Multifunction Counter (DIN 72 × 72)

H7BX

CSM_H7BX_DS_E_5_4

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, twin counter, and tachometer (See note.).
- Equipped with a Replacement Time Notification Function to be notified in advance by predicting the service life.
- Equipped with a Memory Backup and H7AN Compatibility Function to facilitate problem-free conversion from H7AN.
- 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).

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

⚠ **Refer to *Safety Precautions* on page 36.**

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 *	**Y92A-72T**

* 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 *1 (selectable)	1-stage preset counter, 2-stage preset counter, total and preset counter (*1), batch counter, dual counter, twin counter, tachometer (selectable)
Ratings	Power supply voltage *2	H7BX-A/AW: 100 to 240 VAC (50/60 Hz) H7BX-AD1/AWD1: 24 VAC (50/60 Hz)/12 to 24 VDC (ripple 20% max.)	
	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		Compliant with IEC IP54 for panel surface only, Certified for UL Type 1	
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 (UP), decrement (DOWN), increment/decrement (UP/DOWN A (command input), UP/DOWN B (individual inputs), or UP/DOWN C (quadrature inputs)), UP/DOWN D (command input), UP/DOWN E (individual inputs), UP/DOWN F (quadrature inputs)	
	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, power 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: 1-input mode: 0.001 to 10 kHz Other modes: 0.01 to 5 kH
	Measuring accuracy	---	±0.1% FS ±1 digit max. (at 23 ±5°C)
	Output modes	---	Input mode: Not 2-input independent measurement: Upper and lower limits, area, upper limit, lower limit. 2-input independent measurement: Upper limit, lower limit
	Auto-zero time	---	0.1 to 999.9 s
	Startup time	---	0.0 to 99.9 s
	Average processing	---	OFF/2/4/8/16 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 *External Power Supply* on page 37.)	
Control output		Contact output: 3 A at 250 VDC/30 VDC, resistive load ($\cos\phi = 1$) 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 *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		Non-volatile memory (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

*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

Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying terminal and exposed non-current-carrying metal parts, and between non-continuous contacts
Dielectric strength	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
Impulse withstand voltage	6.0 kV between power terminals: 3.0 kV (1.0 kV for 24 VAC/12 to 24 VDC models) 6.0 kV 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)
Noise immunity	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)
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude, 2 hours each in three directions Malfunction: 10 to 55 Hz, 0.50-mm single amplitude, 10 minutes each in three directions
Shock resistance	Destruction: 294 m/s^2 3 times each in 6 directions Malfunction: 98 m/s^2 3 times each in 6 directions
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: 100,000 operations min. (3 A at 250 VAC/30 VDC, resistive load) *
Weight	Approx. 250 g

* Check the electrical life expectancy curve.

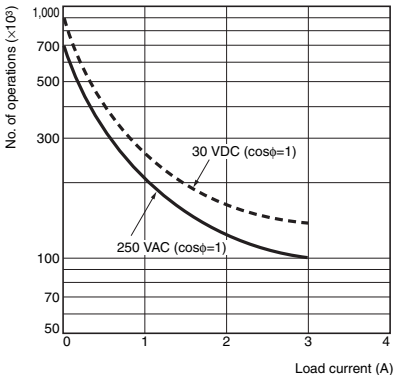
Applicable Standards

Approved safety standards	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		
EMC	(EMI)	EN 61326-1 *	
	Emission Enclosure:	EN 55011 Group 1 class A	
	Emission AC mains:	EN 55011 Group 1 class A	
	(EMS)	EN 61326-1 *	
	Immunity ESD:	EN 61000-4-2:	4 kV contact discharge; 8 kV air discharge
	Immunity RF-interference:	EN 61000-4-3:	10 V/m (Amplitude-modulated, 80 MHz to 1 GHz); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz)
	Immunity Conducted Disturbance:	EN 61000-4-6:	3 V (0.15 to 80 MHz)
	Immunity Burst:	EN 61000-4-4:	2 kV power-line; 1 kV I/O signal-line
	Immunity Surge:	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))
	Immunity Voltage Dip/Interruption:	EN 61000-4-11:	Voltage Dip 1 cycle, 100% (rated voltage) 10/12 cycle 60% (rated voltage) 25/30 cycle 30% (rated voltage) Interruption 250/300 cycle 100% (rated voltage)

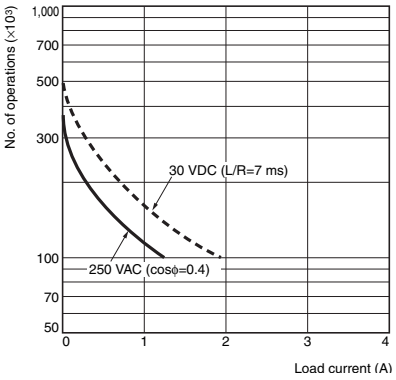
* Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

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 *1

Inputs	**CP1, CP2**	(1) All Modes Except for Dual Counter Mode and Twin Counter Mode • Reads count signals. • Increment, decrement, up/down (command, individual, or quadrature) inputs can be used. (2) Dual Counter Mode or Twin Counter Mode • Reads CP1 count signals on CP1 input and CP2 count signals on CP2 input. • Increment signals can be used.
	Reset or Reset 1	(1) All Modes Except for Dual Counter Mode and Twin Counter Mode • Resets present value and outputs (OUT2 when using the batch counter). *2 • Counting cannot be performed while resetting or when reset 1 input is ON. • The reset indicator is lit while the reset input is ON. (2) Dual Counter Mode or Twin Counter Mode • Resets the CP1 present value to 0. • Counting the CP1 input cannot be performed while the reset 1 input is ON. • The reset indicator is lit while the reset 1 input is ON.
	Total Reset or Reset 2	The reset operation depends on the selected function. *3
Outputs	**OUT1, 2**	When the corresponding set value is reached, signals are output according to the designated output mode.

*1. Refer to pages 18 to 23 for information on the operation of input and output functions.
*2. 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.
*3. 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	• Resets the total count value. • Holds the total count value at 0 while the total reset input is ON.
Batch counter	• Resets the batch count value and batch output (OUT1). • Holds the batch count value at 0 while the reset 2 input is ON.
Dual counter	• Resets the CP2 present value. • Counting for CP2 input is disabled while the reset 2 input is ON.
Twin counter	• Resets the CP1 present value and output 1 when the CP1 present value is displayed. • Resets the CP2 present value and output 2 when the CP2 present value is displayed.

Using as a Tachometer

Inputs	**CP1, CP2**	Reads counting signals. (The CP2 input can be used when the input mode is not 1-input mode.)
	Reset 1, Reset 2	• Holds the measurement value and outputs. (The reset 2 input can be used when the input mode is 2-input independent measurement.) • Functions as a hold input. The measurement value (displayed value) and the outputs are held while the RST Key on the front panel is pressed. • The reset indicator is lit when the value is being held.
Outputs	**OUT1, OUT2**	Outputs signals according to the specified output mode when a set value is reached.

Using as a Counter or Tachometer

Key protection input	• Prohibits using the keys on the front panel. • Set the key protection level in function selection mode. • Key protection is enable by short-circuited key protection terminals.

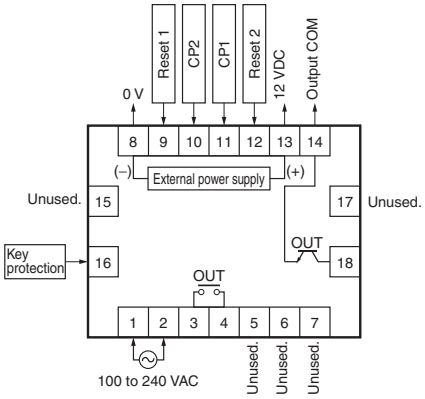
Note: For details, refer to page 34.

Connections

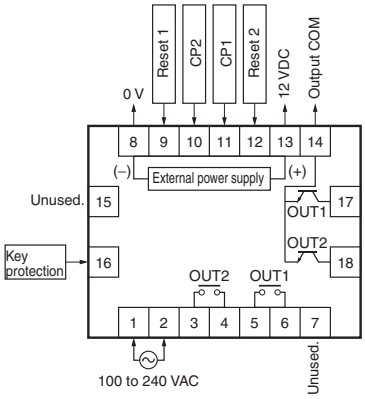
Terminal Arrangement

Confirm that the power supply meets specifications before using the H7BX.

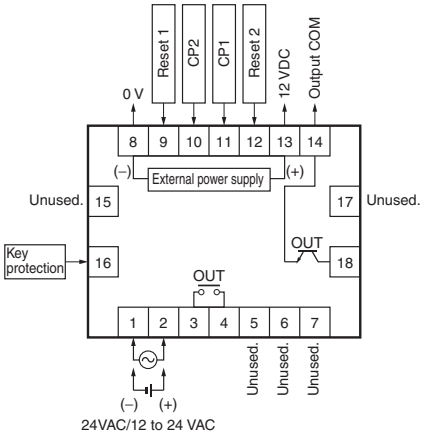
H7BX-A



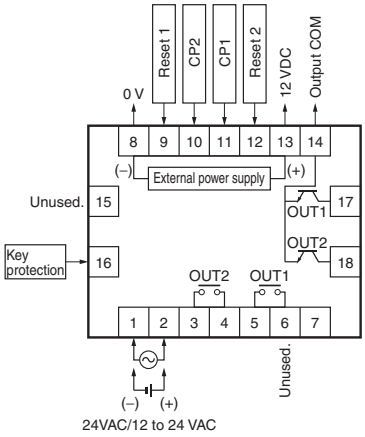
H7BX-AW



H7BX-AD1

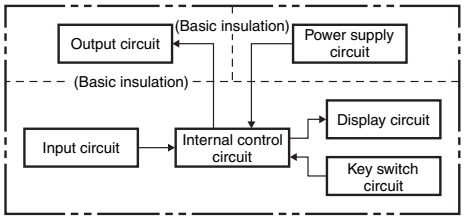


H7BX-AWD1



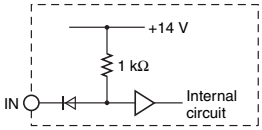
Note: Do not use the unused terminals for relay connections.

Block Diagram



Input Circuits

CP1, CP2, Reset/Reset 1, and Total Reset/Reset 2 Input



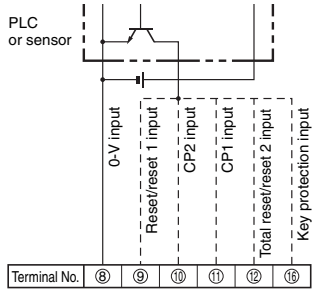
Note: The circuit shown above is for no-voltage input (NPN input).

Input Connections

A no-voltage input (short-circuit or open) or voltage input can be selected for each input.
(The key protection input is always a no-voltage input (NPN input)).

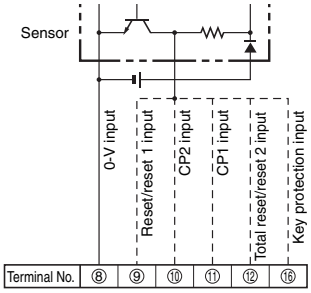
No-voltage Inputs (NPN Inputs)

Open Collector



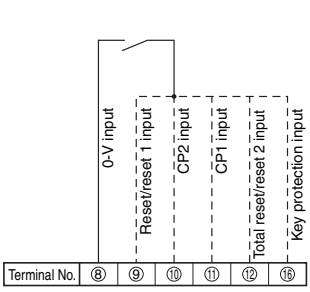
Operates when the transistor turns ON.

Voltage Output



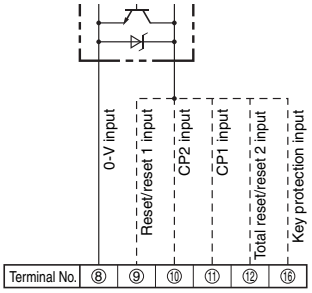
Operates when the transistor turns ON.

Contact Input



Operates when the contact turns ON.

DC Two-wire Sensor



Operates when the transistor turns ON.

Note: When using the H7BX as a tachometer, do not use the CP2 input or total reset/reset 2 input.

No-voltage Input Signal Levels

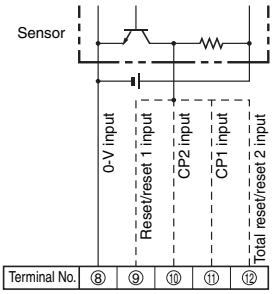
No-contact input	Short-circuit level Transistor ON • Residual voltage: 3 V max. • Impedance when ON: 1 kΩ max. (The leakage current is approx. 12 mA when the impedance is 0 Ω.)
	Open level Transistor OFF • Impedance when OFF: 100 kΩ min.
Contact input	Use contact which can adequately switch 5 mA at 10 V.

Note: Use a DC power supply of 30 V max.

Applicable Two-wire Sensors
• Leakage current: 1.5 mA max. • Switching capacity: 5 mA min. • Residual voltage: 3 VDC max. • Operating voltage: 10 VDC

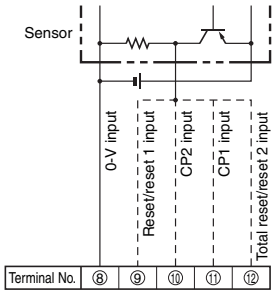
Voltage Inputs (PNP Inputs)

No-contact Input (NPN Transistor)



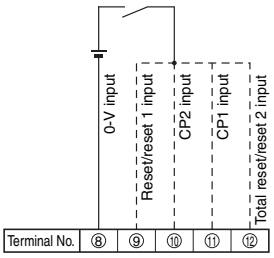
Operates when the transistor turns OFF.

No-contact Input (PNP Transistor)



Operates when the transistor turns ON.

Contact Input



Operates when the contact turns ON.

Note: When using the H7BX as a tachometer, do not use the CP2 input or total reset/reset 2 input.

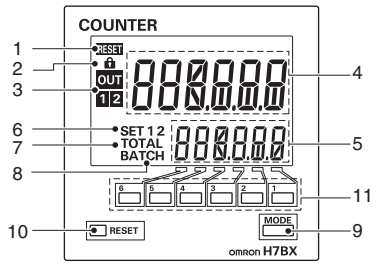
Voltage Input Signal Levels

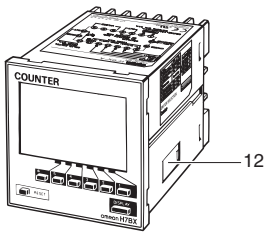
High level (Input ON): 4.5 to 30 VDC
Low level (Input OFF): 0 to 2 VDC

Note: 1. Use a DC power supply of 30 V max.
2. Input resistance: Approx. 4.7 kΩ

Nomenclature

Indicators
1 Reset Indicator (Orange) Lit when the reset input (1) or reset key is ON.
2 Key Protection Indicator (Orange)
3 Control Output Indicator (Orange) OUT: One stage OUT1, OUT2: Two stages
4 Present Value (Main Display) Character height: 13.5 mm (Red/green selectable)
5 Set Value (Sub-display) Character height: 9 mm (Green)
6 Set Value 1 and 2 Stage Indicators (Green)
7 Total Count Indicator (Green) Lit when the total count value is displayed.
8 Batch Indicator (Green) Lit when the batch count value is displayed.





Operation Keys
9 Mode Key Used to switch mode and setting items.
10 Reset Key
11 Up Keys: 1 to 6

Switches
12 DIP Switch

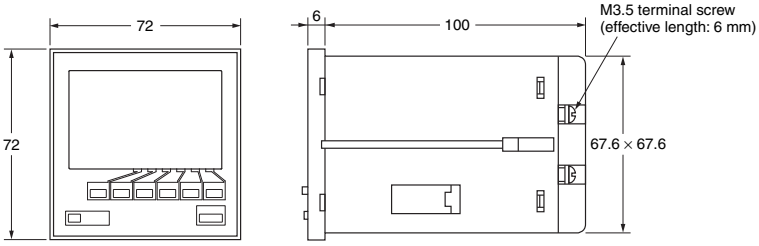
Dimensions

(Unit: mm)

Counter

Counter

H7BX-A□□

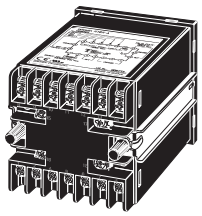


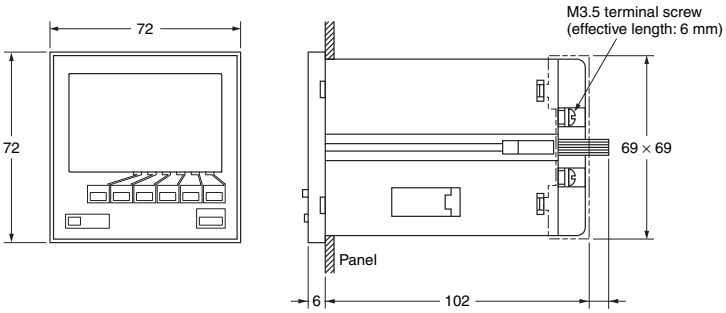
Note: M3.5 terminal screws (effective length: 6 mm).

Dimensions with Flush Mounting Adapter

H7BX-A□□

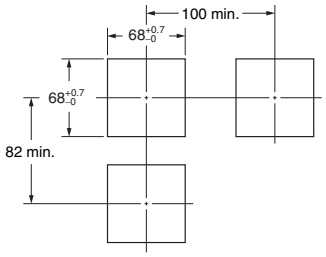
(The flush mounting adapter is supplied with the H7BX.)





Panel Cutouts

Panel cutouts are as shown below (according to DIN 43700).

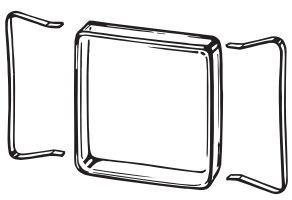


Note: The mounting panel thickness must be 1 to 5 mm.

Accessories (Order Separately)

Soft Cover

Y92A-72F1

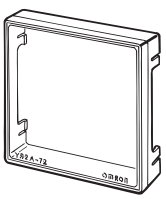


Product Protection for Use in Environments Subject to Water or Oil

The panel surface has a protective structure so that the internal circuits will not be adversely affected if drops of water penetrate the gaps between the keys. If, however, there is a possibility of water or oil being present on the operator's hands, mount the optional Soft Cover.
The Soft Cover ensures protection equivalent to IP54. Do not, however, use the H7BX in locations where it would come into direct contact with oil.

Hard Cover

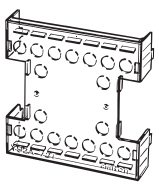
Y92A-72



Terminal Cover *

Y92A-72T

(VDE0106/T100)



* Supplied with the H7BX.

Note: 1. Depending on the operating environment, the condition of resin parts may deteriorate, and may shrink or harden. Therefore, it is recommended that resin parts are replaced regularly.
2. Due to material properties, the product surface may become cloudy white. If this causes any issues during use, please wipe it with isopropyl alcohol or similar before using.