# OMRON I/O Block

G7TC

### Single Cable Connection to PLC Means Space is Saved and Less Control Panel Wiring is Required.

- Compact size: 182 (W) × 85 (D) × 68 (H) mm (8-point Output Block width is 102 mm).
- Connects to the PC through the connecting cable (G79 Series) and connector, and requires only a snap-in operation.
- Surge suppressor circuit built-in.
- Immediate recognition of I/O signal status using LED operation indicators.
- G3TA I/O Solid-state relay can be mounted instead of G7T.
- Mounts easily on a DIN track.
- Approved by UL, CSA (except for G7TC-OC16-1).

### Ordering Information

### Model Number Legend

A G7TC I/O Block is a combination of (8 or 16) G7T I/O Relays with SPST-NO specifications and a P7TF I/O Terminal.

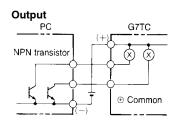
### G7TC-\_\_\_\_

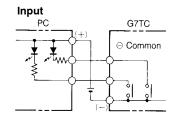
1 2 3 4

#### 1. Input/Output Classification

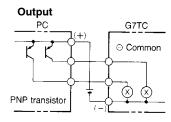
- I: For input
- O: For output
- 2. Type of I/O Signal
  - A: AC coil type for input relays mounted (Input/Output Classification: I)
  - D: DC coil type for input relays mounted (Input/Output Classification: I)
  - C: Contact output for output relays mounted (Input/Output Classification: O)
- 3. Number of I/O Points
  - 16: 16 points
  - 08: 8 points (for output only)
- 4. Internal I/O Circuit Common

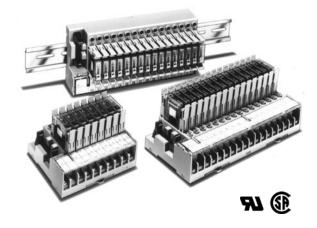
Blank: NPN 1: PNP











#### I/O Block

I/O classification	I/O points	Internal I/O circuit common	Rated voltage	Model
Input	16	NPN (– common)	12 VDC	G7TC-ID16
			24 VDC	
			100 (110) VDC	
			100 (110) VAC	G7TC-IA16
			200 (220) VAC	
Output	16	NPN (+ common)	12 VDC	G7TC-OC16
			24 VDC	
		PNP (– common)	12 VDC	G7TC-OC16-1 (see note 1)
			24 VDC	
	8	NPN (+ common)	12 VDC	G7TC-OC08
			24 VDC	

Note: 1. Not approved by UL, CSA.

2. When ordering, add the rated coil voltage to the model number. Example: G7TC-ID16 <u>24 VDC</u>

Rated coil voltage

### Specifications -

### ■ Coil Ratings (Common to Input/Output per Relay)

	Item	Rated cu	rrent (mA)	Coil resistance	Must operate	Must release	Maximum voltage	Power co	nsumption
Rated	voltage (V)	50 Hz	60 Hz	(Ω)	of rated voltage		per Relay	per 16 Relays	
AC	100/(110) 200/(220)	8.2/- 4.1/-	7/7.7 3.5/3.85	8,700 33,300	80% max.	30% min.	105%	0.7 VA	11 VA
DC	12 24 100/110	42 21 5		290 1,150 20,000	80% max.	10% min.	105%	0.5 W	8 W

Note: 1. The rated current and coil resistance are measured at a coil temperature of +23°C with a tolerance of +15%/-20% for AC rated current and  $\pm$ 15% for coil resistance.

2. The operating characteristics are measured at a coil temperature of +23°C.

3. The value for maximum voltage is the maximum value within the allowable voltage fluctuation range for the relay coil's operating power supply. Continuous operation at this voltage is not within product specifications.

4. Approx. 4 mA flows into each LED indicator. To calculate the power supply capacity, add the current value of each LED indicator.

5. When the G7TC is used with an AC rated voltage, three rated currents can be used. If a coil voltage of 110 or 220 VAC is used, 50 Hz cannot be used.

### Contact Ratings (G7T I/O Relay)

Classification	For i	input	For a	output	
Item	Resistive load (coso=1)	Inductive load (cos∳=0.4 L/R=7 ms)	Resistive load (coso=1)	Inductive load (cosφ=0.4 L/R=7 ms)	
Rated load	1 A at 24 VDC	0.5 A at 24 VDC	5 A at 24 VDC 2 A at 220 VAC	2 A at 24 VDC 1 A at 220 VAC	
Rated carry current	1 A		5 A		
Max. switching voltage	250 VAC, 125 VDC				
Max. switching current	1 A	0.5 A	5 A	2 A	
Error rate (reference value) (See note.)	100 μA at 1 V		10 mA at 5 V		
Electrical life expectancy	10,000,000 operations (at 10 mA)         2,500,000 operations (at 10 mA)           50,000 operations (at 1 A)         20,000 operations (at 1 A)		t 1,000,000 operations (under rated load)		
Mechanical life expectancy	50,000,000 operations				

Note: The above values are for a switching frequency of 120 operations/min.

#### Characteristics

	Model	G7TC-IA16 (Input, AC coil)	G7TC-ID16 (Input, DC coil)	G7TC-OC16 (–1) (output, DC coil)	G7TC-OC08 (output, DC coil)
Item Contact form		SPST-NO × 16			SPST-NO × 8
Contact mechan	lism	Bifurcated crossbar	contact	Single contact	
Contact materia		Au cladding + Ag		AgInSn	
Contact resistar	-	50 m $\Omega$ max.		, ignion	
Must Operate tir	· /	15 ms max.			
Release time (Se	, ,	15 ms max.			
Max.	Mechanical limit	18,000 operations/ho	our		
switching frequency	At rated load	1,800 operations/hou	ur		
Insulation resist	ance	100 MΩ (at 500 VDC	C)		
Dielectric	Between coil and contact	2,000 VAC, 50/60 Hz	z for 1 minute		
strength	Between same polarity contacts	1,000 VAC, 50/60 Hz for 1 minute			
	Between paired connectors	250 VAC, 50/60 Hz for 1 minute			
Vibration resista	ince	10 to 55 to 10 Hz with 0.5-mm single amplitude (1.0-mm double amplitude)			
Shock resistanc	e	200 m/s <sup>2</sup>			
Noise immunity		Noise level: 1.5 kV; pulse width: 100 ns to 1 $\mu s$			
Rated voltage between positive and negative terminal blocks		Rated voltage of controller's (PLC or other) input circuit		$\begin{array}{l} \text{12 VDC} \pm \text{5\%} \\ \text{24 VDC} \pm \text{5\%} \end{array}$	
Rated current be terminal blocks	etween positive and negative	$\begin{array}{llllllllllllllllllllllllllllllllllll$			
Cable length	To controller	5 m max. (reference value)			
(See note 4.)	To I/O devices	50 m max. (reference value, for 2-mm <sup>2</sup> Dependent or CVV cable)		Dependent on load	
Ambient operati	ng temperature	0 to 55°C			
Ambient operati	ng humidity	35% to 85% (with no icing or condensation)			
Tightening torqu	ue for external connections	0.78 to 1.18 N·m			
Tensile strength		No damage when a tensile force of 49 N is applied in each direction. In the direction of the track, the tensile strength is 9.8 N min.			
I/O terminal tigh	tening torque	Tightening strength: 0.98 N·m; Tensile strength 49 N per minute			
LED color		Red	Green		
Case color		Transparent red	Transparent green Transparent green		
Coil surge abso	rber	Varistor	Diode (1 A, 400 V)		
Weight		Approx. 640 g	Approx. 630 g	Approx. 670 g	Approx. 350 g

**Note:** 1. The above values are initial values.

2. Measurement condition: 1 A at 5 VDC.

3. Ambient temperature: 23°C.

4. Connecting cables up to 5 m are available as standard products. For longer cables, enquire separately.

#### **UL and CSA Standards**

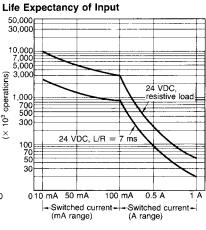
Standard G7TC I/O Blocks, except for the G7TC-OC16-1 and the G7TC-OC08, have met UL and CSA standards (UL file no. E95399; CSA file no. LR35535).

Note that the following UL- and CSA-qualifying ratings differ from the performance characteristics of the individual models:

Model	Coil ratings	Contact ratings
G7TC-ID16, G7TC-IA16	10 mA/point, 24 VDC	250 VAC max.
G7TC-OC16	Coil drive current, 24 VDC	Inductive load: 10 A, 250 VAC Resistive load: 10 A, 30 VDC Rated horsepower: 1/2 HP, 240 VAC

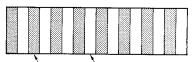
### Engineering Data

#### Max. Switching Capacity of Output (Life expectancy: 1,000,000 Operations) Life Expectancy of Output 50 30 AC inductive load (coso 0.4) 10,000 7,000 5,000 3,000 10 1111 +++++ 24 VDC, resistive load 10<sup>3</sup> operations) € 3 load 24 VDC, L/R=7 ms current 1,000 uctive I 7 ms <del>|</del> DC induċ 700 500 0.5 Ηbb resistive lo Operating 300 103 0.3 I I I × 100 70 50 0.1 res load 0.05 220 VAC (cosø 0.4) 30 0.03 10L 5 30 50 300 500 1,000 100 Switched current (A) Voltage (V)



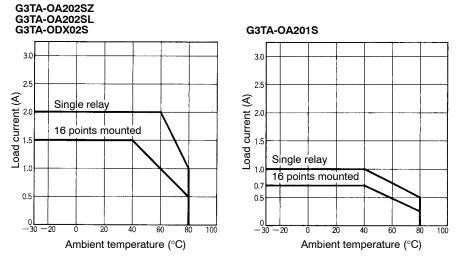
## Example for Output Block (for Reference)

If a G7T I/O Relay is mounted in every other position on an Output Block (see drawing), a resistive load of 10 A (24 VDC) can be switched. Note that the service life is reduced to 150,000 operations in this case.



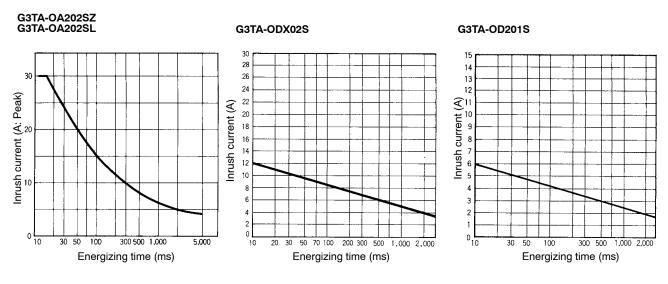
G7T (10 A) G7T (0.1 A max.)

Load Current vs. Ambient Temperature



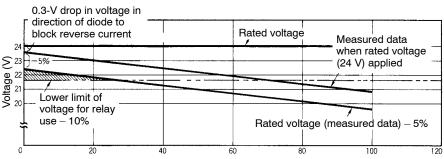
#### **Inrush Current**

The following graphs show the maximum inrush currents that can be withstood for non-repetitive operation. For repetitive operation, the figures should be reduced by half.



#### Cable Length

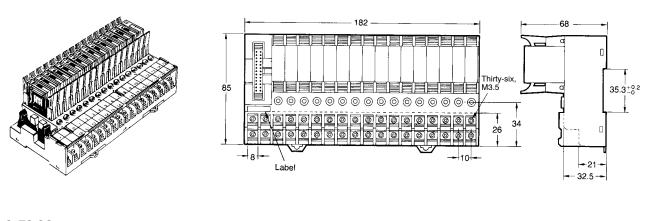
The following graph gives reference values for the relationship between cable length and voltage in the case where the voltage fluctuation of the power supply is 5%.



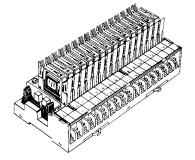
Length of power line (AWG 28) (m)

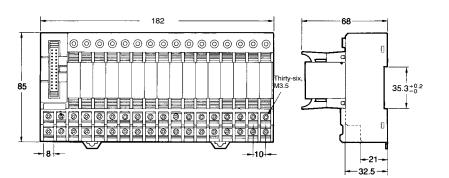
## Dimensions

G7TC-ID16 G7TC-IA16



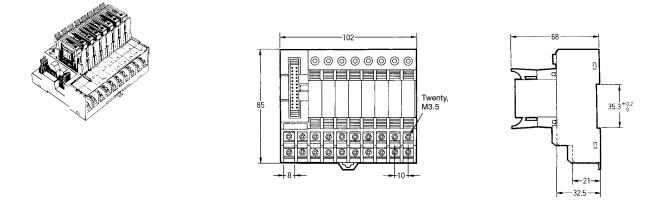
G7TC-OC16 G7TC-OC16-1





Screw terminals

#### G7TC-OC08



#### Terminal Arrangement/Internal Connection

G7TC-ID16 (NPN input/- common)

0

00

0

-O 03

-0 04

O 05

-O C6

-O 07

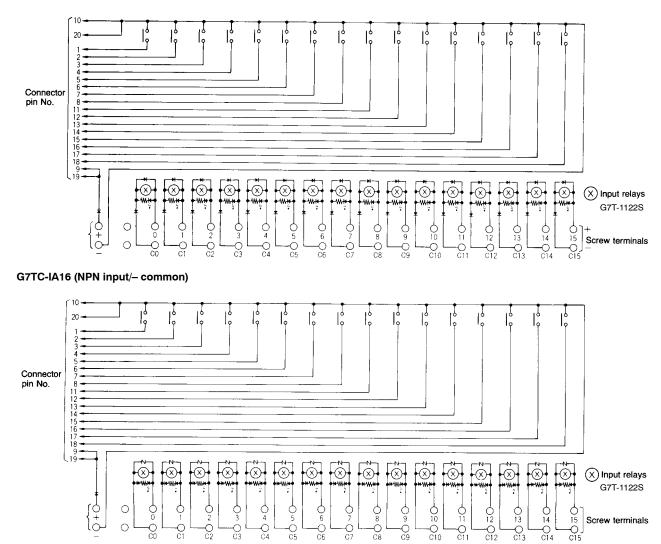
C8

-0 011

-0 012

-O 013

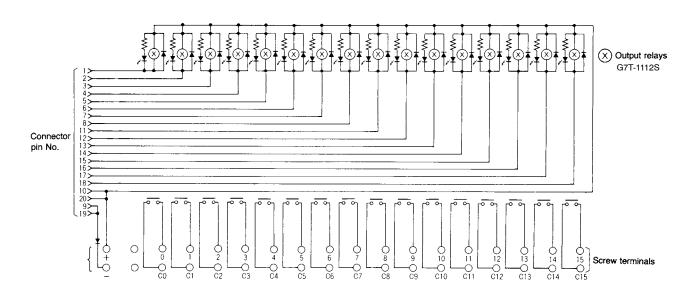
-O C14



#### G7TC-OC16

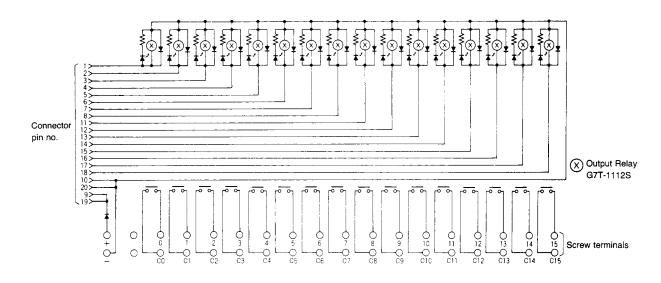
G7TC ·

Note: A controller with an NPN transistor, common output can be connected to the G7TC-OC16.



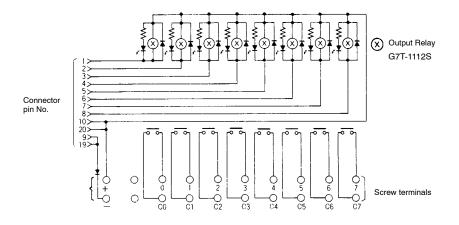
#### G7TC-OC16-1

Note: A controller with a PNP transistor, + common output can be connected to the G7TC-OC16-1. Do not connect the G71 Remote Interface to the G7TC-OC16-1. Due to the difference in polarity, the G71 will be damaged if the G7TC-OC16-1 and the G71 are connected to each other. Use the G7TC-OC16 (NPN output/+ common) instead, to connect to the G71.

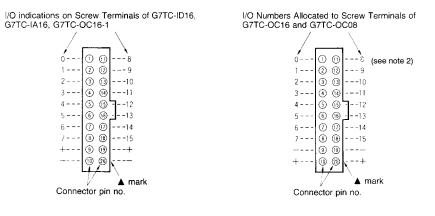


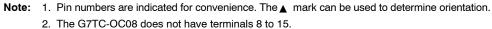
#### G7TC-OC08 (NPN output/+ common)

Note: A controller with an NPN transistor, - common output can be connected to the G7TC-OC08.



### Connector Pin Configuration Top View





### Accessories (Order Separately)

#### G79 Connecting Cables

G79-Y C Connecting Cable with Crimp-type Hooks This Cable is convenient for connecting I/O Blocks to devices equipped with screw terminals.

Length ( $\ell$ )	Model	and the second	
1,000 mm	G79-Y100C		
1,500 mm	G79-Y150C		
2,000 mm	G79-Y200C		
3,000 mm	G79-Y300C	- carryon	l → l →
5,000 mm	G79-Y500C	*	

Note: 1. Power line capacity must be within 50 mA per I/O point. Always check driver capacity and I/O relay power consumption when using an Output Block.

- 2. Hooks are labeled with corresponding connector pin numbers.
- 3. Connect terminals 9 and 19 and terminals 10 and 20 together when using the G7TC-OC08.
- 4. The separate wires at the device end of the Cable each have a diameter of AWG 28 (10/0.38).

#### G79-A C Connecting Cable

This Cable has separate wires at the device end.

00C
00C





Note: 1. The separate wires at the device end of the Cable each have a diameter of AWG 24 (7/0.203).

2. Connect terminals 9 and 19 and terminals 10 and 20 together when using the G7TC-OC08.

#### G79- C Connecting Cable with One Connector

This Cable is convenient for connecting an I/O Block to a single device equipped with one connector socket.

Length ( $\ell$ )	Model
1,000 mm	G79-100C
1,500 mm	G79-150C
2,000 mm	G79-200C
3,000 mm	G79-300C
5,000 mm	G79-500C



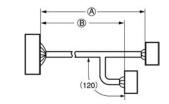
#### G79-O C- and G79-I C Connecting Cables with Two Connectors

Cables for both Output Blocks (for connection to SYSMAC I/O Units; tape color: red) and Input Blocks (for connection to SYSMAC I/O Units; tape color: yellow) are available.

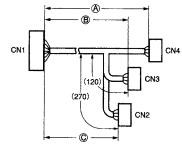
Length		Cables for	Cables for
Α	В	Input Blocks	Output Blocks
1,000 mm	750 mm	G79-I100C-75	G79-O100C-75
1,500 mm	1,250 mm	G79-I150C-125	G79-O150C-125
2,000 mm	1,750 mm	G79-I200C-175	G79-O200C-175
3,000 mm	2,750 mm	G79-I300C-275	G79-O300C-275
5,000 mm	4,750 mm	G79-I500C-475	G79-O500C-475

**Note:** The 32-point card-type connector for Input Block Cables and that for Output Block Cables have different pin arrangements.









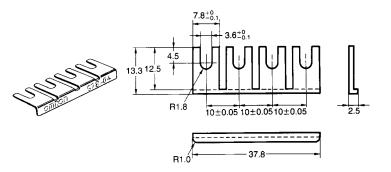
The lengths given are for straight lines and do not take bends into account.

#### G79CConnecting Cable with Three Connectors

Length			Model
А	В	С	
1,500 mm	1,250 mm	1,000 mm	G79-150C-125-100
2,000 mm	1,750 mm	1,500 mm	G79-200C-175-150
3,000 mm	2,750 mm	2,500 mm	G79-300C-275-250

### Shorting Bar

**G78-04** Use this piece for short-circuiting across terminals. Max. current flow: 20 A



### I/O Block Details

#### Input Blocks G7TC-ID16 G7TC-IA16

Supply power to terminals 0 through 15 and C0 through C15 according to the voltage specifications of the I/O Relays and I/O Block. Do not reverse positive and negative terminals on the DC Input Block (0 through 15 are positive; C0 through C15, negative). Shorting bars are available.

Supply to the power terminal (positive and negative) the rated voltage of the controller's input circuits (24 VDC or 12 VDC). Use a low-noise power source.

When using a Connecting Cable with two connectors, be sure to use the Cable for Input Blocks. Using the Cable for Output Blocks may result in malfunction or damage to the product. Connecting Cable: G79-I C-

Tape Color: Red

#### Output Block G7TC-OC16(-1) G7TC-OC08

There are voltage specifications for the Relays and Terminals. Depending on the controller connected, select either 12 or 24 VDC.

Supply power to contact output terminals 0 through 15 and C0 through C15 according to the requirements of the loads. A 4 terminal Shorting Bar is available.

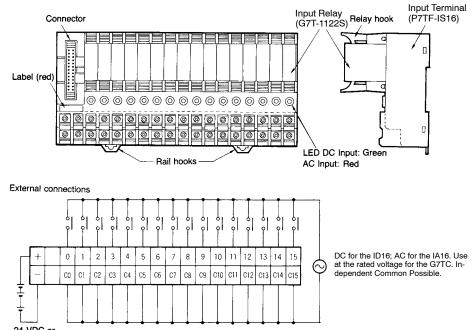
Supply to the power terminals (positive and negative) power both for driving the relays and for controller output transistors. Match the controller and I/O block voltage specifications. Use a lownoise power source.

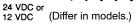
When using a Connecting Cable with two connectors, be sure to use the Cable for Output Blocks. Using the Cable for Input Blocks may result in malfunction or damage to the product.

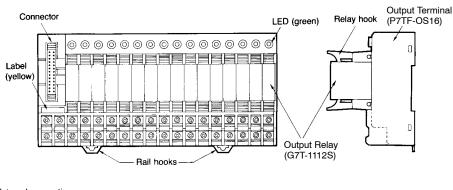
Connecting Cable: G79-O C-

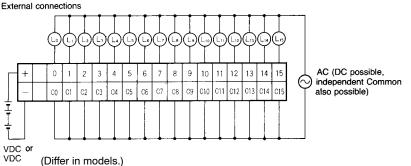
Output Block Unit G7TC-OC08 does not have terminals 8 through 15 and C8 through C15. Although a 20-pin connector is used, pins 11 through 18 24 VDC or are not connected.

When an I/O SSR (G3TA-OD  $\square$ ) is mounted, terminals 0 to 15 will be positive.





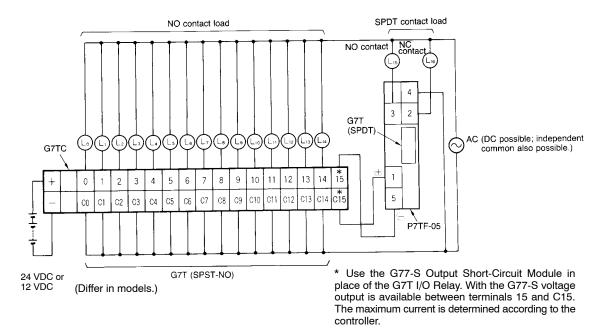




# Connection Example for SPDT Relays

G7TC

The following is an application example for the P7TF-05 using an SPDT Relay on a terminal of the G7TC-16(-1).



Note: If more than one G77-S Output Short-Circuit Module is employed, the voltage output of the terminals on the G7TC is as follows: G7TC-OS16: The positive side (the lower row) connects to the common line internally. G7TC-OS16-1: The negative side (the upper row) connects to the common line internally.

### P7TF-05 Socket

The G7T (SPST-NO, SPST-NC, and SPDT types) and the G3TA I/O Relays can be mounted on the P7TF-05 Socket.

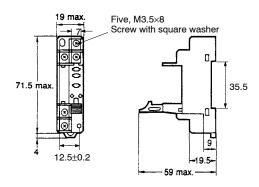
The P7TF-05 can be used for applications involving sequences that require slim relays, or to enable use of SPDT relays with the I/O Block. To use part of the I/O Block with SPDT specifications, insert an Output Short-Circuit Module into the I/O Block, and use the P7TF-05 Socket in combination with an SPDT Relay for the Module's output.



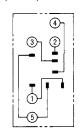
#### Specifications

Contact resistance	10 m $\Omega$ max.
Contact resistance	10 msz max.
Dielectric strength	2,000 VAC for 1 minute
Insulation resistance	100 MΩ (at 500 V)
Vibration resistance	10 to 55 Hz, 1.0 mm double amplitude
Shock resistance	200 m/s <sup>2</sup>
Ambient temperature	Operating: 0 to 55°C
Ambient humidity	35% to 85%
Weight	Approx. 28 g

#### Dimensions

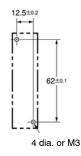


Internal Connections (Top View)



Note: Terminal 1 is positive when the I/O SSR is employed.

#### Mounting Hole Dimensions



**Note:** Terminal 1 is positive when the G3TA or Indicator Module is employed.

#### ■ P70 Indicator Module (With Surge Suppressing Function)

Remove the transparent style strip of the P7TF-05 socket and mount this module and it will function as an operation indicator with the surge suppression.



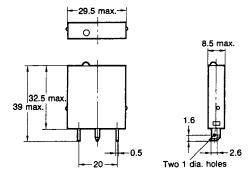
#### **Ordering Information**

Mode		Applicable relay coil voltage	Remarks
For AC relay	P70A	100 (110) VAC	Surge suppressing system with
		200 (220) VAC	varistor
For DC relay	P70D	12/24 VDC	Surge suppressing system with diode

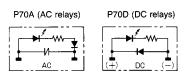
**Note:** 1. Order the indicator module suitable for the relay coil voltage.

2. The indicator module for DC relays has a multiple power supply common to both 12 and 24 VDC.

#### Dimensions



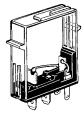
#### Internal Connection



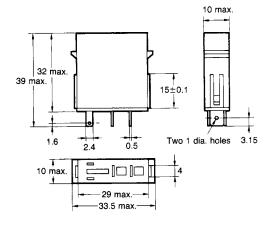
(There is no coil polarity for AC relays.)

#### ■ G77-S Output Short-Circuit Module

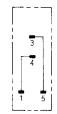
The output of the I/O Block can be obtained without relays through the G77-S Output Short-Circuit Module. Note that the G77-S Output Short-Circuit Module is not available for inputs.



Dimensions



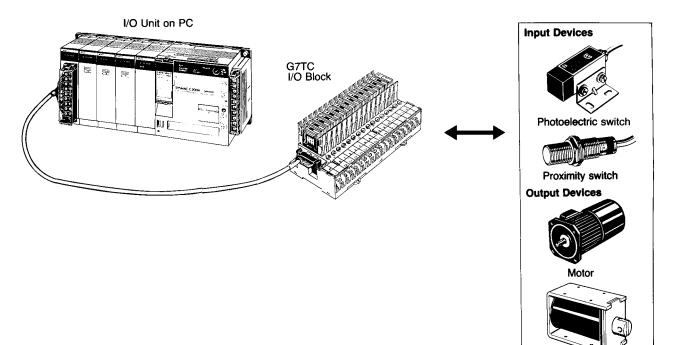
Terminal Arrangement/Internal Connections (Bottom View)



(There is no coil polarity.)

Solenoid

# Connecting to Programmable Controller through Crimp-type Hooks I/O Units without connectors can be easily connected to the I/O Block through the connecting cable equipped with crimp-type hooks.



### Precautions

#### General

I/O Relays and I/O Block Bases can be combined as follows to form I/O Blocks:

	I/O Blocks	Block Base*3	I/O Relay		I/O SSR*2
DC output	G7TC-OC16 G7TC-OC16-1	P7TF-OS16 P7TF-OS16-1	G7T–1112S (SPST-NO type) <sup>*1</sup> G7T–1012S (SPST-NC type)	AC	G3TA-OA202SZ G3TA-OA202SL
	G7TC-OC08	P7TF-OS08		DC	G3TA-ODX02S G3TA-OD201S
DC input	G7TC-ID16	P7TF-IS16 (DC type)	G7T-1122S <sup>*1</sup>	DC	G3TA-IDZ002 (M)
AC input	G7TC-IA16	P7TF-IS16 (AC type)	-	AC	G3TA-IAZR02S

\*1 These are the I/O Relays mounted on the G7TC I/O Relay Terminal.

- \*2 To use I/O SSRs, remove the I/O Relays and mount the I/O SSRs to the slots where the I/O Relays were mounted. Or, order and combine a P7FT I/O Terminal and I/O SSRs.
- \*3 The P7TF I/O Terminal provides only sockets. It does not have Relays mounter to it. Mount I/O Relays or I/O SSRs to the sockets. Specify the rated voltage in the same way as when ordering the G7TC I/O Relay Terminal.
- Combinations of AC Input Relays/SSRs and DC Input Relays/SSRs cannot be used with the same Terminal. This is because specifications for coil surge suppression elements are different.

Relays/SSRs with different voltage specifications cannot be used with the same Terminal. (For example, a 100-VAC Input Relay and a 200-VAC Input Relay, or a 12-VDC Output Relay and a 24-VDC Output Relay cannot be used with the same Terminal.) This is because specifications of operation indicator circuits are different.

 Only use I/O Terminals, I/O Relays, and I/O SSRs with the same specifications for rated voltage.

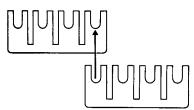
#### General

 I/O Blocks are color coded, as shown below, according to input/output and AC/DC specifications.

		I/O Terminal Iabel	I/O Terminal indicators	I/O Relay case
Output Block (DC)		Yellow	Green	Transparent
Input Block	DC	Red	Green	Green
	AC	Red	Red	Red

- Both Input and Output Blocks do not have internal power supplies. For an Output Block, supply the relay drive power to the positive and negative terminals (either 12 or 24 VDC). Loads (terminal contacts 0 through 15) must also be supplied with appropriate power. For an Input Block, supply, to the positive and negative terminals, power for input signals to the controller.
- The same Connecting Cable, G79-Y, is used for the G7TC-OC08 eight-point Output Block as for other I/O Blocks; leave 8 points unconnected.
- Indicators indicate the presence or absence of signals.
   Use the display lever inside each relay for fault diagnosis. (Some relays do not have this lever depending on the specifications.)
- Each relay must be pressed down until its hold-down hooks engage completely. Heating or malfunction can result if relays are not mounted properly.
- Unlabeled terminals are not electrically connected. Use these for repeater terminals.
- Indicator positions and relay orientation differ between Input and Output Blocks. This is to aid in differentiating Input Blocks from Output Blocks and in following signal flow.
- DC Input Blocks and Output Blocks with G3TA-OD \_\_\_\_ have positive and negative terminals, with the positive terminals normally being on the top of the I/O Block. Reversing positive and negative terminals will prevent operation.

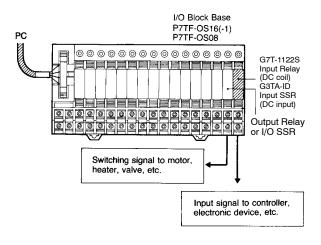
- DIN tracks are generally used to mount I/O Blocks. For screw mounting, a 210-mm DIN track is available that can be used as an adapter in combination with End Plates (PFP-M, two required).
- A Shorting Bar is provided to connect four terminals. The current capacity of the shorting bar is 20 A. As long as this current capacity is not exceeded, the shorting bar can be used in combination as shown at the right to connect more than four terminals.



 Special Connecting Cables are provided for connections to OMRON SYSMAC I/O Units with Connectors. Connecting Cables with two connectors, however, come in two types: Cables for Input Blocks (G79-I) and Cables for Output Blocks (G79-O). Be sure to purchase the correct Cable for the application.

#### Microload Switching

Input Relays (DC coil type) and I/O SSRs (DC input type) can be mounted onto an Output Block. Doing so enables using controller programming to simultaneously switch on or off two outputs (DPST-NO operation) to switch a SPST-NO load that in turn switches another SPST-NO load. One configuration for this is shown below.



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