter, tachometer (selectable)
Ratings	Power supply voltage (See note 2.)	<ul style="list-style-type: none"> <li>• 100 to 240 VAC (50/60 Hz)</li> <li>• 24 VAC (50/60 Hz)/12 to 24 VDC (ripple 20% max.)</li> </ul>	
	Operating voltage range	85% to 110% of rated supply voltage (90% to 110% at 12 VDC)	
	Power consumption	H7BX-A/AW: 9.6 VA max. (100 to 240 VAC) H7BX-AD1/AWD1: 8 VA max. (24 VAC), 5.3 W max. (12 to 24 VDC)	
Mounting method		Flush mounting	
External connections		Screw terminals	
Degree of protection		IP54 (front section only)	
Input signals		CP1, CP2, reset 1, reset 2, key protection	
Counter	Max. counting speed	30 Hz or 5 kHz (selectable, ON/OFF ratio 1:1), setting for both CP1 and CP2	
	Input modes	Increment, decrement, command (UP/DOWN A), individual (UP/DOWN B), quadrature (UP/DOWN C)	
	Output modes	N, F, C, R, K-1, P, Q, A, K-2, D, L	N, F, C, R, K-1, P, Q, A, K-2, D, L, H
	One-shot output time	0.01 to 99.99 s	
	Reset input	External reset (minimum reset input signal width: 1 ms or 20 ms selectable), manual reset, and automatic reset (internal according to C, R, P, and Q mode operation)	
Tachometer	Pulse measurement method	---	Periodic measurement (Sampling period: 200 ms)
	Max. counting speed	---	30 Hz or 10 kHz (selectable)
	Measuring ranges	---	30 Hz: 0.01 to 30.00 Hz 10 kHz: 0.01 Hz to 10 kHz
	Measuring accuracy	---	±0.1% FS ±1 digit max. (at 23 ±5°C)
	Output modes	---	Upper and lower limits, area, upper limit, lower limit
	Auto-zero time	---	0.1 to 99.9 s
	Startup time	---	0.0 to 99.9 s
Average processing	---	OFF/2/4/8 times	
Prescaling function		Yes (0.001 to 99.999)	
Decimal point adjustment		Yes (rightmost 3 digits)	
Sensor waiting time		290 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.)	
Key protection input		Response speed: Approx. 1 s No-voltage NPN input (fixed) Short-circuit (ON) impedance: 1 kΩ max. (Leakage current at 0 Ω: Approx. 12 mA) Short-circuit (ON) residual voltage: 3 V max. Open (OFF) impedance: 100 kΩ min.	
Input method (except key protection input)		No-voltage NPN input or voltage PNP input (selectable) No-voltage input Short-circuit (ON) impedance: 1 kΩ max. (Leakage current at 0 Ω: Approx. 12 mA) Short-circuit (ON) residual voltage: 3 V max. Open (OFF) impedance: 100 kΩ min. Voltage input High level: 4.5 to 30 VDC Low level: 0 to 2 VDC Input resistance: Approx. 4.7 kΩ	
External power supply		12 VDC (±10%), 100 mA (For details, refer to <i>External Power Supply</i> on page 26.)	
Control output		Contact output: 3 A at 250 VDC/30 VDC, resistive load (cosφ = 1) Minimum applied load: 10 mA at 5 VDC (Failure level: P, reference value) Transistor output: 100 mA max. at 30 VDC max. Residual voltage: 1.5 VDC max. (approx. 1 V) Leakage current: 0.1 mA max.	
Display (See note 3.)		Backlit 7-segment negative transmissive LCD Character Heights PV: 13.5 mm (red/green) SV: 9 mm (green)	
Digits		6 digits -99,999 to 999,999 (5 digits negative and 6 digits positive)	6 digits Counter: -99,999 to 999,999 (5 digits negative and 6 digits positive) Tachometer: 0 to 999,999 (6 digits)
Memory backup		EEPROM (Overwrites: 100,000 min.), Data storage: 10 years min.	
Ambient operating temperature		-10 to 55°C (with no icing)	
Ambient storage temperature		-25 to 65°C (with no icing)	
Ambient operating humidity		25 to 85°C (with no condensation)	
Case color		Black (N1.5)	
Accessories		Two flush-mounting adapters, terminal cover	Two flush-mounting adapters, terminal cover, DIP switch setting stickers

- Note 1.** The total and preset counter functions as a 1-stage preset counter and total counter.  
**2.** Do not use an inverter output for the power supply.  
**3.** Displayed only when the power is ON. Not displayed when the power is OFF.

■ Characteristics

<b>Insulation resistance</b>	100 MΩ min. (at 500 VDC) between current-carrying terminal and exposed non-current-carrying metal parts, and between non-continuous contacts
<b>Dielectric strength</b>	Between current-carrying metal parts and non-current-carrying metal parts: 2,000 VAC, 50/60 Hz for 1 min Between power supply and input circuit: 2,000 VAC, 50/60 Hz for 1 min (for models other than the H7BX-A□D1) 1,000 VAC, 50/60 Hz for 1 min (H7BX-A□D1) Between control output, power supply, and input circuit: 2,000 VAC, 50/60 Hz for 1 min Between non-continuous contacts: 1,000 VAC, 50/60 Hz for 1 min
<b>Impulse withstand voltage</b>	Between power terminals: 3.0 kV (1.0 kV for 24 VAC/12 to 24 VDC models) Between current-carrying terminal and exposed non-current-carrying metal parts: 4.5 kV (1.5 kV for 24 VAC/12 to 24 VDC models)
<b>Noise immunity</b>	Between power terminals: ±1.5 kV Between input terminals: ±600 V Square-wave noise by noise simulator (Pulse width: 100 ns/1 μs, 1-ns rise)
<b>Static immunity</b>	Malfunction: 8 kV Destruction: 15 kV
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 4 cycles each in 3 directions (8 min/cycle) Malfunction: 10 to 55 Hz, 0.50-mm single amplitude for 4 cycles each in 3 directions (8 min/cycle)
<b>Shock resistance</b>	Destruction: 294 m/s <sup>2</sup> 3 times each in 6 directions Malfunction: 98 m/s <sup>2</sup> 3 times each in 6 directions
<b>Life expectancy</b>	Mechanical: 10,000,000 operations min. Electrical: 100,000 operations min. (3 A at 250 VAC/30 VDC, resistive load) (See note.)
<b>Weight</b>	Approx. 250 g

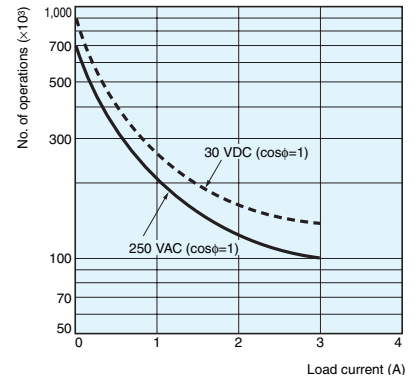
Note: Check the electrical life expectancy curve.

■ Applicable Standards

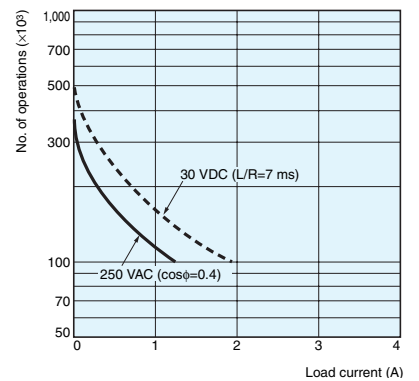
<b>Approved safety standards</b>	cURus: UL 508, CSA C22.2 No. 14 EN 61010-1 (IEC 61010-1): Pollution degree 2/overvoltage category II; EN 61326; VDE 0106 Part 100	
<b>EMC</b>	(EMI) Emission Enclosure: Emission AC mains: (EMS) Immunity ESD: Immunity RF-interference: Immunity Conducted Disturbance: Immunity Burst: Immunity Surge: Immunity Voltage Dip/Interruption:	EN 61326 EN 55011 Group 1 class A EN 55011 Group 1 class A EN 61326 EN 61000-4-2: 4 kV contact discharge; 8 kV air discharge EN 61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) EN 61000-4-6: 3 V (0.15 to 80 MHz) EN 61000-4-4: 2 kV power-line; 1 kV I/O signal-line EN 61000-4-5: 1 kV line to lines (power and output lines (relay outputs)); 2 kV line to ground (power and output lines (relay outputs)) EN 61000-4-11: 0.5 cycle, 100% (rated voltage)

● Electrical Life Expectancy (Reference Values)

Resistive Load



Inductive Load



A current of 0.15 A max. can be switched at 125 VDC (cosφ = 1) and current of 0.1 A max. can be switched with L/R = 7 m/s. In both cases, a life of 100,000 operations can be expected.

■ I/O Functions

● Using as a Counter (See note 1.)

Inputs	CP1, CP2	(1) All Modes Except for Dual Counter Mode <ul style="list-style-type: none"> <li>• Reads count signals.</li> <li>• Increment, decrement, up/down (command, individual, or quadrature) inputs can be used.</li> </ul> (2) Dual Counter Mode <ul style="list-style-type: none"> <li>• Reads CP1 count signals on CP1 input and CP2 count signals on CP2 input.</li> <li>• Increment signals can be used.</li> </ul>
	Reset or Reset 1	(1) All Modes Except for Dual Counter Mode <ul style="list-style-type: none"> <li>• Resets present value and outputs (OUT2 when using the batch counter). (See note 2.)</li> <li>• Counting cannot be performed while resetting or when reset 1 input is ON.</li> <li>• The reset indicator is lit while the reset input is ON.</li> </ul> (2) Dual Counter Mode <ul style="list-style-type: none"> <li>• Resets the CP1 present value to 0.</li> <li>• Counting the CP1 input cannot be performed while the reset 1 input is ON.</li> <li>• The reset indicator is lit while the reset 1 input is ON.</li> </ul>
	Total Reset or Reset 2	The reset operation depends on the selected function. (See note 3.)
Outputs	OUT1, 2	When the corresponding set value is reached, signals are output according to the designated output mode.

- Note 1.** Refer to pages 14 to 17 for information on the operation of input and output functions.
- In increment mode or increment/decrement mode, the present value returns to 0; in decrement mode, the present value returns to the set value with 1-stage models, and returns to set value 2 with 2-stage models.
  - The reset indicator will not be lit when the total reset or reset 2 input is ON.

Function	Reset operation
1-stage/2-stage preset counter	Does not operate (Not used).
Total and preset counter	<ul style="list-style-type: none"> <li>• Resets the total count value.</li> <li>• Holds the total count value at 0 while the total reset input is ON.</li> </ul>
Batch counter	<ul style="list-style-type: none"> <li>• Resets the batch count value and batch output (OUT1).</li> <li>• Holds the batch count value at 0 while the reset 2 input is ON.</li> </ul>
Dual counter	<ul style="list-style-type: none"> <li>• Resets the CP2 present value.</li> <li>• Counting for CP2 input is disabled while the reset 2 input is ON.</li> </ul>

● Using as a Tachometer

Inputs	CP1, CP2	Reads counting signals. (CP2 input is not available.)
	Reset 1, Reset 2	<ul style="list-style-type: none"> <li>• Holds the measurement value and outputs. (Reset 2 input is not available.)</li> <li>• The reset indicator is lit during hold.</li> </ul>
Outputs	OUT1, 2	Outputs signals according to the specified output mode when a set value is reached.

● Using as a Counter or Tachometer

Key protection input	<ul style="list-style-type: none"> <li>• Prohibits using the keys on the front panel.</li> <li>• Set the key protection level in function selection mode.</li> </ul>
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**Note:** For details, refer to page 24.