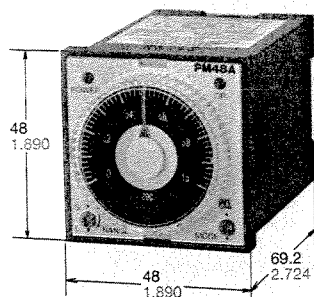


NAIS

DIN48 SIZE, ANALOG MULTIRANGE TIMERS

PM48A·PM48(M) Timers



mm inch

- Multiple time ranges 12 ranges
- A unique mechanism allows easy time setting and reading
- PM48A allows 5 different operation modes and an external signal input terminal is provided
- Indicator LEDs visible at a glance are provided separately for power supply and operation modes
- UL recognized, CSA approved

PRODUCT TYPE

Type	Control output	Part No.	Rated operating voltage	Rated power consumption	Operation mode	Time range
PM48A	Relay Timed-out 2 Form C	PM48A-100H-AC24V	24V AC	Max. 2VA	Pulse ON-delay Signal OFF-delay Differential ON/OFF-delay Pulse Flicker Pulse One-shot	12 selectable ranges over 0.02s to 100h
		PM48A-100H-AC120V	100 to 120V AC	Max. 10VA		
		PM48A-100H-AC240V	200 to 240V AC			
		PM48A-100H-DC12V	12V DC	Max. 2W		
		PM48A-100H-DC24V	24V DC			
PM48	Relay Timed-out 2 Form C	PM48-100H-AC24V	24V AC	Max. 2VA	Power ON-delay	
		PM48-100H-AC120V	100 to 120V AC	Max. 10VA		
		PM48-100H-AC240V	200 to 240V AC			
		PM48-100H-DC12V	12V DC	Max. 2W		
		PM48-100H-DC24V	24V DC			
PM48M	Relay Timed-out 1 Form C Instantaneous 1 Form C	PM48M-100H-AC24V	24V AC	Max. 2VA	Power ON-delay (with instantaneous contact)	
		PM48M-100H-AC120V	100 to 120V AC	Max. 10VA		
		PM48M-100H-AC240V	200 to 240V AC			
		PM48M-100H-DC12V	12V DC	Max. 2W		
		PM48M-100H-DC24V	24V DC			

SPECIFICATIONS

Timing

Time accuracy (max.)	Operating time fluctuation & Power off time change error	±0.3% (power off time change at the range of 0.1 s to 1 h)
	Temperature error	±2%
	Voltage error	±0.5%
	Setting error	±5%
Min. power off time		100ms
Min. input signal width (PM48A type)		50ms

Time range

Time range	Time range unit		
	s	min	h
1	0.02 s to 1 s	0.02 min to 1 min	0.02 h to 1 h
5	0.1 s to 5 s	0.1 min to 5 min	0.1 h to 5 h
10	0.2 s to 10 s	0.2 min to 10 min	0.2 h to 10 h
100	2 s to 100 s	2 min to 100 min	2 h to 100 h

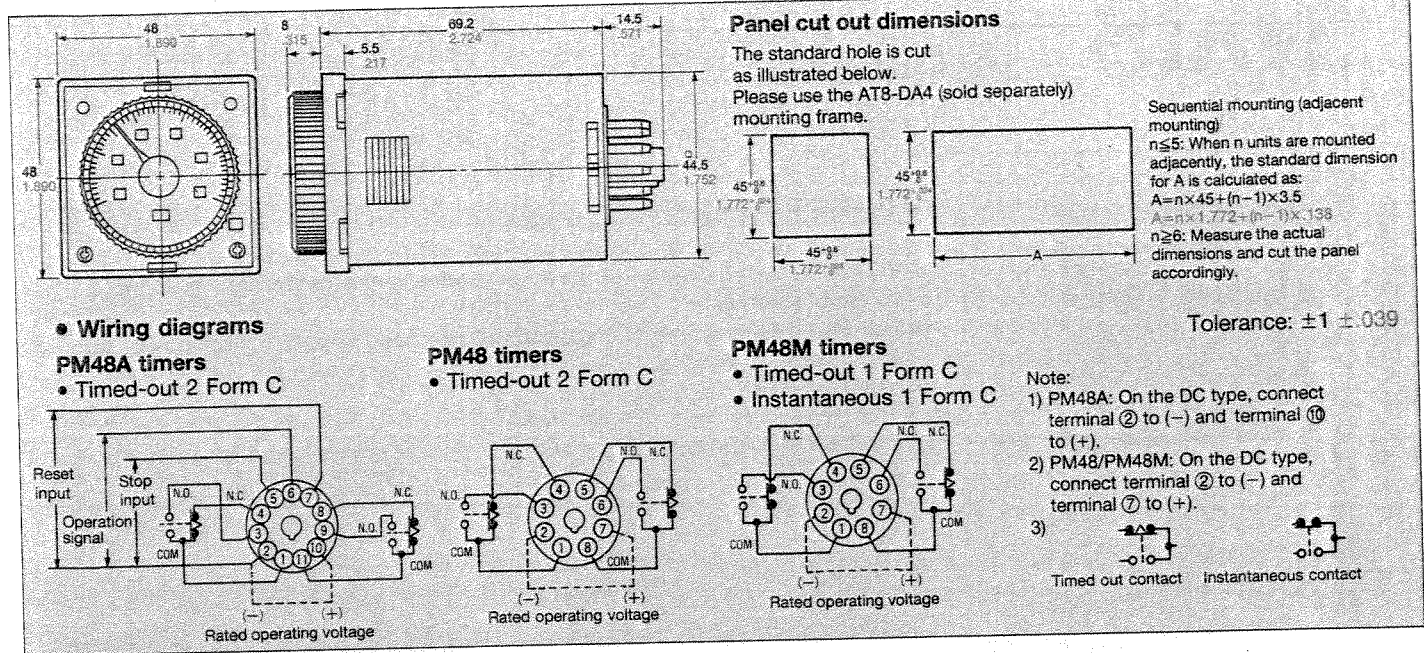
*Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage (within 5% ripple factor for DC), 20°C 68°F ambient temperature, and 1s power-off time. For the 1s range, the tolerance for each specification becomes ±10ms.

Characteristics

Type		PM48A	PM48	PM48M
Rated operating voltage		24V AC, 100 to 120V AC, 200 to 240V AC, 12V DC, 24V DC		
Operating voltage range		80 to 110% of rated operating voltage		
Rated frequency (AC operating type)		50/60Hz common		
Power supply ripple (DC operating type)		20%		
Rated control capacity (resistive)		5A 250V AC		
UL/CSA rating		5A 250V AC, PILOT DUTY C300		
Output arrangement		Timed-out 2 Form C		Timed-out 1 Form C Instantaneous 1 Form C
Initial contact resistance, max. (By voltage drop 6V DC 1A)		100mΩ		
Expected life (min. operations)	Mechanical	[Except for 12V DC operating type]: 10 ⁷ [12V DC operating type]: 5×10 ⁶		10 ⁷
	Electrical (resistive)	10 ⁵		
Initial insulation resistance (At 500V DC)		Min. 100MΩ Between input and output Between contact sets Between contacts		
Initial breakdown voltage		2000Vrms for 1 min Between input and output 2000Vrms for 1 min Between contact sets 1000Vrms for 1 min Between contacts		
Shock resistance	Functional	Min. 10G (4 times on 3 axes)		
	Destructive	Min. 100G (5 times on 3 axes)		
Vibration resistance	Functional	10 to 55Hz: 1 cycle/min double amplitude of 0.5mm (10min on 3 axes)		
	Destructive	10 to 55Hz: 1 cycle/min double amplitude of 0.75mm (1h on 3 axes)		
Max. temperature rise		55 deg.		
Ambient temperature		-10 to 50°C +14 to 122°F		
Ambient humidity		Max. 85% RH		

DIMENSIONS

mm inch



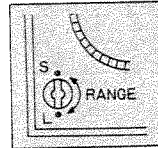
MODES & TIME SETTING

1. Time setting

- When power supply is on, the time range and setting time can not be changed. Turn off the power to set the new time range.
- To set the time in the range, turn the dial to a desired time scale. Do not turn the dial beyond the stopper.
- Turn the time range selector until the slit reaches the • mark on the name plate as shown in the figure.

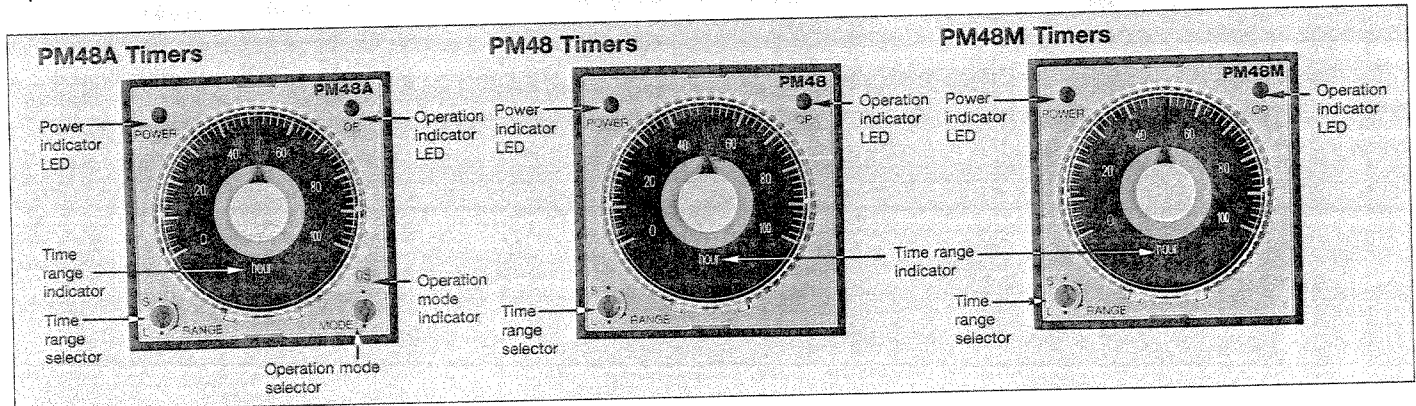
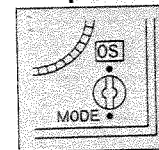
Clockwise turning increases the time range, and counter-clockwise turning decreases the time range.

- Set the time within the range of the scale on the dial. The "0" on the dial indicates the minimum time (not 0s) for the variable control time.



2. Operation mode change [PM48A]

- Turn the operation mode selector until the slit reaches the • mark on the name plate as shown in the figure.
- When the power supply is on, the operation mode can not be changed. Turn off the power supply to set the new operation mode.



INPUT [PM48A]

1. Operation input

Terminals ②-⑥ shall be connected as the operation signal terminals for min. 50ms. Input impedance should be:
Short-circuited condition: Max. 1kΩ
Open-circuited condition: Min. 100kΩ

① Contact input

Use gold-plated contact with high-reliability. Since contact bouncing causes errors in the operation, use an input contact without bounce.

② Open collector input

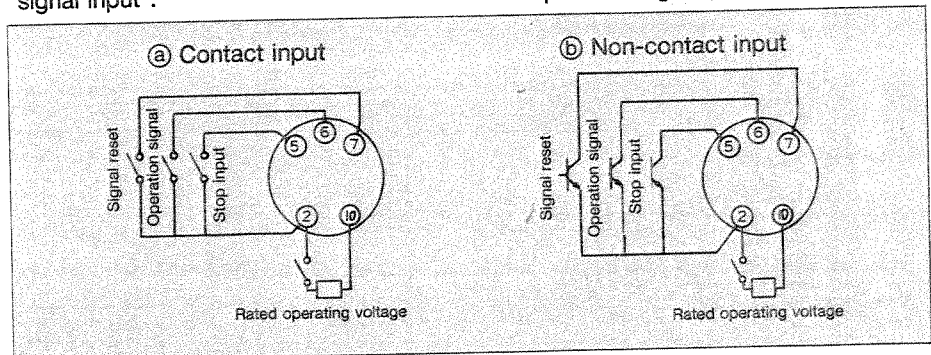
The characteristics of the transistor shall be: V_{CE0} : Min. 10V, I_C : Min. 10mA
 I_{CBO} : Max. 6μA
Residual voltage: Max. 0.6V

2. Stop input

Connect terminals ②-⑤ for min. 50ms. For other conditions, refer to those on "signal input".



3. Reset input

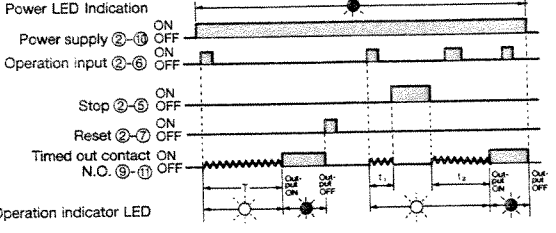
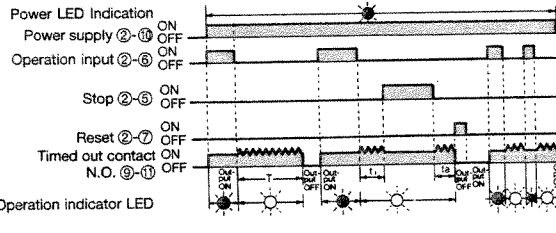
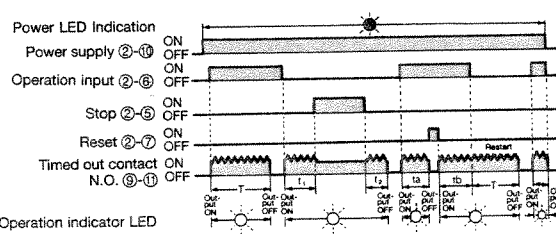
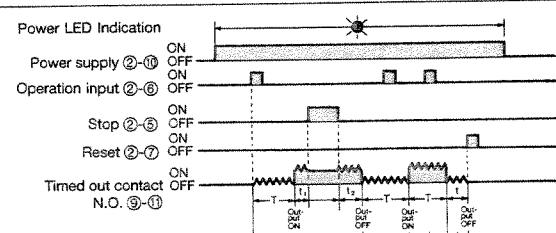
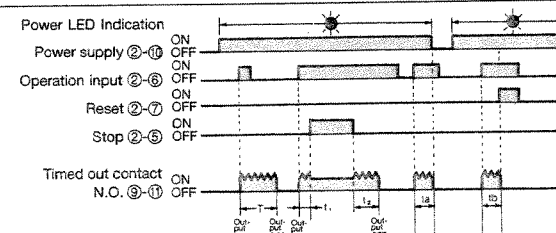
Connect terminals ②-⑦ for min. 50ms. For other conditions, refer to those on "1. Operation signal".



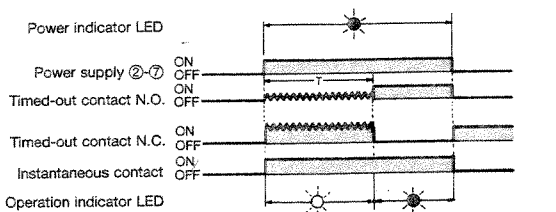
OPERATION MODES

1. PM48A Timers Operation Modes

( : LED lighting  : LED flickering)
T: Setting time $t_1, t_2, t_a, t_b, t_c < T$ $t_1 + t_2 = T$

Operation mode	Operation	Time chart
Pulse ON-delay PO	<ul style="list-style-type: none"> Turn the operation selector to PO. Timing operation starts when terminals ② and ⑥ are connected while power is ON. Control output (N.O. contact) is turned on after the set time regardless of operation signal input time. If terminals ② and ⑤ are connected during operation, the operation is stopped and the timer conditions are maintained. If power is cut off during operation, the timer is reset. 	 <p>Power LED Indication</p> <p>Power supply ②-⑪ ON OFF</p> <p>Operation input ②-⑥ ON OFF</p> <p>Stop ②-⑤ ON OFF</p> <p>Reset ②-⑦ ON OFF</p> <p>Timed out contact N.O. ⑨-⑪ ON OFF</p> <p>Operation indicator LED</p>
Signal OFF-delay SF	<ul style="list-style-type: none"> Turn the operation selector to SF. Timing operation starts when terminals ② and ⑥ are opened while power is ON. Control output (N.O. contact) is turned off after the set time. If terminals ② and ⑤ are connected during operation, the operation is stopped and the timer conditions are maintained. If power is cut off during operation, the timer is reset and control output becomes OFF. 	 <p>Power LED Indication</p> <p>Power supply ②-⑪ ON OFF</p> <p>Operation input ②-⑥ ON OFF</p> <p>Stop ②-⑤ ON OFF</p> <p>Reset ②-⑦ ON OFF</p> <p>Timed out contact N.O. ⑨-⑪ ON OFF</p> <p>Operation indicator LED</p>
Differential ON/OFF-delay OF	<ul style="list-style-type: none"> Turn the operation selector to OF. Timing operation starts when terminals ② and ⑥ are connected (or opened) while power is ON. Control output (N.O. contact) is changed after the set time. If the state of terminals ② and ⑥ are changed during operation, the timing operation starts at that point. If terminals ② and ⑤ are connected during operation, the operation is stopped and the timer conditions are maintained. If power is cut off during operation, the timer is reset and control output becomes OFF. 	 <p>Power LED Indication</p> <p>Power supply ②-⑪ ON OFF</p> <p>Operation input ②-⑥ ON OFF</p> <p>Stop ②-⑤ ON OFF</p> <p>Reset ②-⑦ ON OFF</p> <p>Timed out contact N.O. ⑨-⑪ ON OFF</p> <p>Operation indicator LED</p>
Pulse Flicker FR	<ul style="list-style-type: none"> Turn the operation selector to FR. Timing operation starts when terminals ② and ⑥ are connected while power is ON. Control output (N.O. contact) repeatedly turns ON and OFF regardless of operation signal input time (ON time = OFF time = Set time). If terminals ② and ⑤ are connected during operation, the operation is stopped and the timer conditions are maintained. If power is cut off during operation, the timer is reset. 	 <p>Power LED Indication</p> <p>Power supply ②-⑪ ON OFF</p> <p>Operation input ②-⑥ ON OFF</p> <p>Stop ②-⑤ ON OFF</p> <p>Reset ②-⑦ ON OFF</p> <p>Timed out contact N.O. ⑨-⑪ ON OFF</p> <p>Operation indicator LED</p>
Pulse One-shot OS	<ul style="list-style-type: none"> Turn the operation selector to OS. Timing operation starts when terminals ② and ⑥ are connected while power is ON. Control output (N.O. contact) is turned off after the set time regardless of operation signal input time. If terminals ② and ⑤ are connected during operation, the operation is stopped and the timer conditions are maintained. If power is cut off during operation, the timer is reset. 	 <p>Power LED Indication</p> <p>Power supply ②-⑪ ON OFF</p> <p>Operation input ②-⑥ ON OFF</p> <p>Reset ②-⑦ ON OFF</p> <p>Stop ②-⑤ ON OFF</p> <p>Timed out contact N.O. ⑨-⑪ ON OFF</p> <p>Operation indicator LED</p>

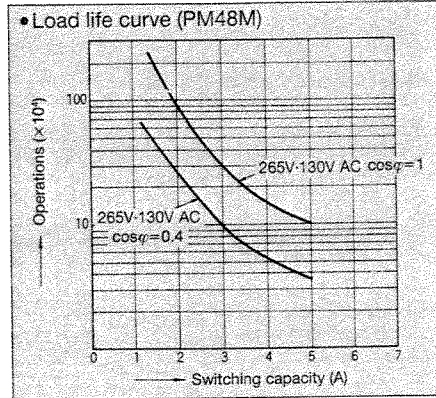
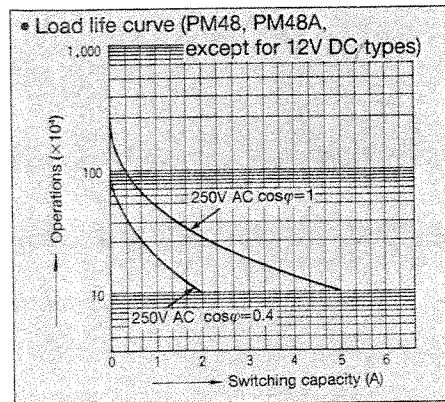
2. PM48(M) Timers Operation Modes

Operation type	Explanation	Time chart
Power ON-delay	<ul style="list-style-type: none"> Timing operation starts when power is applied to terminals ② and ⑦. Control output (N.O. contact) is turned on after the set time. If power is cut off during operation, the timer is reset. PM48M is equipped with instantaneous contact. This contact turns on when power is applied to terminals ② and ⑦, and turns off when power becomes OFF. 	 <p>Power indicator LED</p> <p>Power supply ②-⑦ ON OFF</p> <p>Timed-out contact N.O. ON OFF</p> <p>Timed-out contact N.C. ON OFF</p> <p>Instantaneous contact ON OFF</p> <p>Operation indicator LED</p>

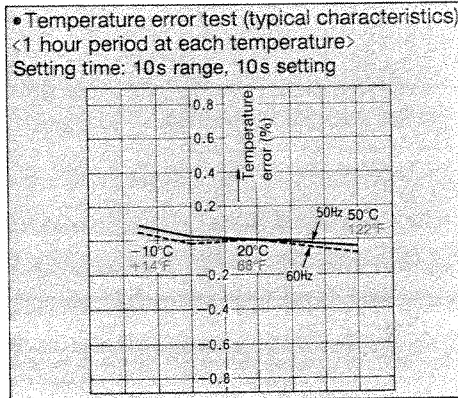
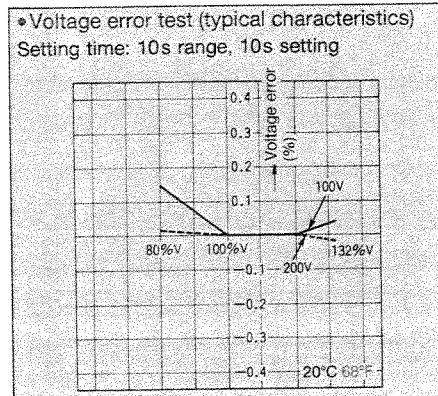
Note: Keep 0.1 s or more for the power up time, and 0.05 s or more for the input signal time. When stop input is ON, the operation indication LED goes out.

DATA

1. Load control life



2. Time accuracy

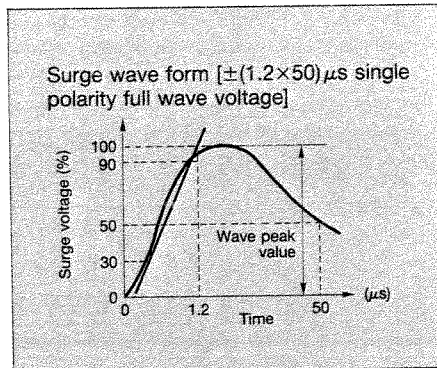


CAUTIONS

[COMMON]

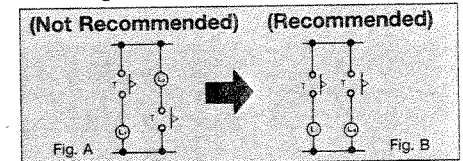
1. Prevent using the timer in such places where flammable or corrosive gas is generated, a lot of dust exists, oil is splashed or considerable shock and vibration occur.
2. Since the main body cover is made of polycarbonate resin, prevent contact with organic solvents such as methyl alcohol, benzene and thinner, or strong alkali materials such as ammonia and caustic soda.
3. External surge protection may be required if the following values are exceeded. Otherwise, the internal circuit will be damaged.

Operating voltage	Surge voltage
100 to 120V AC	4,000V
200 to 240V AC	4,000V
24V AC	500V
12, 24V DC	500V

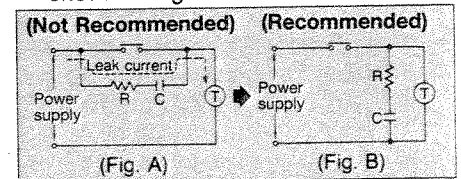


4. Prevent generating inductive or residual voltages between the power supply terminals of the timer when the power supply switch is turned off. (If the power supply cables are routed parallel to the high voltage or power cables, an inductive voltage may be generated between the power supply terminals.)
5. The control output load must be less than the rated load capacity of the relay contact.

6. If wired as shown in Fig. A, a short may result. Be sure to avoid this wiring. Wire as shown in Fig. B.

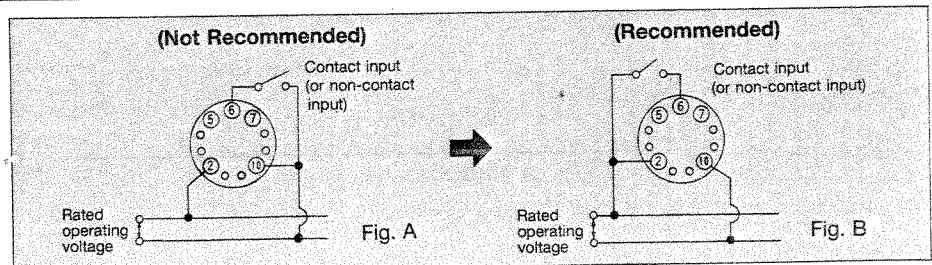


7. For connecting and disconnecting operating voltage to the timer, a circuit should be used which will prevent the flow of leakage current. For example, a circuit for contact protection as shown in Fig. A will permit leakage current to flow through R and C, causing erroneous operation of the timer. Instead, the circuit shown in Fig. B should be used.

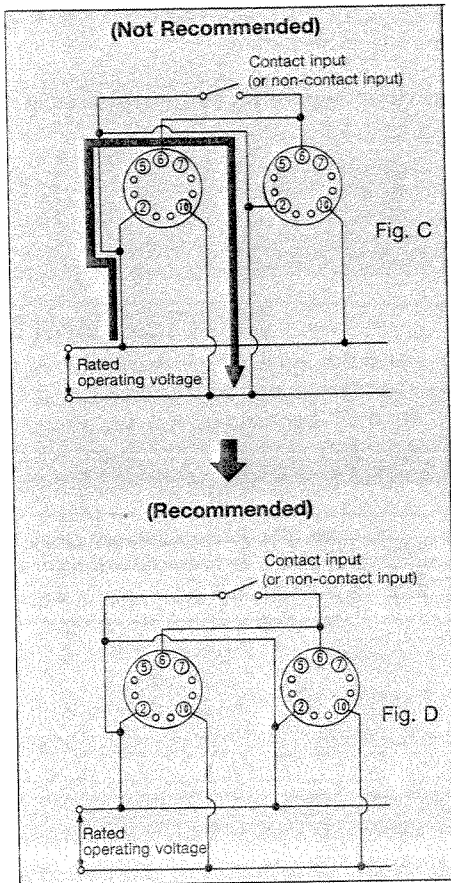


[PM48A]

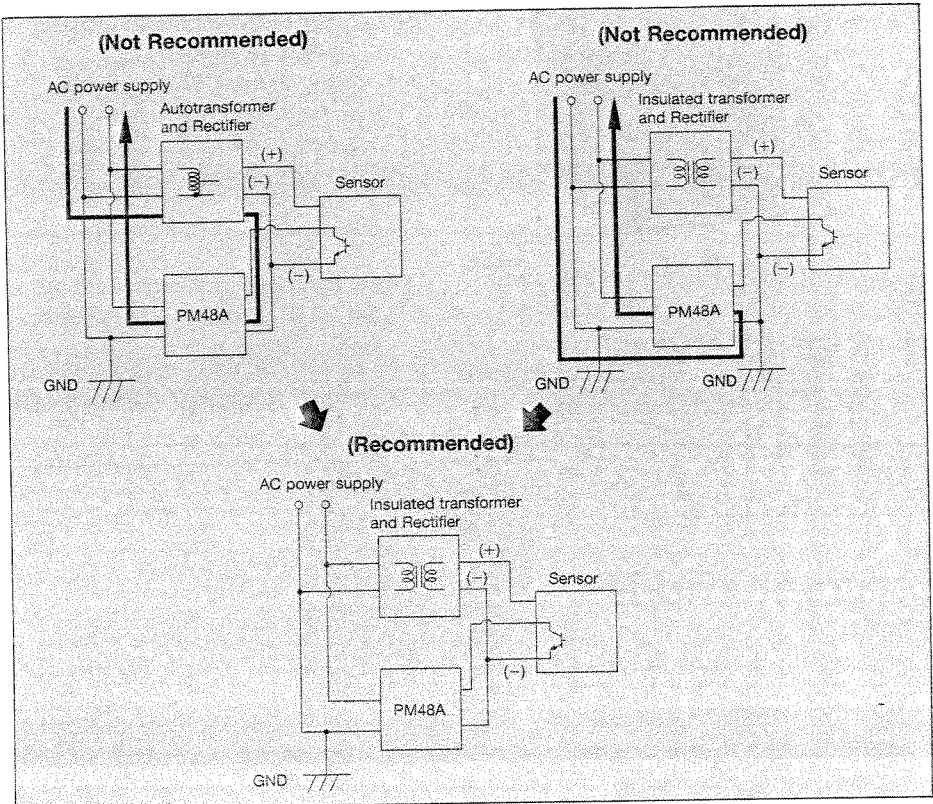
1. Be sure not to use terminal ⑩ as the common terminal of the operation signal as shown in Fig. A. Otherwise, the internal circuit of the timer may be damaged. Use terminal ② as the common terminal as shown in Fig. B.



2. When one input signal is simultaneously input to more than one timer, be sure to avoid the wiring shown in Fig. C. Otherwise, the short-circuit current will flow and cause damage. Be sure to align the polarity of the power supply as shown in Fig. D.



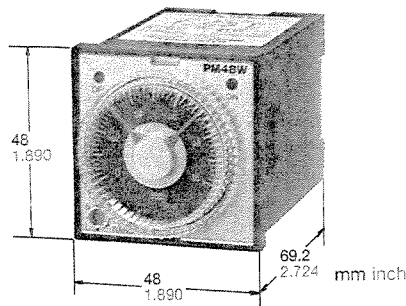
3. Since the PM48A timers use a transformerless power supply system, the input equipment must have the power supply transformer in which the secondary side is not grounded with the primary and secondary sides insulated, in order to prevent interference of the power supply circuit when connecting the external input circuit. Be sure not to use an auto-transformer.



NAIS

DIN48 SIZE, ANALOG MULTIRANGE CYCLIC TWIN TIMERS

PM48W Timers



- Multiple time ranges 12 ranges
- A unique mechanism allows easy time setting and reading
- PM48W allows cyclic operation
- Indicator LEDs visible at a glance are provided separately for power supply and operation modes
- UL recognized, CSA approved

PRODUCT TYPE

PRODUCT TYPE					
Control output	Part No.	Rated operating voltage	Rated power consumption	Operation mode	Time range
Relay Timed-out 2 Form C	PM48W-100H-AC24V	24V AC	Max. 2VA	Power OFF-start cyclic	12 selectable ranges over 0.02 s to 100 h
	PM48W-100H-AC120V	100 to 120V AC	Max. 10VA		
	PM48W-100H-AC240V	200 to 240V AC			
	PM48W-100H-DC12V	12V DC	Max. 2W		
	PM48W-100H-DC24V	24V DC			

SPECIFICATIONS

Timing

Time accuracy (max.)	Operating time fluctuation & Power off time change error	±0.3% (power off time change at the range of 0.3s to 1h)
	Temperature error	±2%
	Voltage error	±0.5%
	Setting error	±5%
Min. power off time		300ms

*Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage (within 5% ripple factor for DC operating voltage types), 20°C 68°F ambient temperature, and 1s power-off time. For the 1s range, the tolerance for each specification becomes ±10ms.

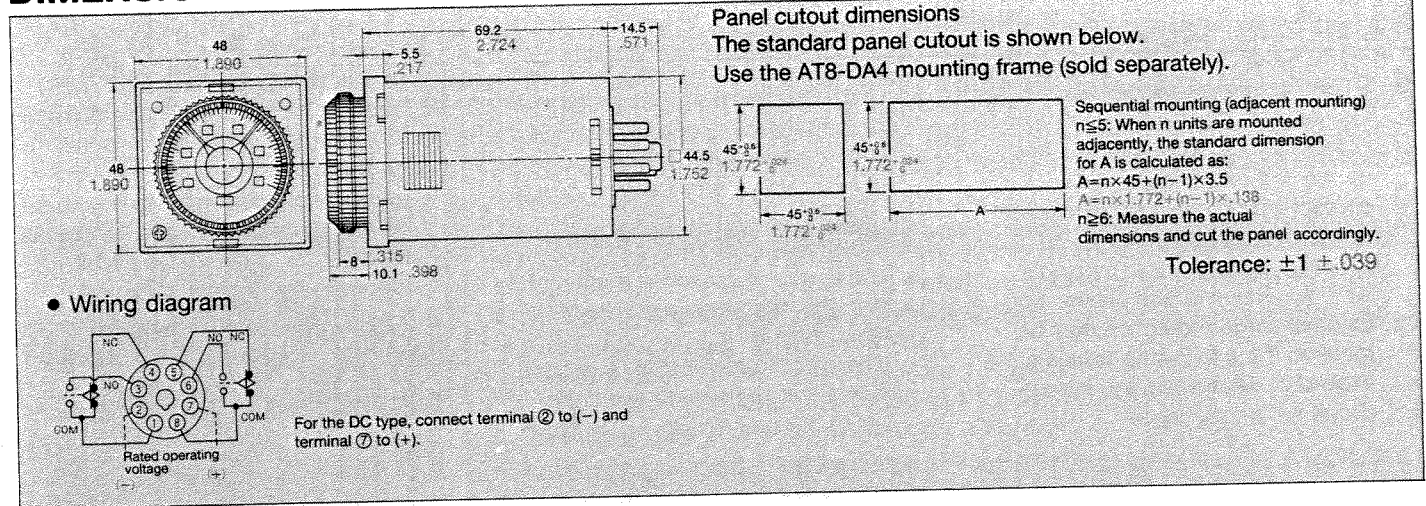
Time range

Time range	Time range unit	s	min	h
1	0.02s to 1s	0.02min to 1min	0.02h to 1h	
5	0.1 s to 5s	0.1 min to 5min	0.1 h to 5h	
10	0.2 s to 10s	0.2 min to 10min	0.2 h to 10h	
100	2 s to 100s	2 min to 100min	2 h to 100h	

Characteristics

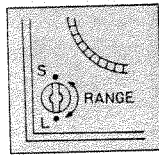
Rated operating voltage		24V AC, 100 to 120V AC, 200 to 240V AC, 12V DC, 24V DC	
Operating voltage range		80 to 110% of rated operating voltage	
Rated frequency (AC operating type)		50/60Hz common	
Power supply ripple (DC operating type)		20%	
Rated control capacity (resistive)		5A 250V AC	
UL/CSA rating		5A 250V AC, PILOT DUTY C300	
Output arrangement		Timed-out 2 Form C	
Initial contact resistance, max. (By voltage drop 6V DC 1A)		100mΩ	
Expected life (min. operations)	Mechanical	[Except for 12V DC operating type]: 10 ⁷ [12V DC operating type]: 5×10 ⁶	
	Electrical (resistive)	10 ⁵	
Initial insulation resistance (At 500V DC)		Min. 100MΩ Between input and output Between contact sets Between contacts	
Initial breakdown voltage		2000Vrms for 1 min Between input and output 2000Vrms for 1 min Between contact sets 1000Vrms for 1 min Between contacts	
Shock resistance	Functional	Min. 10G (4 times on 3 axes)	
	Destructive	Min. 100G (5 times on 3 axes)	
Vibration resistance	Functional	10 to 55Hz: 1 cycle/min double amplitude of 0.5mm (10min on 3 axes)	
	Destructive	10 to 55Hz: 1 cycle/min double amplitude of 0.75mm (1h on 3 axes)	
Max. temperature rise		55 deg.	
Ambient temperature		-10 to 50°C +14 to 122°F	
Ambient humidity		Max. 85% RH	

DIMENSIONS



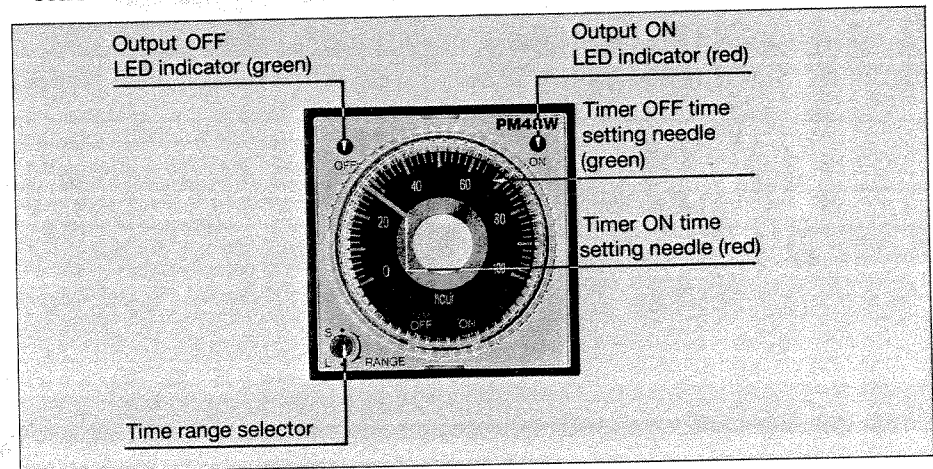
TIME SETTING

- When power supply is on, the time range, setting time and operation mode can not be changed. Turn off the power to set the new time range.
- To set the time in the range, turn the dial to a desired time scale. Do not turn the dial beyond the stopper.
- Turn the time range selector until the slit reaches the • mark on the name plate as shown in the figure. Clockwise turning increases the time range, and counter-clockwise turning decreases the time range.

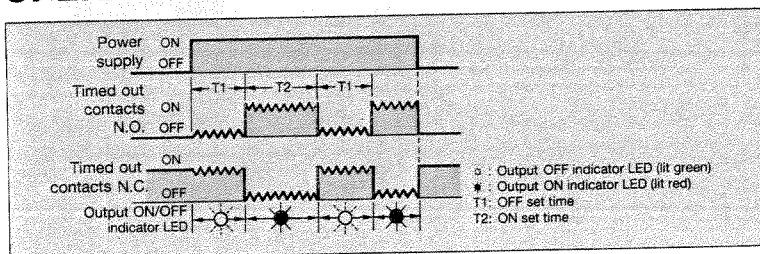


- Set the time within the range of the scale on the dial. The "0" on the dial

indicates the minimum time (not 0s) for the variable control time.



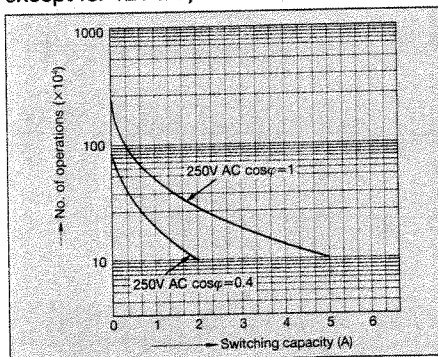
OPERATION



DATA

1. Load control life

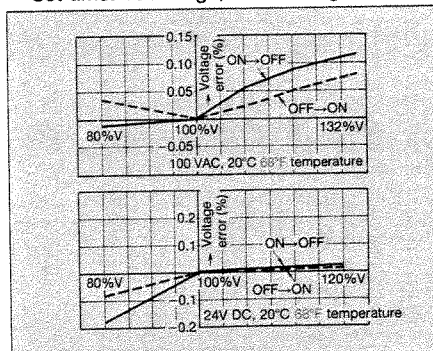
- Load life curves (from internal relay data, except for 12V DC)



2. Time accuracy

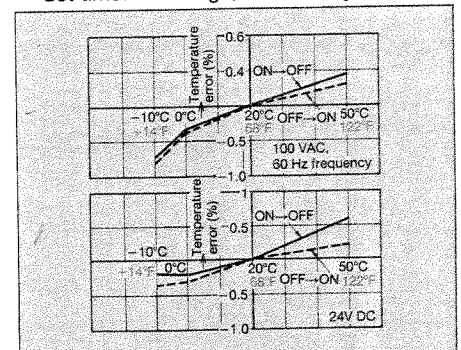
- Voltage error test (typical characteristics)

Set time: 10s range, 10s setting



- Temperature error test (typical characteristics)

Set time: 10s range, 10s setting

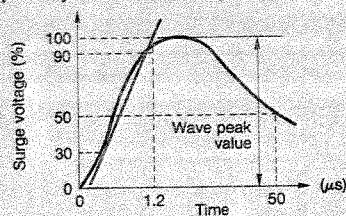


CAUTIONS

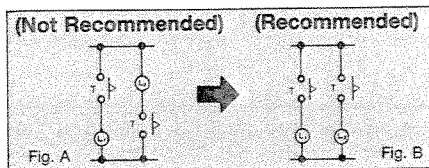
1. Prevent using the timer in such places where flammable or corrosive gas is generated, a lot of dust exists, oil is splashed or considerable shock and vibration occur.
2. Since the main body cover is made of polycarbonate resin, prevent contact with organic solvents such as methyl alcohol, benzene and thinner, or strong alkali materials such as ammonia and caustic soda.
3. External surge protection may be required if the following values are exceeded. Otherwise, the internal circuit will be damaged.

Operation voltage	Surge voltage
100 to 120V AC	4,000V
200 to 240V AC	4,000V
24V AC	500V
12, 24V DC	500V

Surge wave form [$\pm(1.2 \times 50)\mu\text{s}$ single polarity full wave voltage]



4. Prevent generating inductive or residual voltages between the power supply terminals of the timer when the power supply switch is turned off. (If the power supply cables are routed parallel to the high voltage or power cables, an inductive voltage may be generated between the power supply terminals.)
5. The control output load must be less than the rated load capacity of the relay contact.
6. If wired as shown in Fig. A, a short may result. Be sure to avoid this wiring. Wire as shown in Fig. B.



7. For connecting and disconnecting operating voltage to the timer, a circuit should be used which will prevent the flow of leakage current. For example, a circuit for contact protection as shown in Fig. A will permit leakage current to flow through R and C, causing erroneous operation of the timer. Instead, the circuit shown in Fig. B should be used.

