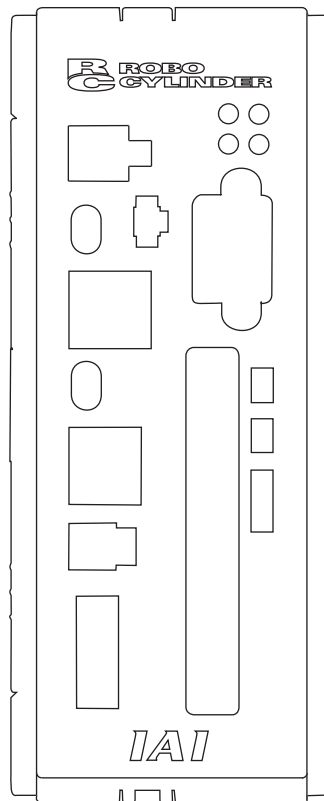


# RCS

## Robo Cylinder Controller Operating Manual



This publication was written to assist you in better understanding this part of your Intelligent Actuator system. If you require further assistance, please contact Intelligent Actuator Technical Support. For Central and East Coast Time Zones, please call our Itasca, IL office at 1-800-944-0333 or FAX 630-467-9912. For Mountain and Pacific Time Zones, please call our Torrance, CA office at 1-800-736-1712 or FAX 310-891-6015; Monday thru Friday from 8:30AM to 5:00PM.



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The information and technical data contained herein are subject to change without notice. Intelligent Actuator, Inc. assumes no responsibility for any errors or omissions regarding the accuracy of the information contained in this publication.

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# 1. Safety Precautions

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## 1-1 Forward

Thank you very much for purchasing the RCS Controller. Without knowing beforehand how to correctly use or operate the controller, not only will the user be unable to take full advantage of all the functions built into this product but the user might also, inadvertently cause damage to the robot or shorten its life. Please read this manual as well as other manuals carefully pertaining to the product to acquire an understanding of the proper method of handling and operating the controller. Keep this manual handy so that you can refer to the appropriate sections as the need arises.

### **Absolute Specifications:**

With the RCS Controller, once power is applied, and home position is taught, you can execute positioning without homing after reapplying the power. Other basic functions are same as the standard RC Controller.

- Actuators for Absolute are the only actuator that can operate using RCP Controller absolute specifications. You may not use a standard RC Actuator.
- Absolute reset is not done at the time of shipment. Absolute reset needs to be done by the user.

\* All precautions have been taken to ensure the accuracy of the contents of this manual. However, if you become aware of any inaccuracies or discrepancies, please contact your IAI sales representative or technical service department.

# 1. Safety Precautions

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## 1-2 Safety Precautions

**Please read the following information carefully in order to gain an understanding of safety precautions.**

This product was developed as components for driving automated equipment and is designed not to produce greater torquing or speed than is necessary. However, strictly observe the following items to prevent any accidents from occurring.

1. As a rule, any handling or operating methods not described in this manual should be viewed as things that should not be attempted. Please contact the company if any portion of the contents of this manual are unclear.
2. Use only the products specified for wiring between the actuator and controller.
3. Stand clear of the operating range of the machine when it is in motion or is ready to operate. Surround the system with safety partitions if there is a possibility that people can enter the area where the machine is being used.
4. When assembling, adjusting, or performing maintenance on the machine, always disengage the power supply to the controller. During work, display a sign stating work in progress where it is readily visible. Also, keep the power cable close to the operator so that another person cannot inadvertently switch on the power.
5. When more than one person is working on the system, agree on signals beforehand to ensure everyone's safety before beginning work. In particular, when doing work involving axis movement, always call out for everyone's safety regardless of whether power is ON or OFF, or the axis is to be mechanically driven or manually moved.
6. When the user needs to lengthen the cables, check the wiring carefully to make sure it is correct before turning the power ON since miswiring can lead to malfunction.

# 1. Safety Precautions

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## 1-3 Warranty Period and Scope of Warranty

The RC Controller undergoes stringent testing before it is shipped from our factory. IAI provides the following warranty:

### 1. Warranty Period

The warranty period is 12 months from the date the unit is shipped to the customer.

### 2. Scope of Warranty

If within the period specified above, a breakdown occurs while operating the controller under normal conditions and is clearly the responsibility of the manufacturer, IAI will repair the unit at no cost. However, the following items are not covered by this warranty:

- Faded paint or other changes that occur naturally over time.
- Consumable components that wear out with use (battery, etc.).
- Unit seems to be noisy or similar impressions that do not affect machinery performance.
- Damage resulting from improper handling or use.
- Damage resulting from user error or failure to perform proper maintenance.
- Any alterations not authorized by IAI or its representatives, including parameters.
- Damage caused by fire and other natural disasters or accidents.

The warranty pertains to the purchased product itself and does not cover any loss that might arise from a breakdown of the product. Any repairs will be done at our factory.

### 3. Service

The purchase price of the product does not include programming or expenses for sending technicians to the customer's site. Even if the product is still under the warranty period, separate charges will be assessed for the following services.

- Assistance with unit installation or trial operation.
- Inspection and maintenance.
- Technical training on controller operation, wiring or programming.
- Any other services or work for which IAI normally assesses separate charges.

# 1. Safety Precautions

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## 1-4 Setting Environment and Noise Measures

### 1-4-1 Installation Environment

- (1) Do **NOT** block the air vents of your controller when installing your IA system.
- (2) Your controller is **NOT** dust, water, or oil proof. Take steps to prevent foreign matter from getting into the controller air vents. Avoid using your IA system in environments subject to contamination by dust, oil, mist, or cutting oil.
- (3) Do not expose your IA system to direct sunlight or place it near a heat source.
- (4) Avoid placing your IA system under conditions of extreme temperatures above 40°C or below 0°C (32°F). The level of humidity should not be exceed 85%. Do **NOT** expose to corrosive or inflammable gas.
- (5) Avoid external vibration, unnecessary impact, or excessive shocks to your IA system.
- (6) Take steps to shield all cables and wires from electromagnetic noise.

### 1-4-2 Power Source

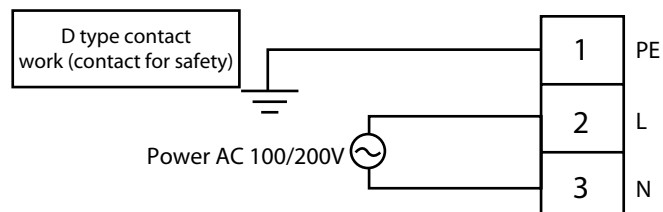
Make certain that DC24V, AC100 and AC200V are maintained.

### 1-4-3 Electromagnetic Noise Supression

#### (1) Wiring and Power Supply

##### 1. AC 100/200V Power Type Controller

The power terminal board FG is for security grounding, and needs to the D-type grounding construction. The thickness of the cable needs to be 0.75mm<sup>2</sup> (#18AWWG), and above AC cable. .



# 1. Safety Precautions

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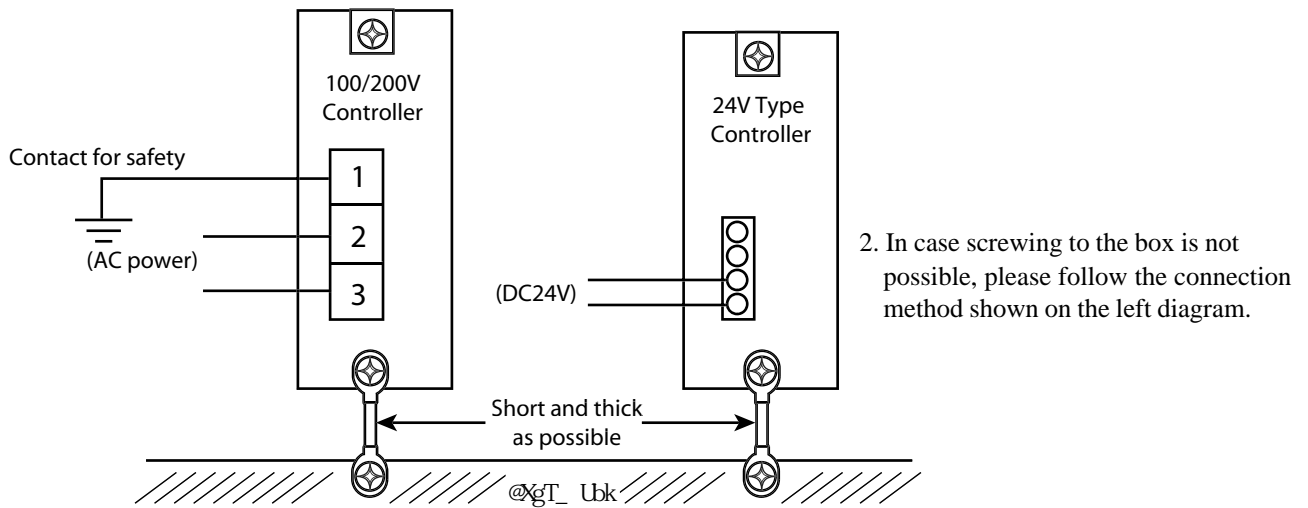
## 2. DC 24V Type Controller

Although contact terminal for security does not exist on the power terminal board, you will need to set noise compliance and grounding.

### (2) Grounding for noise compliance

You will need to ground as a noise compliance regardless of AC100/200V Type and DC 24V Type.

1. Directly screw in the main body to the metal box.



### \* Wiring Notes

1. Twist the cable for the DC24V external power.
2. Isolate the controller cable from high power lines such as motor circuits (Do not bundle, and do not place in the same piping circuit).
3. The controller encoder cable is particularly sensitive to noise so make sure to keep it separate from load wiring for other equipment.
4. Consult with IAI if you need longer motor and encoder cables than what comes with the controller.

# 1. Safety Precautions

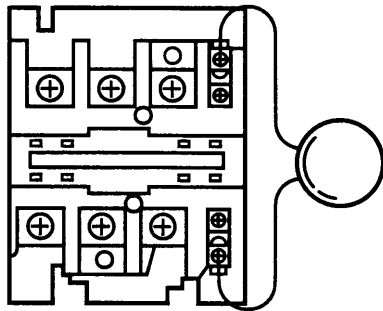
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## (3) Noise Source and Noise Suppression

When using electrical components such as electromagnets, solenoids, or relays which create electromagnetic noise, some type of noise suppression device should be used.

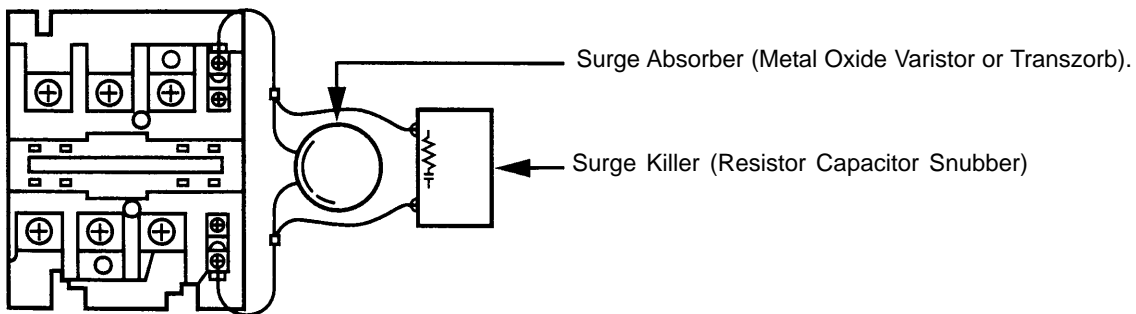
### 1. AC solenoid valve · magnetic switch · relay

- Install a surge absorber parallel to the reactance load (solenoid and relay coils).



**\*Note\*** Use the shortest possible wiring between the surge absorber and the noise-creating device. Use of excessively long wiring will decrease the performance of the surge absorber.

- The most effective method is to install a surge absorber and surge killer in parallel to the reactance load (solenoid and relay coils). This will reduce noise in a wide band of frequencies.



# 1. Safety Precautions

## 2. DC solenoid valve · magnetic switch · relay

- Install a diode parallel with a reactive/inductive load.

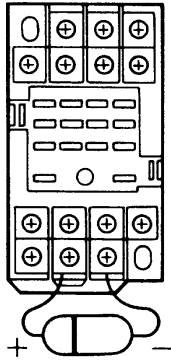


Figure 1-4-3

- Select a diode with the proper voltage rating. The voltage rating is determined by the loading capacity of the system.
- When installing the diode, pay careful attention to the polarity of the diode. A diode installed in reverse polarity could damage your IA System's internal circuitry.

## 1-5 Heat Dissipation and Mounting

The size of the controller panel, controller position and cooling method should all be designed so that the controller boundary temperature remains under 40°C. As the diagram below shows, mount vertically (wall mounting). Since cooling is done according to natural convection, always mount in vertical direction. Furthermore, as shown in Figure 1-5-2, make sure to leave more than 50mm of space above and below the controller so that enough natural convection may be attained. When mounting with several controllers lined up, also mount an agitator fan above the controllers in order to maintain ambient temperature. In addition, the spacing between the controller front side and wall (cover) should be more than 95mm, as shown in Figure 1-5-3.

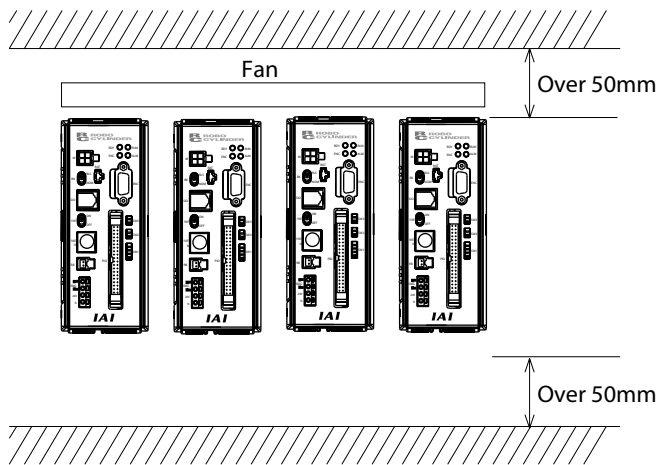


Figure 1-5-2

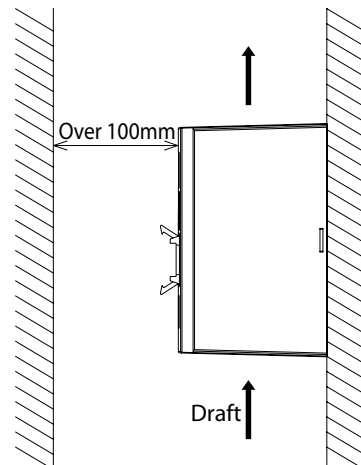


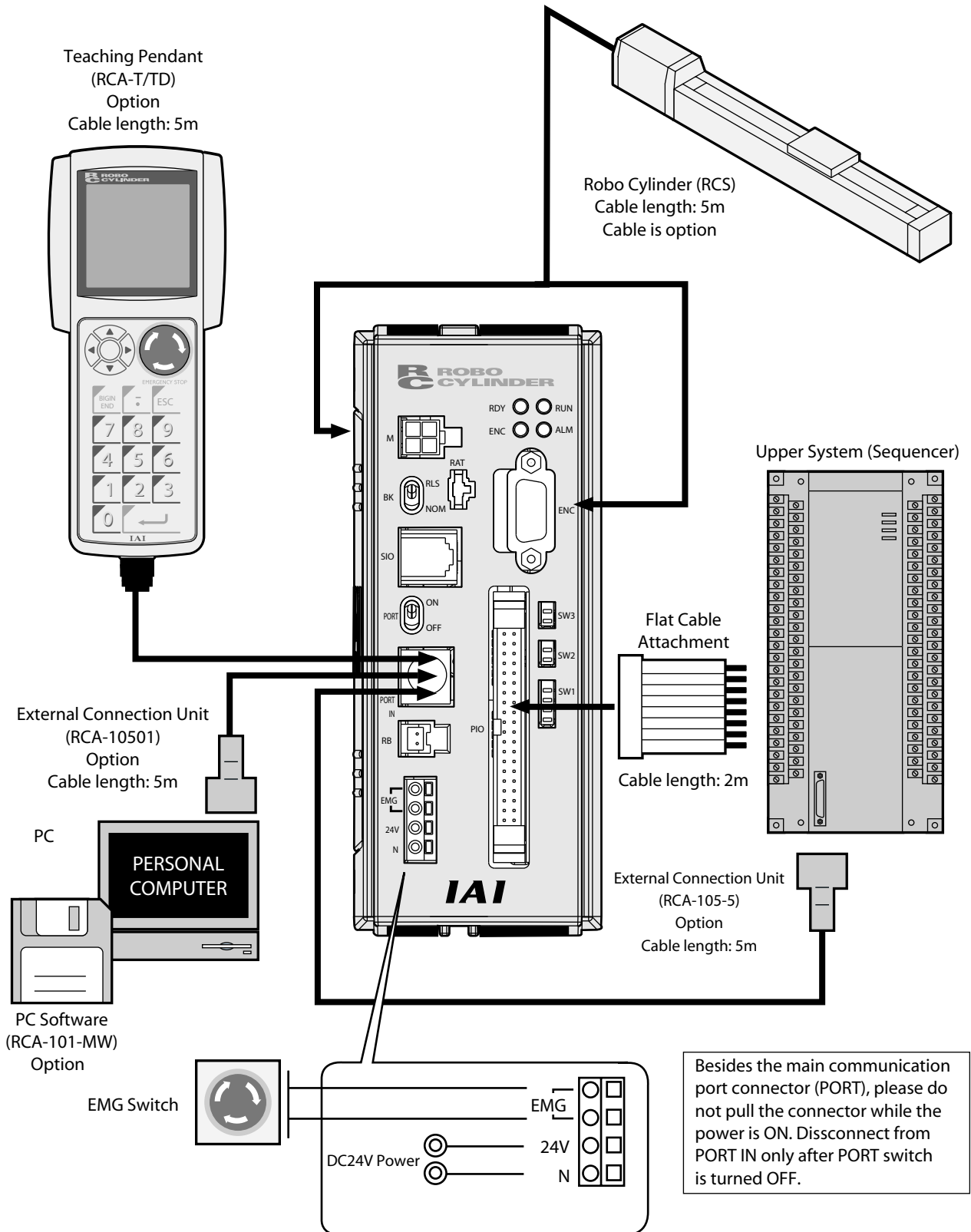
Figure 1-5-3

As for the spacing in between the controllers, whether or not it's a single controller or multiple controllers, please leave enough space so that controller mounting and removal may be done easily.

# 2. 24V Type Specifications

## 2-1 Connection Method

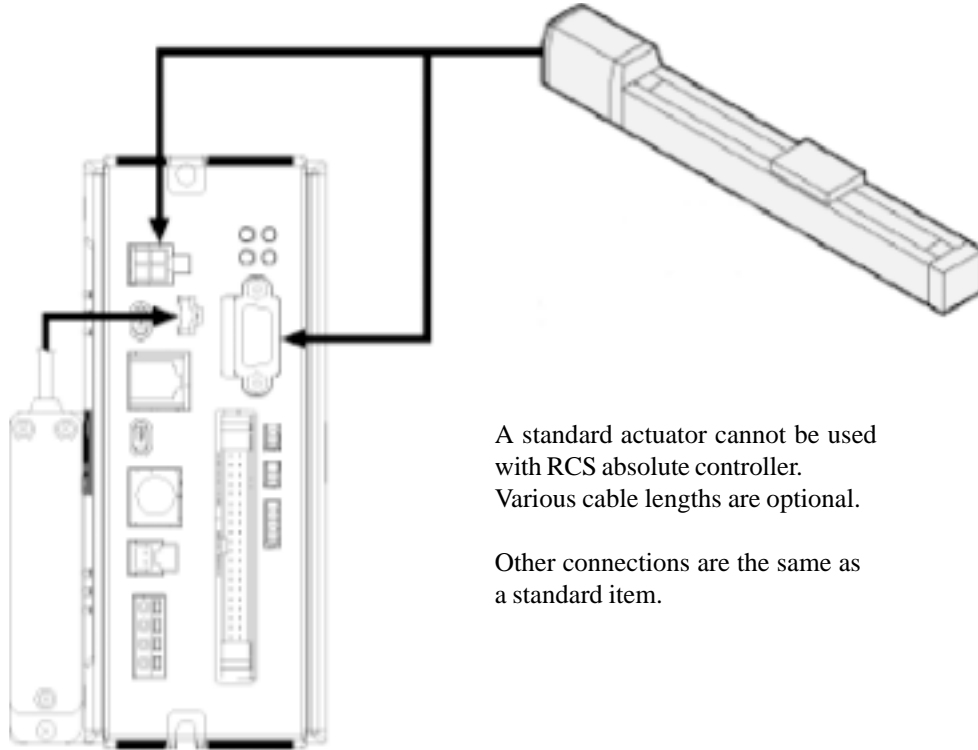
### 2-1-1 Standard Item



## 2. 24V Type Specifications

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### 2-1-2 Absolute Specifications



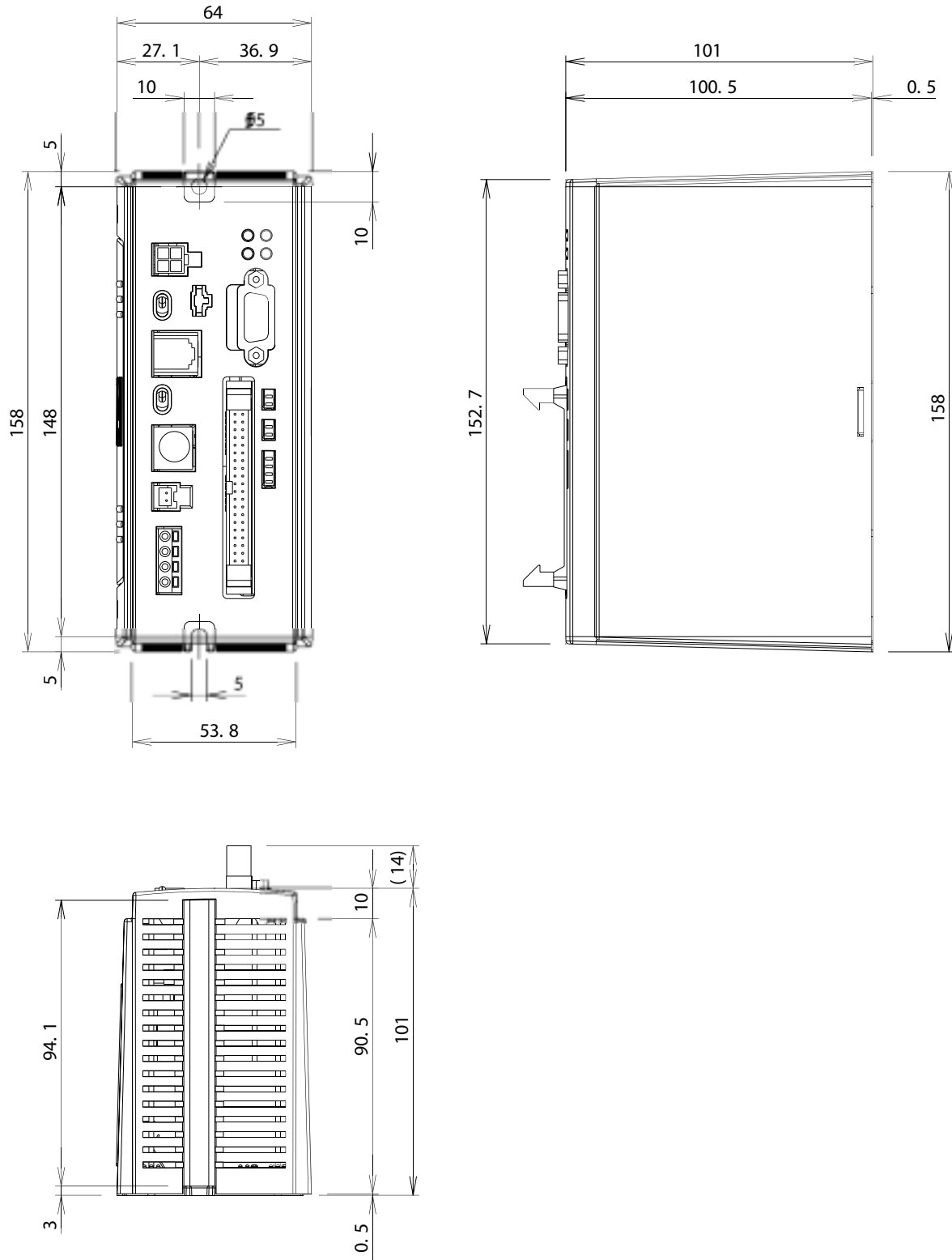
A standard actuator cannot be used with RCS absolute controller. Various cable lengths are optional.

Other connections are the same as a standard item.

## 2. 24V Type Specifications

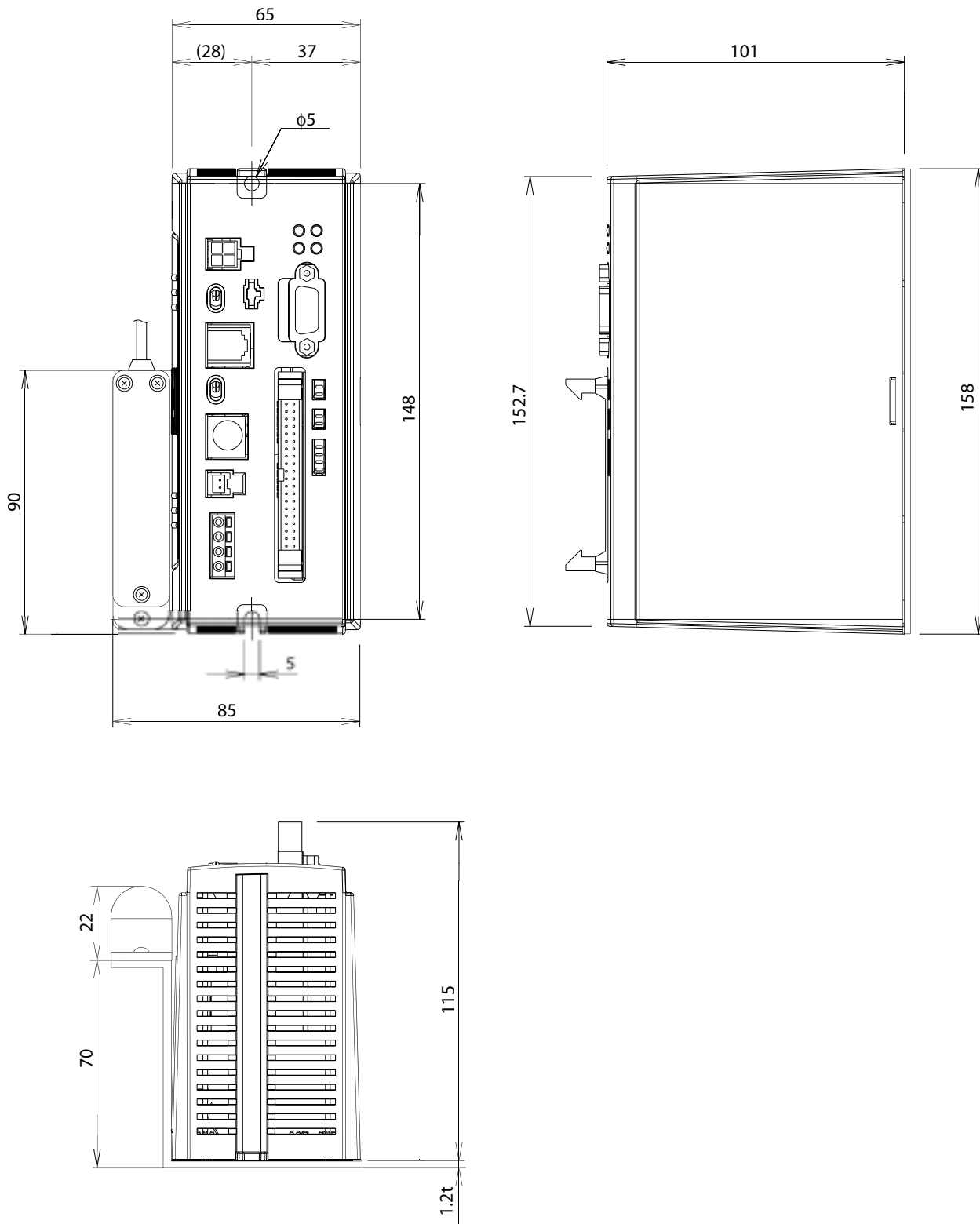
### 2-2 External Dimensional Diagram

#### 2-2-1 Controller Outer Shape (Standard)



## 2. 24V Type Specifications

### 2-2-2 Absolute Specifications



## 2. 24V Type Specifications

### 2-3 Controller Specifications

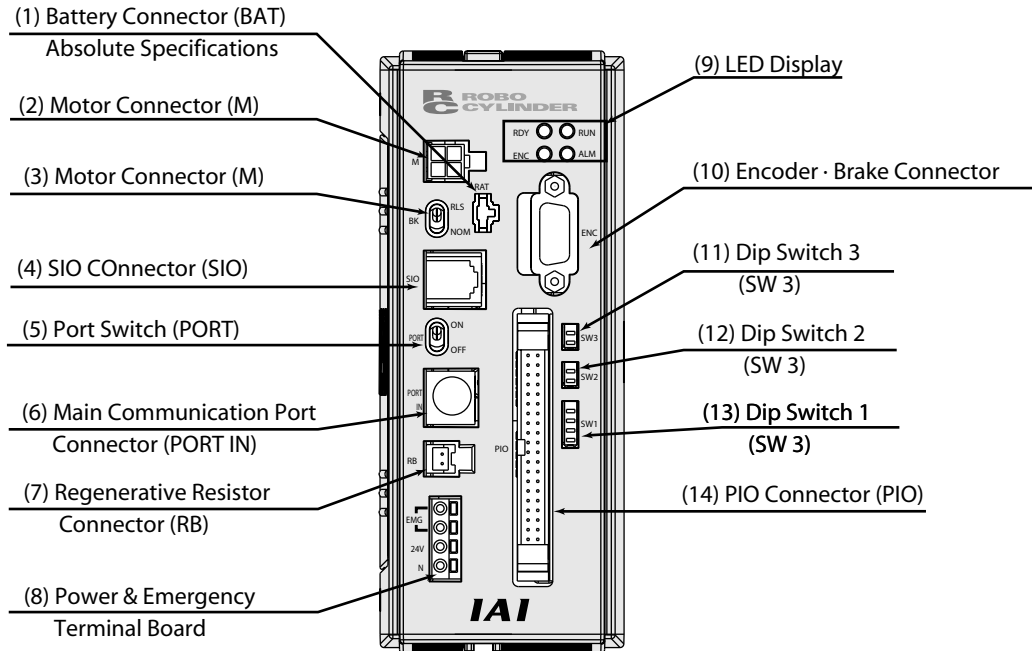
| Column                         |                             | Specifications  |
|--------------------------------|-----------------------------|---|
| Type                           |                             | 24V Type  |
| Power Voltage                  |                             | DC24V±10%   |
| Power Current/Capacity         |                             | 3A (during 60W rated) / 7.3A (60W peak)   |
| Maximum Motor Output           |                             | 60W (Torque limit double) Others (triple)   |
| Ambient Temperature • Humidity |                             | Temperature 0°C~40°C Humidity less than 85%RH   |
| Ambient Environment            |                             | IP10 No corrosive gas   |
| Weight                         |                             | 540g  |
| Protective Function            |                             | Circuit voltage abnormality, motor excessive current, power stage abnormal heat, encoder abnormality, motor excessive load, excessive speed |
| LED Display                    |                             | RDY (ready) RUN ALM (alarm) ENC (Encoder abnormality)   |
| D/DIO Interface                |                             | DC24V insulate  |
| I/O                            | Exclusive Input<br>8 port   | Start, command position number (4 bit binary), hold, reset, servo ON  |
|                                | Exclusive Output<br>10 port | Complete position number (4 bit binary)<br>positioning complete, homing complete,<br>zone, alarm, emergency stop, moving                    |
|                                |                             | Serial interface I/O  |
| Number of Positions            |                             | 16  |
| Data Input Method              |                             | Teaching Pendant  |
| Memory Capacity                |                             | EEPROM 8K byte S-RAM 128K byte  |

**Caution: Applying voltage over the specifications to the I/O Port will lead to a breakdown.**

## 2. 24V Type Specifications

### 2-4 Names of Parts and Functions

#### 2-4-1 Names



#### 2-4-2 Functions

- (1) Battery Connector**  
This is the connector for the absolute data backup battery (absolute specifications).
- (2) Motor Connector (M)**  
This is the connector for the motor power cable of the actuator.
- (3) Brake Release Switch (M)**  
RLS: Release position turns the brake OFF.  
NOM: Normal position makes the brake active.
- (4) SIO Connector (SIO)**  
This is the connector for the serial controller link cable connection.

## 2. 24V Type Specifications

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### (5) Port Swith (PORT)

- ON: PORT IN Port (Teaching Pendant • PC Software) will be activated. However, in case of exclusive teaching pendant and exclusive non-connection, emergency stop status will occur.
- OFF: PORT IN Port (Teaching Pendant • PC Software) will be deactivated  
(Since RS 485 line is hot, communication between the controllers will be possible).

### (6) Main Communication Port Connector (PORT IN)

This is the connector for the teaching pendant or external device communication cable. This is also the connector for the controller link cable for connection with another controller (axis).

### (7) Circuit Resistor Connector (RB)

This is the connector for connecting circuit discharge resistor.

### (8) Power and Emergency Terminal Board

- N: This is the ground side for 24V power.
- 24V: This is the DC24V Power terminal.
- EMG: Both of the two terminals are terminals for emergency stop switch connection.

### (9) LED Display

- RDY: This indicates that the CPU is in normal operation.
- RUN: This indicates normal operation.
- ENC: This will turn ON when voltage drops for the battery used in absolute data backup.
- ALM: Turns On during alarm eruption and during emergency stop.

### (10) Encoder • Brake Connector (ENC)

This is the connector for encoder • Brake power cable.

### (11) Dip Switch 3

This is the interchange switch for encoder voltage. This is used when voltage drop must be considered for special cable application. Interchange assembly of 1 and 2 will change the encoder voltage as follows:

| 1   | 2   | Encoder Voltage | Applicable Cable length |
|-----|-----|-----------------|-------------------------|
| OFF | OFF | 5.25            | 1~5m                    |
| ON  | OFF | 5.55V           | 5~10m                   |
| OFF | ON  | 5.86V           | 10~15m                  |

### (12) Dip Switch 2

- 1: Clears ABS-CLR and absolute encoder data. This is used when resetting the absolute: Normally OFF
- 2: FWR, Light Protect Switch. This is the used during remote-UP.

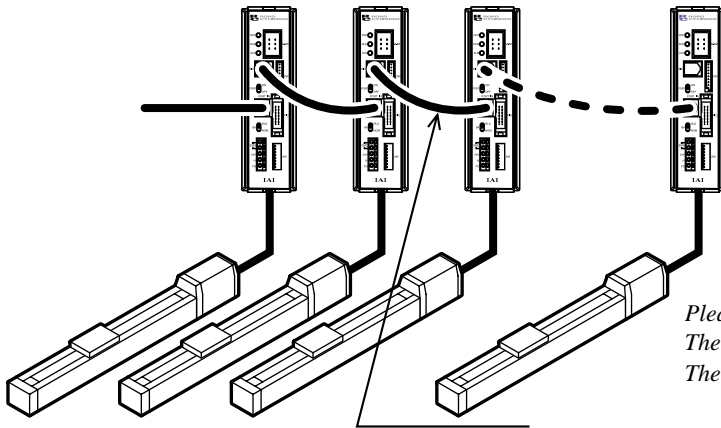
### (13) Dip Switch 1 (SW1)

Dip Switch 1~4: Axis number setting switch

When connecting more than 2 axes onto the SIO Connector, serial reorganization occurs when setting the actuator axis number. You may set up to 0~15 axes (at the time of shipment, numbers 1~4 are all set as OFF. This application is for single axis unit). For every controller, please set the dip switch and set the desired axis number. As for the number, make sure that the same number does not fit into multiple controller.

## 2. 24V Type Specifications

| Axis Number | Dip Switch Number |     |     |     |
|-------------|-------------------|-----|-----|-----|
|             | 1                 | 2   | 3   | 4   |
| 0           | OFF               | OFF | OFF | OFF |
| 1           | ON                | OFF | OFF | OFF |
| 2           | OFF               | ON  | OFF | OFF |
| 3           | ON                | ON  | OFF | OFF |
| 4           | OFF               | OFF | ON  | OFF |
| 5           | ON                | OFF | ON  | OFF |
| 6           | OFF               | ON  | ON  | OFF |
| 7           | ON                | ON  | ON  | OFF |
| 8           | OFF               | OFF | OFF | ON  |
| 9           | ON                | OFF | OFF | ON  |
| 10          | OFF               | ON  | OFF | ON  |
| 11          | ON                | ON  | OFF | ON  |
| 12          | OFF               | OFF | ON  | ON  |
| 13          | ON                | OFF | ON  | ON  |
| 14          | OFF               | ON  | ON  | ON  |
| 15          | ON                | ON  | ON  | ON  |



*Please note:  
The controller link cable length is 200mm.  
The controller can connect up to a maximum of 16 units.*

*In case of number of axes greater than 1, the emergency stop of the teaching pendant will only effect the controller axis connected to the teaching pendant.*

### (14) PIO Connector (PIO)

This is the connector for PIO cable connection.

## 2. 24V Specifications

### 2-4-3 Main Communications

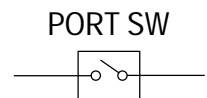
SIO Connector Pin Assignment

| PIN No. | Signal Name | Functions                                     |
|---------|-------------|---|
| 1       | +5V         | DC 5V Power Output or Reserve Signal Terminal |
| 2       | SGA         | Line transceiver I/O positive logic side      |
| 3       | GND         | Ground for communication                      |
| 4       | SGB         | Line Transceiver I/O Negative Logic Side      |
| 5       | GND         | Ground for communication                      |
| 6       | +5V         | DC5V Power Output                             |

Main Communication Port Pin Assign

| PIN No. | Signal Name | Functions             |
|---------|-------------|-----------------------|
| 1       | SGA         | Serial Communication  |
| 2       | SGB         | Serial Communication  |
| 3       | 5V          | 5V Power Output       |
| 4       | EMGS        | Emergency Stop Status |
| 5       | EMGA        | *Note 1               |
| 6       | 24V         | 24V Power Output      |
| 7       | GND         | Ground                |
| 8       | EMGB        | *Note 1               |

\*Note 1: This is used as an emergency stop (B contact).  
When disconnecting the emergency stop, please short-circuit.



### 2-4-4 Specifications for Each Connector Pins and Terminal Board

Motor / Brake Connector (178303-5: AMP)

| Pin No. | Signal Name | Connection Line |
|---------|-------------|-----------------|
| 1       | U           | Motor U Phase   |
| 2       | V           | Motor V Phase   |
| 3       | W           | Motor W Phase   |
| 4       | (NC)        |                 |

## 2. 24V Specifications

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Encoder · Brake Connector (D-Sub DE-15 Type)

| Pin No. | Signal Name | Connecting Line |
|---------|-------------|-----------------|
| 1       | EN A+       | Encoder A+      |
| 2       | EN A-       | Encoder A-      |
| 3       | EN B+       | Encoder B+      |
| 4       | EN B-       | Encoder B-      |
| 5       | EN Z+       | Encoder Z+      |
| 6       | EN Z-       | Encoder Z-      |
| 7       | SD+         | Encoder SD+     |
| 8       | SD-         | Encoder SD-     |
| 9       | BAT+        | (Battery +)     |
| 10      | GND         | (Battery -)     |
| 11      | EN 5        | Encoder 5V+     |
| 12      | EN GND      | Encoder COM-    |
| 13      | BK N        | Brake -         |
| 14      | BK P        | Brake +         |
| 15      | FG          | Shield          |

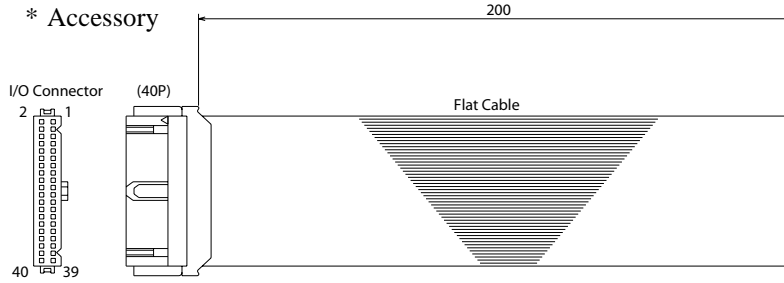
Power and Emergency Stop Terminal Block

| Pin No. | Signal Name | Connecting line  |
|---------|-------------|--|
| 1       | N (OV)      | 24V Power ground   |
| 2       | 24V         | 24V Power plus side  |
| 3       | EMG (24V)   | Emergency stop switch<br>(shorted at the time of shipment) |
| 4       | EMG         |  |

*\*Note: Number 3 and number 4 are connected internally.*

# 2. 24V Specifications

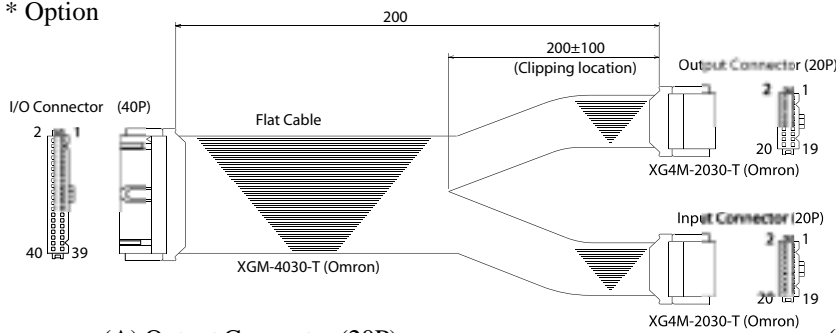
## 2-4-5 I/O Flat Cable



I/O Connector (40P)

| No. | Signal Name     | Color      | No. | Signal Name          | Color      | No. | Signal Name | Color      | No. | Signal Name        | Color      |
|-----|-----------------|------------|-----|----------------------|------------|-----|-------------|------------|-----|--------------------|------------|
| 1   | COM-0A          | Brown - 1  | 11  | NC                   | Brown - 2  | 21  | COM-1A      | Brown - 3  | 31  | NC                 | Brown - 4  |
| 2   | COM-0A          | Red - 1    | 12  | Positioning Complete | Red - 2    | 22  | COM-1A      | Red - 3    | 32  | Start              | Red - 4    |
| 3   | COM-0B          | Orange - 1 | 13  | OUT-11               | Orange - 2 | 23  | COM-1B      | Orange - 3 | 33  | NC                 | Orange - 4 |
| 4   | COM-0B          | Yellow - 1 | 14  | Complete position 8  | Yellow - 2 | 24  | COM-1B      | Yellow - 3 | 34  | Command position 8 | Yellow - 4 |
| 5   | NC              | Green - 1  | 15  | NC                   | Green - 2  | 25  | NC          | Green - 3  | 35  | NC                 | Green - 4  |
| 6   | *Alarm          | Blue - 1   | 16  | Complete position 4  | Blue - 2   | 26  | *Hold       | Blue - 3   | 36  | Command position 4 | Blue - 4   |
| 7   | NC              | Purple - 1 | 17  | Moving               | Purple - 2 | 27  | NC          | Purple - 3 | 37  | NC                 | Purple - 4 |
| 8   | Zone            | Grey - 1   | 18  | Complete position 2  | Grey - 2   | 28  | Servo ON    | Grey - 3   | 38  | Command position 2 | Grey - 4   |
| 9   | NC              | White - 1  | 19  | * Emergency stop     | White - 2  | 29  | NC          | White - 3  | 39  | NC                 | White - 4  |
| 10  | Homing Complete | Black - 1  | 20  | Complete position 1  | Black - 2  | 30  | Reset       | Black - 3  | 40  | Command position 1 | Black - 4  |

\* Option



(A) Output Conenctor (20P)

(B) Input Conenctor (20P)

| No. | Signal Name     | Color      | No. | Signal Name          | Color      |
|-----|-----------------|------------|-----|----------------------|------------|
| 1   | COM-0A          | Brown - 1  | 11  | NC                   | Brown - 2  |
| 2   | COM-0A          | Red - 1    | 12  | Positioning Complete | Red - 2    |
| 3   | COM-0B          | Orange - 1 | 13  | OUT-11               | Orange - 2 |
| 4   | COM-0B          | Yellow - 1 | 14  | Complete position 8  | Yellow - 2 |
| 5   | NC              | Green - 1  | 15  | NC                   | Green - 2  |
| 6   | *Alarm          | Blue - 1   | 16  | Complete position 4  | Blue - 2   |
| 7   | NC              | Purple - 1 | 17  | Moving               | Purple - 2 |
| 8   | Zone            | Grey - 1   | 18  | Complete position 2  | Grey - 2   |
| 9   | NC              | White - 1  | 19  | * Emergency stop     | White - 2  |
| 10  | Homing Complete | Black - 1  | 20  | Complete position 1  | Black - 2  |

| No. | Signal Name | Color      | No. | Signal Name        | Color      |
|-----|-------------|------------|-----|--------------------|------------|
| 21  | COM-1A      | Brown - 1  | 31  | NC                 | Brown - 2  |
| 22  | COM-1A      | Red - 1    | 32  | Start              | Red - 2    |
| 23  | COM-1B      | Orange - 1 | 33  | NC                 | Orange - 2 |
| 24  | COM-1B      | Yellow - 1 | 34  | Command position 8 | Yellow - 2 |
| 25  | NC          | Green - 1  | 35  | NC                 | Green - 2  |
| 26  | *Hold       | Blue - 1   | 36  | Command position 4 | Blue - 2   |
| 27  | NC          | Purple - 1 | 37  | NC                 | Purple - 2 |
| 28  | Servo ON    | Grey - 1   | 38  | Command position 2 | Grey - 2   |
| 29  | NC          | White - 1  | 39  | NC                 | White - 2  |
| 30  | Reset       | Black - 1  | 40  | Command position 1 | Black - 2  |

\* I/O Connector (40P) is the same as the above accessory diagram

## 2. 24V Specifications

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### 2-4-6 Battery Backup (Absolute Specifications)

#### (1) Battery Specifications

| Column                  | Content   |
|-------------------------|---|
| Type                    | Lithium Battery   |
| Manufacturer            | Toshiba Denchi  |
| Model                   | ER3VP   |
| Nominal Voltage         | 3.6V  |
| Rated Capacity          | 1000mAh   |
| Weight                  | Approximately 8.5g  |
| Battery Sustain Time *1 | Approximately 1000 hours (when ambient temperature is 20°C) |

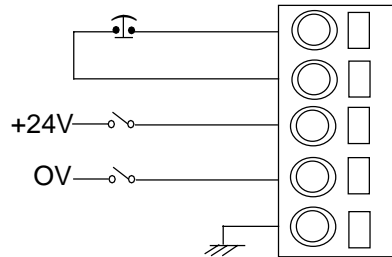
Note 1) The consumed current during absolute data backup is approximately 100 $\mu$ A (approximately 4 $\mu$ A when controller main power is ON).

- \* To avoid breakdown, do not attempt to machine or extend the wire.
- \* Please use IAI specified battery only. Battery exchange is between the battery board. It is not an exchange with the battery unit.
- \* When exchanging the battery, you will need to reset the absolute.

## 2. 24V Specifications

### 2-5 Wiring

#### 2-5-1 Wiring for Power • Emergency Stop



Power and emergency stop terminal board

The two EMG terminals are for connecting an emergency stop switch, and is b-contact input. At the time of shipment, a jumper is used to short the two terminals. Do not remove it!

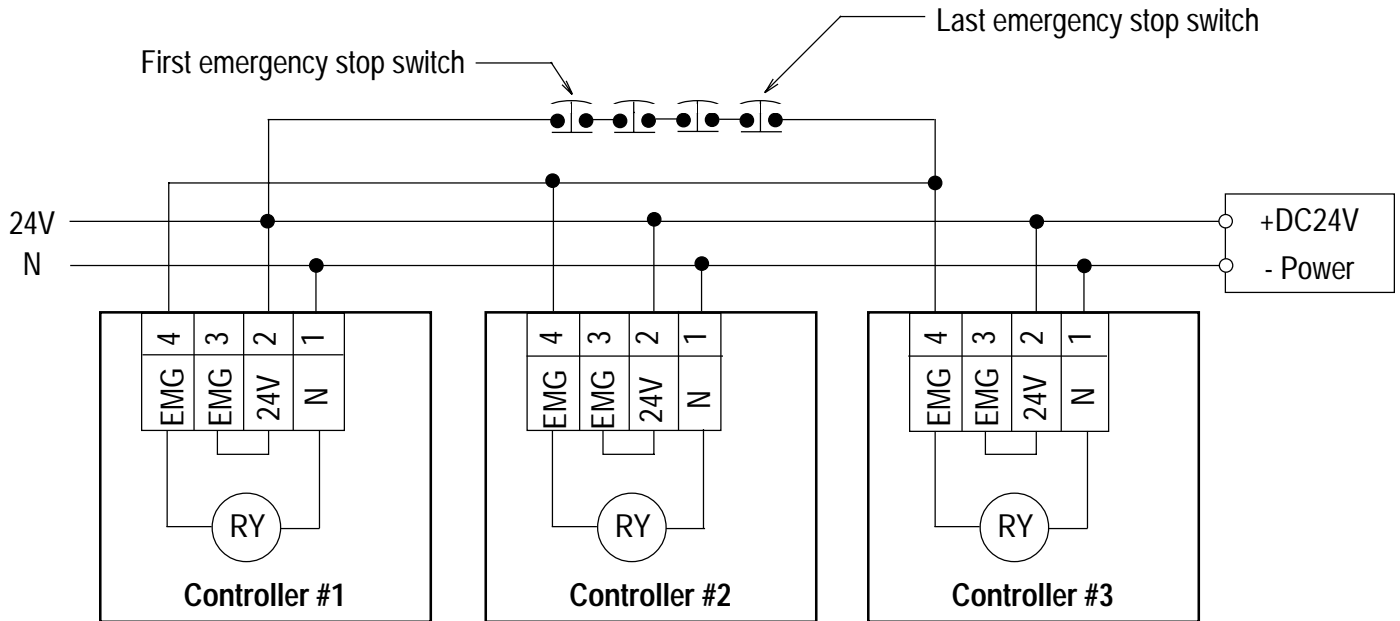
**Caution:** When wiring power on the customer site, please make sure that the following specifications are met.

|                                       |   |  |
|---------------------------------------|---|--|
| Applicable conduit                    | Single line   | $\phi 1.0$ (AWG18)<br>1.75mm <sup>2</sup> (AWG18)        |
| Specifications possible conduit range | Single line   | $\phi 0.4$ (AWG26) ~ $\phi 1.2$ (AWG16)                  |
|                                       | Stranded line   | 0.3mm <sup>2</sup> (AWG22) ~ 1.25mm <sup>2</sup> (AWG16) |
|                                       | Strand diameter   | Over $\phi 0.18$ mm                                      |
| Standard type line length             | 11mm  |  |
| Applicable tool for button operation  | Minus Driver (axis diameter $\phi 3$ , blade point width 2.6) |  |

**Caution:** This controller does not have a power switch.

## 2. 24V Specifications

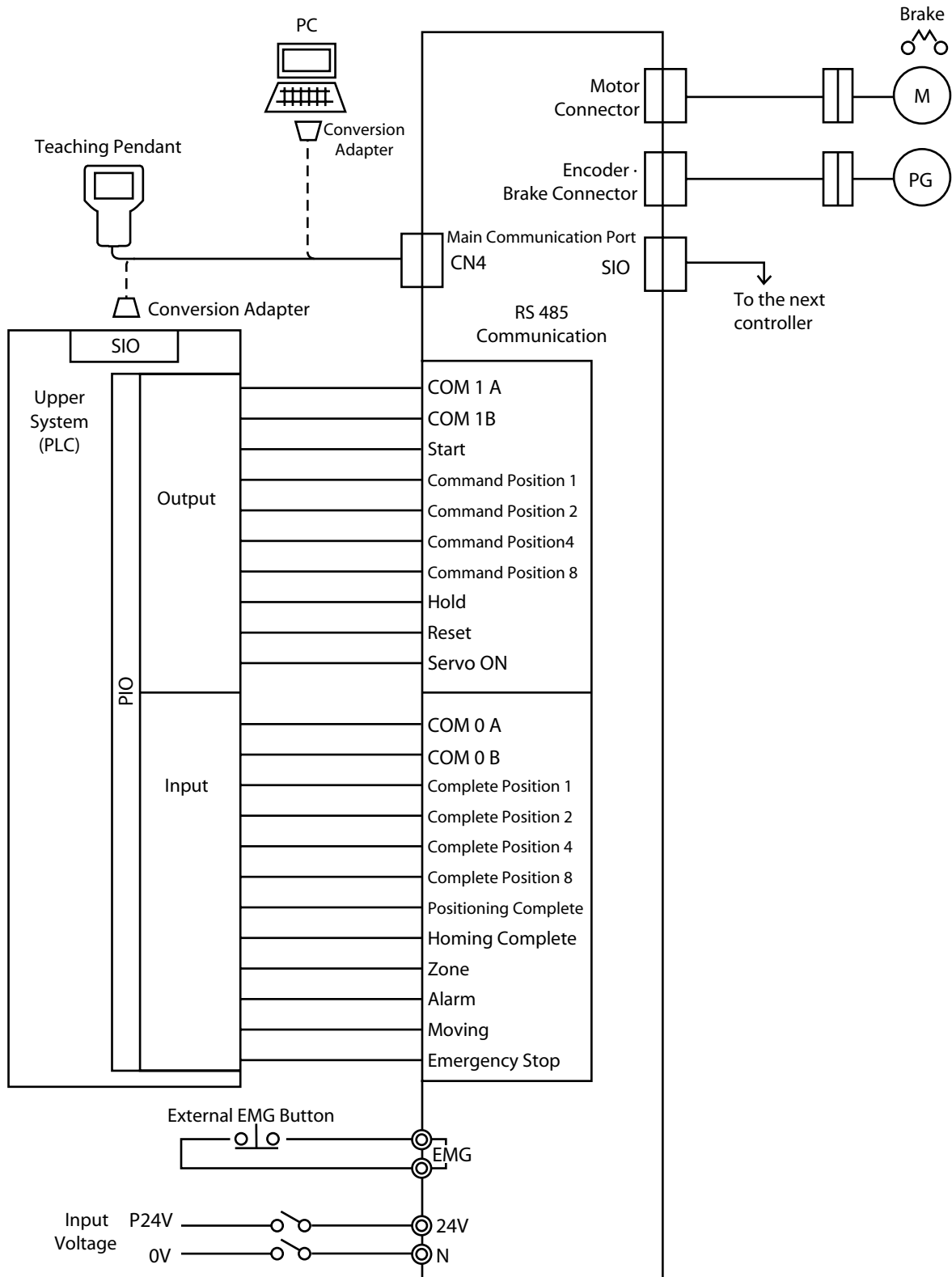
### 2-5-2 Wiring Method for Connecting Multiple E-Stop Switches onto Multiple Controllers



- As for the last emergency stop switch input, always connect it to the number 5 terminal of each controller.
- Connect number 3 terminal (24V) of each controller onto the first emergency stop switch.

# 2. 24V Specifications

## 2-5-3 External Connection Diagram



## 2. 24V Specifications

### 2-5-4 PIO Interface

PIO Interface list for controllers with NPN I/O is indicated as below:

In addition, the PIO cable is unplugged on the external device side for flat cable specifications.

PIO Connector (26 Pin) NPN

| Pin No. | Section | Reference Number | Signal Name | Cable Color |                 |            |
|---------|---------|------------------|-------------|-------------|-----------------|------------|
| 1       |         | (1)              | COM0A       | Brown - 1   |                 |            |
| 3       |         | (2)              | COM0B       | Orange - 2  |                 |            |
| 5       | Output  |                  | NC          | Green - 1   |                 |            |
| 7       |         |                  |             | Purple - 1  |                 |            |
| 9       |         |                  |             | White - 1   |                 |            |
| 11      |         |                  |             | Brown - 2   |                 |            |
| 13      |         |                  |             | Orange - 2  |                 |            |
| 15      |         |                  |             | Green - 2   |                 |            |
| 17      |         |                  |             | (8)         | In-motion       | Purple - 2 |
| 19      |         |                  |             | (9)         | *Emergency Stop | White - 2  |

| Pin No. | Section | Reference Number | Signal Name | Cable Color          |            |
|---------|---------|------------------|-------------|----------------------|------------|
| 2       |         | (1)              | COM0A       | Red - 1              |            |
| 4       |         | (2)              | COM0B       | Yellow - 1           |            |
| 6       | Output  |                  | (3)         | *Alarm               | Blue - 1   |
| 8       |         |                  | (4)         | Zone                 | Grey - 1   |
| 10      |         |                  | (5)         | Homing Complete      | Black - 1  |
| 12      |         |                  | (6)         | Positioning Complete | Red - 2    |
| 14      |         |                  | (7)         | Command Position 8   | Yellow - 2 |
| 16      |         |                  |             | Command Position 4   | Blue - 2   |
| 18      |         |                  |             | Command Position 2   | Grey - 2   |
| 20      |         |                  |             | Command Position 1   | Black - 2  |

| Pin No. | Section | Reference Number | Signal Name | Cable Color |
|---------|---------|------------------|-------------|-------------|
| 21      |         | (10)             | COM1A       | Brown - 3   |
| 23      |         | (11)             | COM1B       | Orange - 3  |
| 25      | Input   |                  | NC          | Green - 3   |
| 27      |         |                  |             | Purple - 3  |
| 29      |         |                  |             | White - 3   |
| 31      |         |                  |             | Brown - 4   |
| 33      |         |                  |             | Orange - 4  |
| 35      |         |                  |             | Green - 4   |
| 37      |         |                  |             | Purple - 4  |
| 39      |         |                  |             | White - 4   |

| Pin No. | Section | Reference Number | Signal Name | Cable Color        |            |
|---------|---------|------------------|-------------|--------------------|------------|
| 22      |         | (10)             | COM1A       | Red - 3            |            |
| 24      |         | (11)             | COM1B       | Yellow - 3         |            |
| 26      | Input   |                  | (12)        | *Hold              | Blue - 3   |
| 28      |         |                  | (13)        | Servo ON           | Grey - 3   |
| 30      |         |                  | (14)        | Reset              | Black - 3  |
| 32      |         |                  | (15)        | Start              | Red - 4    |
| 34      |         |                  | (16)        | Command Position 8 | Yellow - 4 |
| 36      |         |                  |             | Command Position 4 | Blue - 4   |
| 38      |         |                  |             | Command Position 2 | Grey - 4   |
| 40      |         |                  |             | Command Position 1 | Black - 4  |

**Caution**  
*Ports with \* mark indicate negative logic. Never connect to unused port.*

## 2. 24V Specifications

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(1) COM0A → Power for output

(2) COM0B → Power for output

Connect DC24V for output between COM0A · COM0B. Polarity does not exist between COM0A · COM0B.  
Pin No. 1 and 2, 3 and 4 are connected internally.

(3) Alarm

Turns OFF during an alarm. During normal operation, stays ON. Homing method is done during power reinstallation. Alarm will remain ON in case of excessive work load, and when movement is not possible due to collision with an obstacle. Take sufficient time for time check.

(4) Zone

Outputs within range set in the parameter.

(5) Homing Complete

Upon applying power, turns ON once initial homing completes. Afterwards, as long as alarm does not occur and power does not turn OFF, continues to stay ON. This will not turn OFF simply by emergency stop input. Turning the home complete signal OFF means homing is executed prior to this next movement:

*Caution: With the absolute specifications, once home location is taught, upon applying power, homing complete signal will turn ON. In case home complete signal turns OFF due to an alarm occurrence, you will need to teach the home location again.*

(6) Positioning Complete

Upon applying power, once the operation preparation completes, turns ON. Turns OFF upon start signal input. Turns ON once movement completes. The timing for the positioning complete ON and Complete position output are the same.

(7) Complete Position

Turns OFF simultaneously as timing once positioning complete turns OFF. All will turn OFF during emergency stop or direct teaching. In case operation is possible afterwards, in case the current actuator position is within the positioning range from the last positioning complete position, outputs its complete position. All will remain OFF in case of being outside of the positioning width. In case operation is possible during push mode, in either from emergency stop or direct teach, all will remain OFF regardless of the current position.

(8) In-motion

Turns ON during movement.

This signal is used when you want to detect motor stop during hold.

(9) Emergency Stop

Turns OFF during emergency stop. Turns ON during normal operation. Homes during emergency stop release.

(10) COM 1A → Power for input port (Ground) (NPN)

(11) COM 1B → Power for input port

Connect DC24V power plus side to either Pin No. 21 ~24 (COM1A · COM 1B) (NPN specifications).  
Pin No. 21 and 22, 23 and 24 are connected internally.

(12) Hold

This is a B-contact input. During movement, remains ON. Turn OFF during HOLD.

(13) Servo ON

When this signal is turned ON, Servo is turned ON.

## 2. 24V Specifications

---

(14) Reset

Once signal riser is detected, executes alarm reset. In case alarm source is not resolved, alarm will reoccur even after resetting the alarm (you will need to reapply power to “over current alarm (alarm code: C8).” Cancels remaining movement during hold.

(15) Start

Input for movement start signal.

(16) Command Position

Position select inputs.

This is the relationship between the input pin No. and selected position No. (4 bit binary)

You may input select 16 positions of position 0~position 15.

1 : ON      0 : OFF

|                          |    |                    |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|--------------------------|----|--------------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| PIN<br>No.               | 40 | Command Position 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0  | 1  | 0  | 1  | 0  | 1  |
|                          | 38 | Command Position 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1  | 1  | 0  | 0  | 1  | 1  |
|                          | 36 | Command Position 4 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0  | 0  | 1  | 1  | 1  | 1  |
|                          | 34 | Command Position 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  |
| Selected Position Number |    |                    | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

**Caution:**

**Error may occur when selecting an undefined position number and pressing the Start Input ON.**

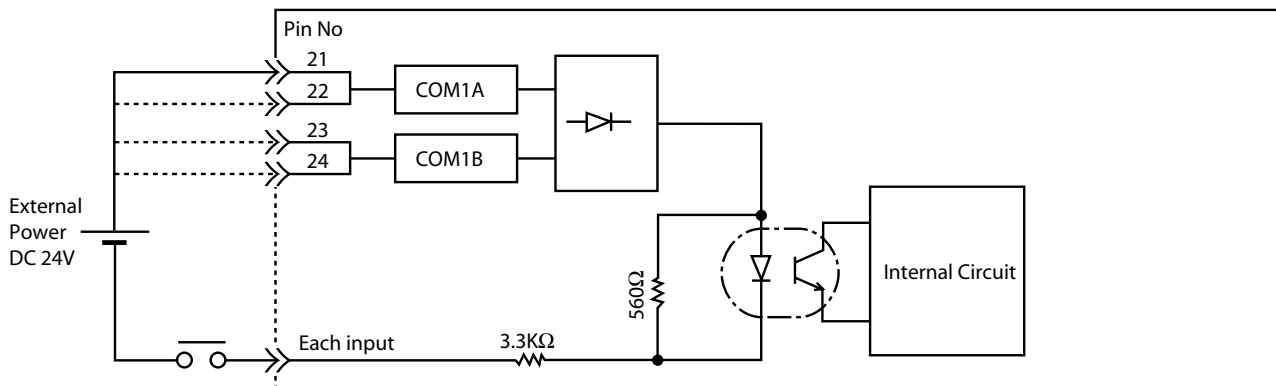
## 2. 24V Specifications

### 2-5-5 24V Type External I/O Specifications

Input Area

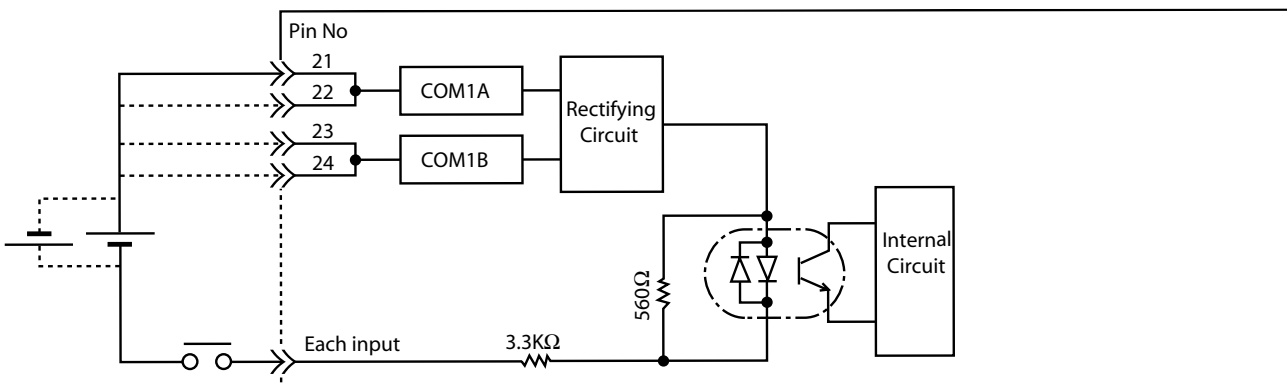
| Column            | Specifications   |
|-------------------|--|
| Number of inputs  | 8 points   |
| Input Voltage     | DC24V $\pm$ 20%  |
| Input Current     | 7mA/1 Circuit  |
| Movement Voltage  | ON Voltage ··· Minimum 16V (4.5mA)<br>OFF Voltage ··· Minimum 6V (1.4mA) |
| Insulation Method | Photo Coupler  |

### Internal Circuit Structure (Standard NPN Specifications)



- Connect plus side of external power to either Pin No. 21~24.
- As for the common side of input, connect to the minus side of the external power.
- Pin No. 21 and 22 of COM 1 A, and Pin No. 23 and 24 of COM 1B are connected internally.

### Internal Circuit Structure (Option PNP Specifications)



- Pin No. 21 and 22 of COM 1 A, and Pin No. 23 and 24 of COM 1B are connected internally.
- Connect the external power (plus or minus) to either one of pins 21~24 of COM1A. Connect opposite polarity of pin numbers 21~24 to the common side of input.

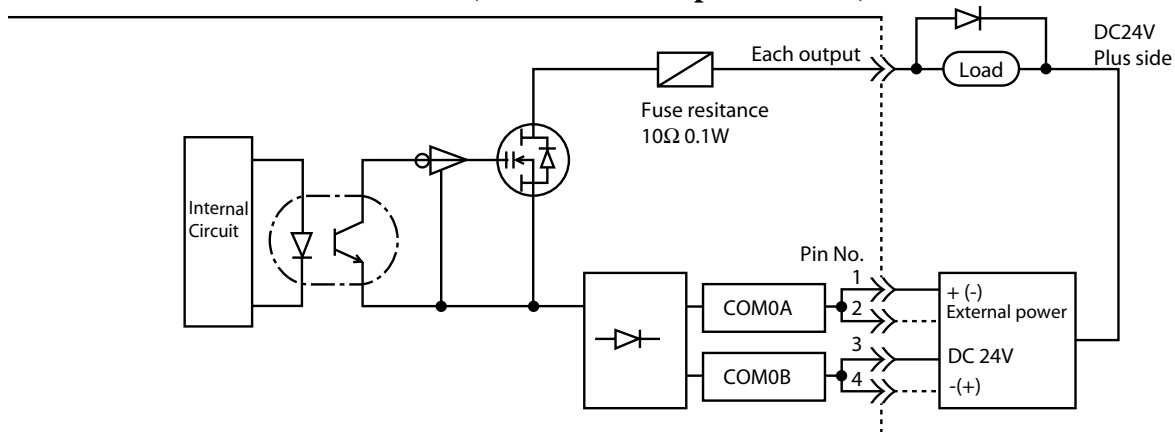
## 2. 24V Specifications

Output Area

100mA output circuit according to Power MOSFET

| Column                 | Specifications                       |
|------------------------|--------------------------------------|
| Number of inputs       | 10 points                            |
| Input Voltage          | DC24V/60V (peak) (No fly hoil diode) |
| Input Current          | 100mA/1 Circuit                      |
| Movement Voltage       | 1.8V/100mA                           |
| Insulation Method      | Photo Coupler                        |
| Overcurrent Protection | Fuse resistance 10Ω 0.1W             |

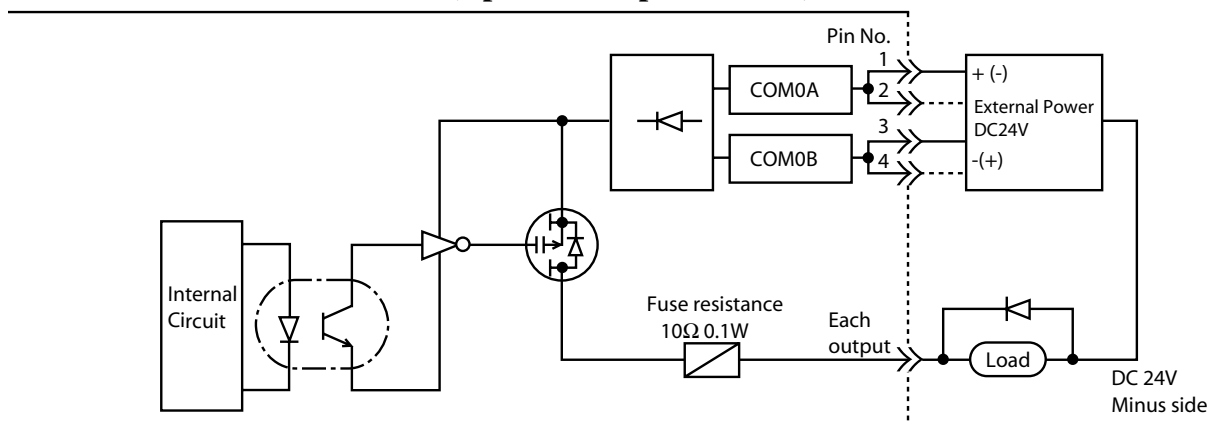
### Internal Circuit Structure (Standard NPN Specifications)



- Add DC24V between COM 0A and COM 0B. Polarity does not exist between COM0A and COM 0 B.
- Pin No. 1 and 2, 3 and 4 are connected internally.

Note 1: As for output circuit, fly wheel diode does not exist in open drain of Power MOSFET. Always execute fly back voltage control compliance using diode on the L load of relay (this is most effective for spike noise prevention when mounting diode to coil in short distance.

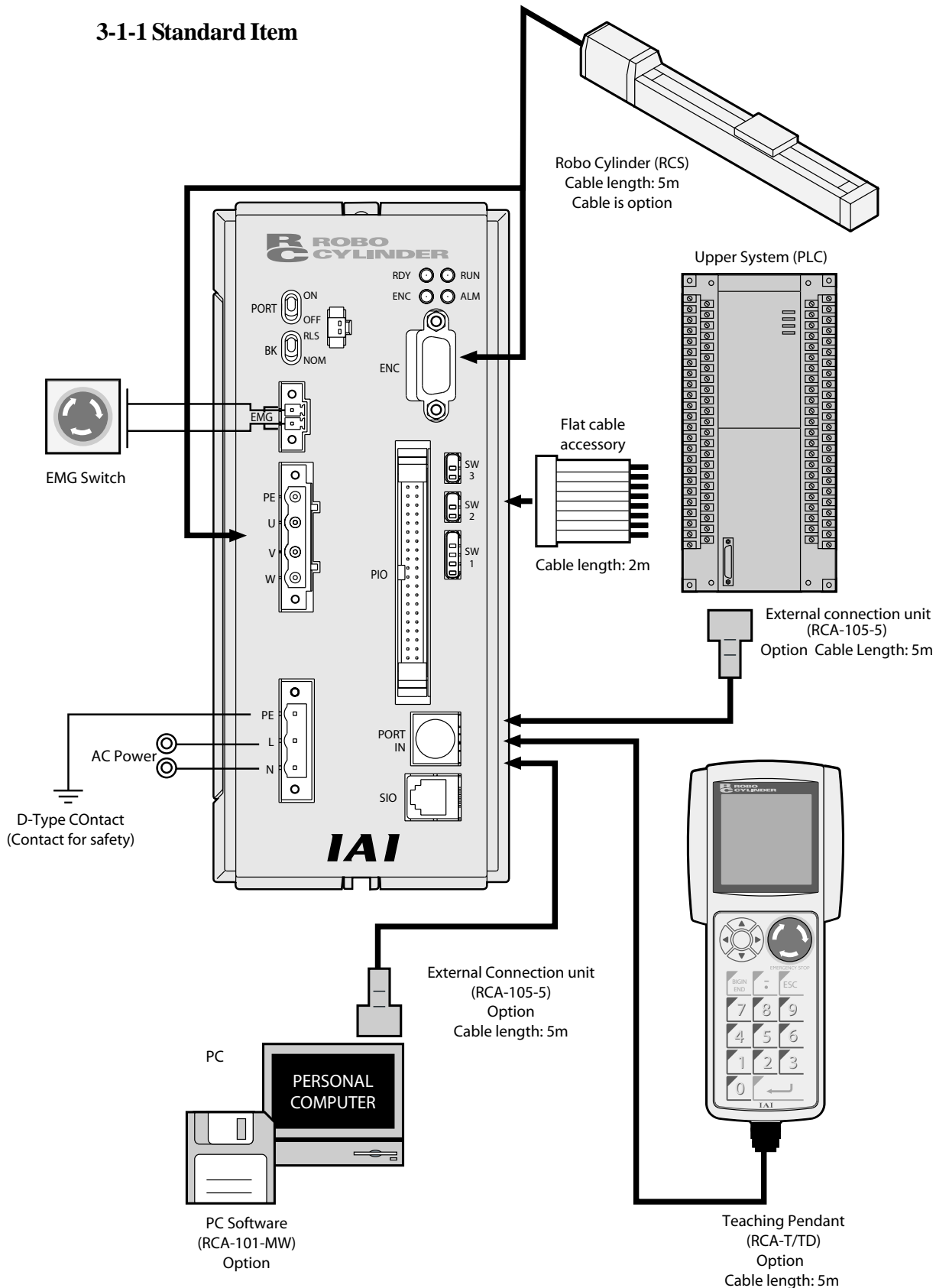
### Internal Circuit Structure (Option PNP Specifications)



# 3. 100/200V Type Specifications

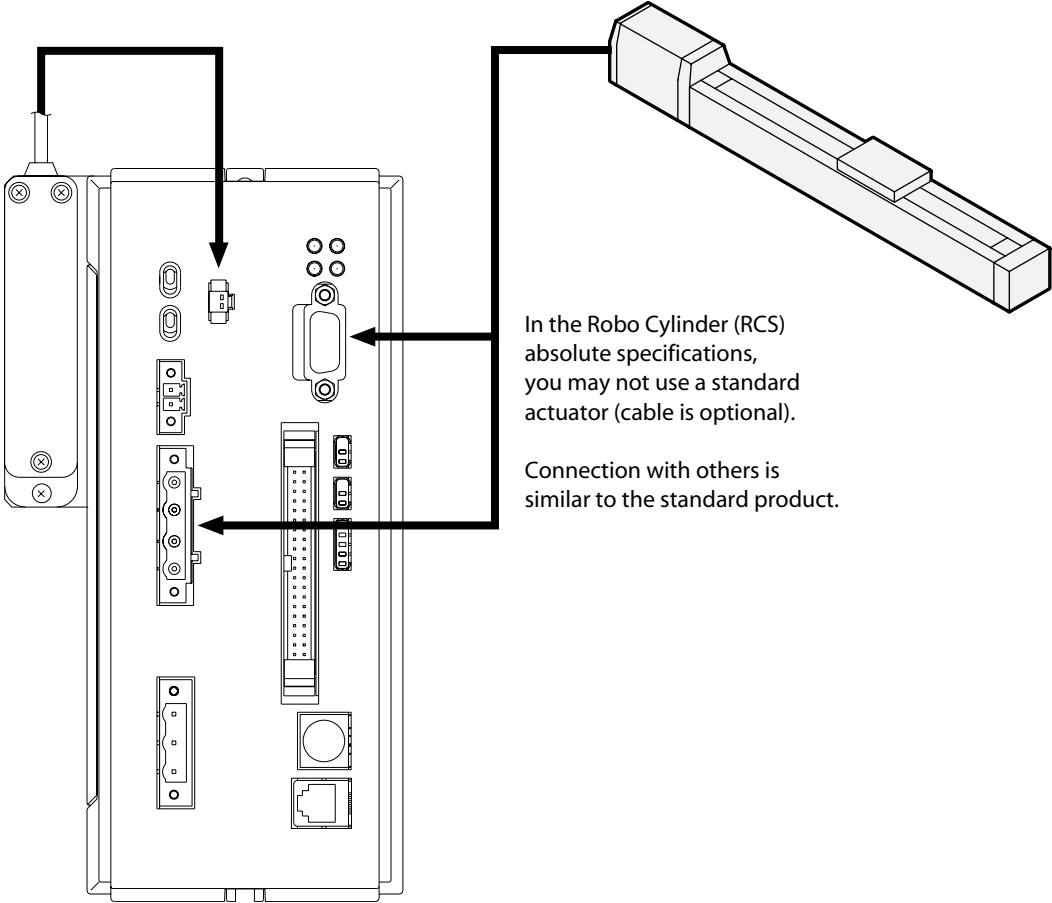
## 3-1 Connection Method

### 3-1-1 Standard Item



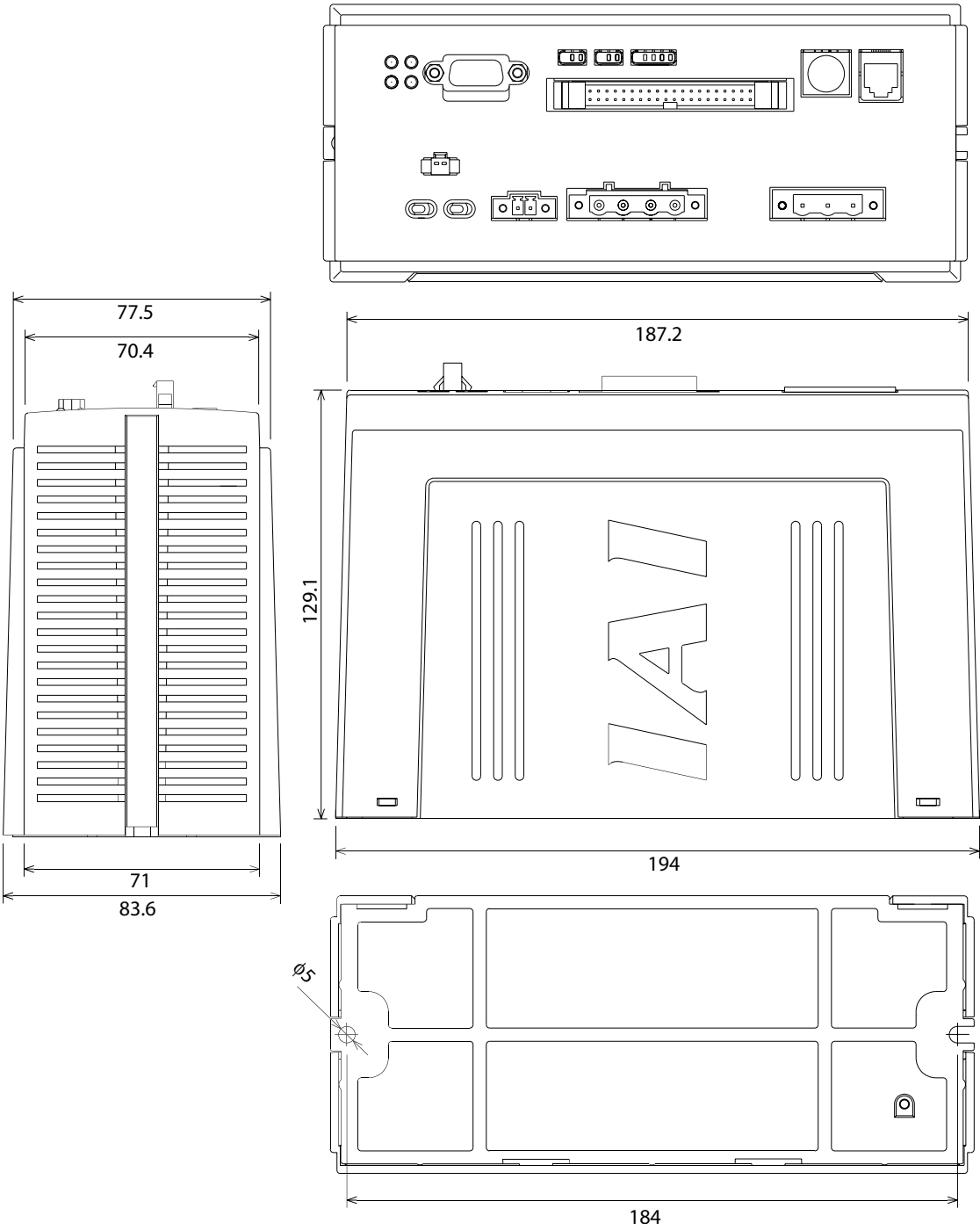
# 3. 100/200V Type Specifications

## 3-2-2 Absolute Specifications



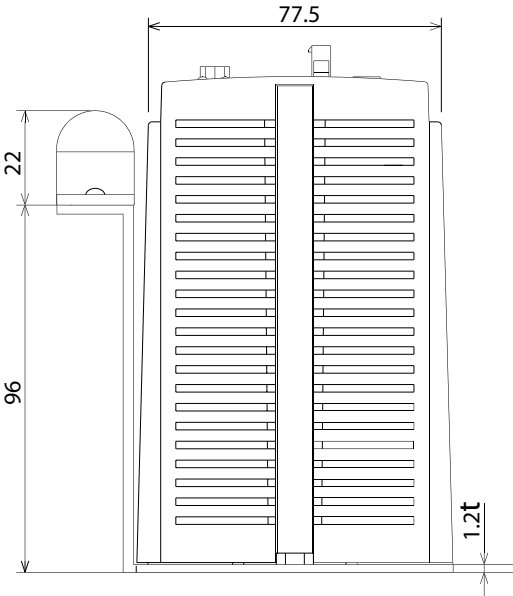
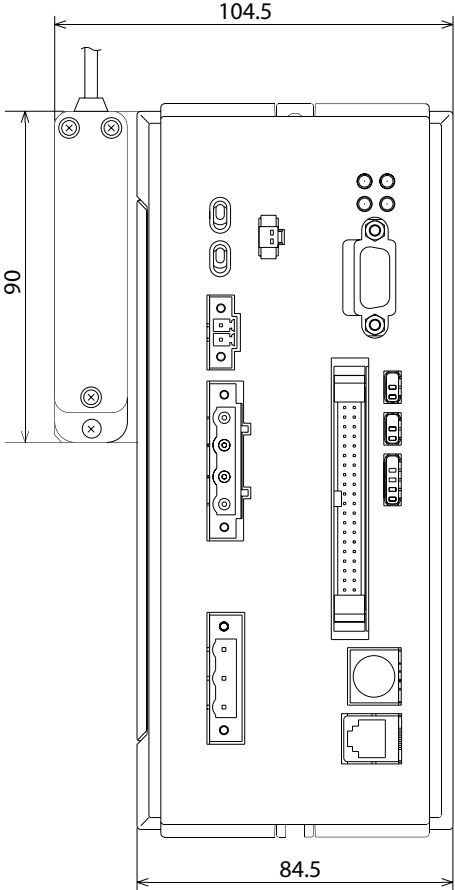
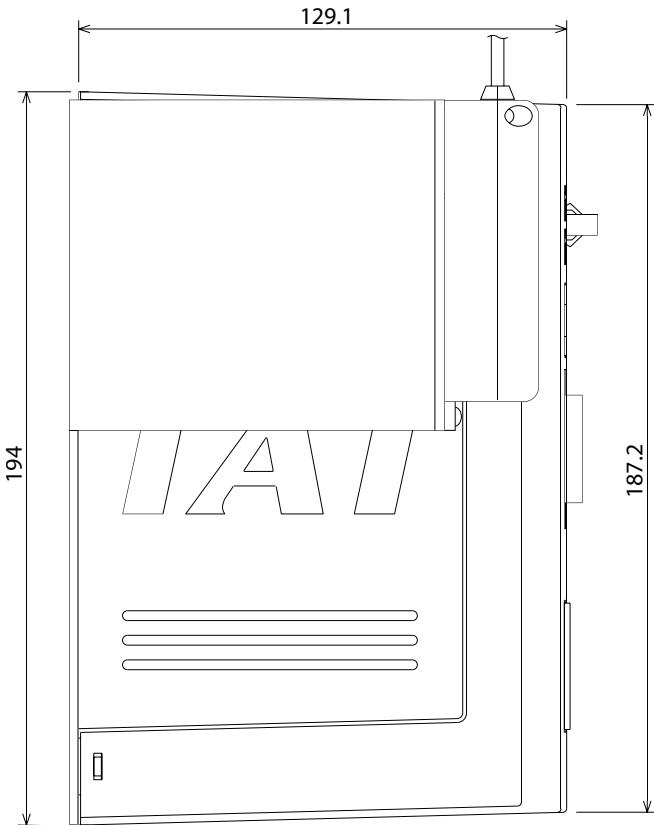
# 3. 100/200V Type Specifications

## 3-2 External Dimensions 3-2-1 Standard Item



# 3. 100/200V Type Specifications

## 3-2-2 Absolute Specifications



### 3. 100/200V Type Specifications

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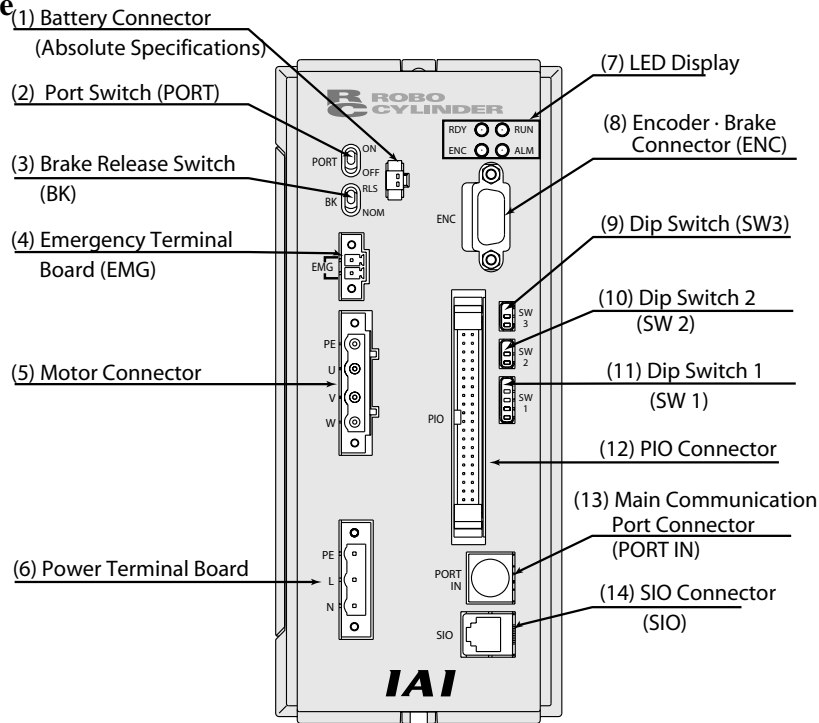
#### 3-3 100/200V Type Controller

| Column                                    |                          | Specifications  |
|---|--------------------------|---|
|   |                          | AC100/200V  |
| Power Voltage                             |                          | AC90~125/180~250V   |
| Power Current/Capacity                    |                          | 200W/330 VA (Rod □ 75During 150W rated)   |
| Maximum motor output                      |                          | 150W (3 times)  |
| Applicable ambient temperature · humidity |                          | Temperature 0°C ~40C Humidity less than 85%   |
| Applicable ambient environment            |                          | IP10 No corrosive gas   |
| Weight                                    |                          | 1320g   |
| Protective Function                       |                          | Circuit Voltage Abnormality, Motor overcurrent, Power stage abnormal excessive heat, Encoder abnormality, Motor Excessive load, Excessive speed |
| LED Display                               |                          | RDY (ready) RUN ALM (alarm) ENC (Encoder abnormality)   |
| DVDIO Interface                           |                          | DC 24V insulation   |
| I/O                                       | Exclusive Input 8 port   | Start, Command position number (4-bit binary), Hold, Reset, Servo ON  |
|   | Exclusive Output 10 port | Complete position number (4-bit binary), Positioning complete, Homing complete, Zone, Alarm, Emergency Stop, Moving                             |
|   |                          | Serial Interface I/O  |
| Number of Positions                       |                          | 16  |
| Data Input Method                         |                          | Teaching Pendant  |
| Memory Capacity                           |                          | EEPROM 8 K Byte S-RAM 128 K Byte  |

# 3. 100/200V Type Specifications

## 3-4 Part Name and Function

### 3-4-1 Name



### 3-4-2 Function

#### (1) Battery Connector

This is the connector for absolute data backup battery (absolute specifications).

#### (2) Port Switch (PORT)

ON: PORT IN Port (Teaching Pendant · PC Software) be activated. However, in case of exclusive non-connection or exclusive teaching pendant, emergency stop status will occur.

OFF: PORT IN Port (Teaching Pendant · PC Software) be deactivated (since RS 485 line is hot, communication between the controllers will be possible).

#### (3) Brake Release Switch (BK) Effective only for brake option.

RLS: Release position turns the brake OFF.

NOM: Normal position makes the brake active.

#### (4) Emergency Stop Terminal Board (EMG)

EMG: Both terminals are terminals for emergency stop switch connection.

#### (5) Motor Connector

This is the connector for motor power cable of the actuator.

#### (6) Power Terminal Board

L · N: This is the AC power connection terminal.

PE: This is the terminal for safety contact.

#### (7) LED

RDY: This indicates that the CPU is in normal operation.

RUN: This indicated normal operation.

ENC: This will turn ON during encoder breakage or when recognition is not possible.

This will turn ON when voltage drops on the absolute data backup.

### 3. 100/200V Type Specifications

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#### (8) Encoder · Brake Connector (ENC)

This is the connector for connecting the motor power cable of the actuator.

#### (9) Dip Switch 3

This is the interchange switch for the encoder voltage. It is used during special cable application when battery voltage letdown must be considered.

By the interchange combination of 1 and 2, the encoder voltage will change as follows:

| 1   | 2   | Encoder Voltage | Applicable Cable Length |
|-----|-----|-----------------|-------------------------|
| OFF | OFF | 5.25V           | 1~5m                    |
| ON  | OFF | 5.55V           | 5~10m                   |
| OFF | ON  | 5.86V           | 10~15m                  |

#### (10) Dip Switch 2

1: Clear ABS-CLR, Absolute Encoder Data. This is used in resetting the absolute: Normally OFF.

2: This is the FWP, Light protect switch. This is used during remote update: Normally OFF.

#### (11) Dip Switch (SW 1)

Number 1~4 ··· Axis setting of axis number:

When connecting more than 2 axes onto the SIO connector, serial reorganization occurs when setting the actuator axis number. You may set up to 0~15 axes (at the time of shipment, numbers 1~4 are all set as OFF. This application is for 1 axis, single unit).

#### (12) PIO Connector (PIO)

This is the connector for Parallel IO connection.

#### (13) Main Communication Port Connector (PORT IN)

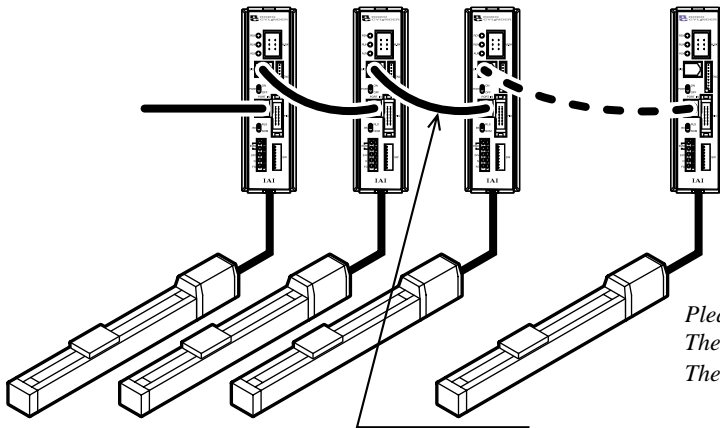
This is the connector for either exclusive teaching pendant or for external device communication cable.

#### (14) SIO Connector (SIO)

This is the connector for the connecting cable to connect more than 2 controllers between the controllers.

### 3. 100/200V Type Specifications

| Axis Number | Dip Switch Number |     |     |     |
|-------------|-------------------|-----|-----|-----|
|             | 1                 | 2   | 3   | 4   |
| 0           | OFF               | OFF | OFF | OFF |
| 1           | ON                | OFF | OFF | OFF |
| 2           | OFF               | ON  | OFF | OFF |
| 3           | ON                | ON  | OFF | OFF |
| 4           | OFF               | OFF | ON  | OFF |
| 5           | ON                | OFF | ON  | OFF |
| 6           | OFF               | ON  | ON  | OFF |
| 7           | ON                | ON  | ON  | OFF |
| 8           | OFF               | OFF | OFF | ON  |
| 9           | ON                | OFF | OFF | ON  |
| 10          | OFF               | ON  | OFF | ON  |
| 11          | ON                | ON  | OFF | ON  |
| 12          | OFF               | OFF | ON  | ON  |
| 13          | ON                | OFF | ON  | ON  |
| 14          | OFF               | ON  | ON  | ON  |
| 15          | ON                | ON  | ON  | ON  |



*Please note:  
The controller link cable length is 200mm.  
The controller can connect up to a maximum of 16 units.*

**Caution:**  
Please do not adjust dip switch numbers 5,6,7,8. **Please do not adjust the setting that was done at the time of shipping.** Any missetting will not only limit basic functions, but will also, lead to a breakdown.

*In case of number of axes greater than 1, the emergency stop of the teaching pendant will only effect the controller axis connected to the teaching pendant.*

### 3. 100/200V Type Specifications

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#### 5-4-3 Main Communications

##### SIO Connector Pin Assignment

| PIN No. | Signal Name | Functions                                |
|---------|-------------|--|
| 1       | +5V         | DC 5V Power Output                       |
| 2       | SGA         | Line transceiver I/O Positive Logic Side |
| 3       | GND         | Ground for Communication                 |
| 4       | SGB         | Transceiver I/O Negative Logic Side      |
| 5       | GND         | Ground for RS-485 Communication          |
| 6       | +5V         | DC5V Power Output                        |

##### Main Communication Port Pin Assign

| PIN No. | Signal Name | Functions             |
|---------|-------------|-----------------------|
| 1       | SGA         | Serial Communication  |
| 2       | SGB         | Serial Communication  |
| 3       | 5V          | 5V Power Output       |
| 4       | EMGS        | Emergency Stop Status |
| 5       | EMGA        | *Note 1               |
| 6       | 24V         | 24V Power Output      |
| 7       | GND         | Ground                |
| 8       | EMGB        | *Note 1               |

*\*Note 1: This is used as an emergency stop (B contact).  
When disconnecting the emergency stop, please short-circuit.*

#### 3-4-4 Specifications for Each Connector Pins and Terminal Board

##### Motor Connector (Molex 5569-04A1)

| Pin No. | Signal Name | Connecting line |
|---------|-------------|-----------------|
| 1       | P E         | Motor FG        |
| 2       | U           | Motor U Phase   |
| 3       | V           | Motor V Phase   |
| 4       | W           | Motor W Phase   |

### 3. 100/200V Type Specifications

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Encoder · brake connector (High Density D-Sub DE-15 type)

| Pin No. | Signal Name | Connecting Line |
|---------|-------------|-----------------|
| 1       | EN A+       | Encoder A+      |
| 2       | EN A-       | Encoder A-      |
| 3       | EN B+       | Encoder B+      |
| 4       | EN B-       | Encoder B-      |
| 5       | EN Z+       | Encoder Z+      |
| 6       | EN Z-       | Encoder Z-      |
| 7       | SD +        | Encoder SD+     |
| 8       | SD -        | Encoder SD-     |
| 9       | BAT +       | (Battery +)     |
| 10      | GND         | (Battery -)     |
| 11      | EN 5N       | Encoder 5V +    |
| 12      | EN GND      | Encoder COM-    |
| 13      | BK N        | Brake -         |
| 14      | BK P        | Brake +         |
| 15      | FG          | Shield          |

Power Terminal Board (Phenix)

| Pin No. | Connecting Line |
|---------|-----------------|
| 1       | PE (Earth)      |
| 2       | L (AC)          |
| 3       | N (AC)          |

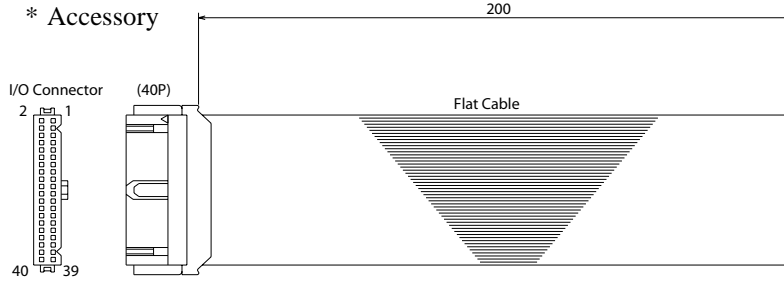
Pin 2 and Pin 3 are connected internally.

Emergency Stop Terminal Board

| Pin No. | Connecting Line |
|---------|-----------------|
| 1       | EMG 1 (24V)     |
| 2       | EMG 2           |

# 3. 100/200V Type Specifications

## 3-4-5 I/O Flat Cable



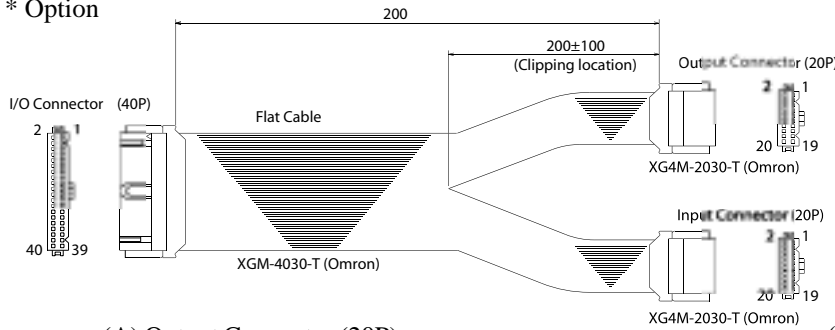
I/O Connector (40P)

| No. | Signal Name     | Color      | No. | Signal Name          | Color      |
|-----|-----------------|------------|-----|----------------------|------------|
| 1   | COM-0A          | Brown - 1  | 11  | NC                   | Brown - 2  |
| 2   | COM-0A          | Red - 1    | 12  | Positioning Complete | Red - 2    |
| 3   | COM-0B          | Orange - 1 | 13  | OUT-11               | Orange - 2 |
| 4   | COM-0B          | Yellow - 1 | 14  | Complete position 8  | Yellow - 2 |
| 5   | NC              | Green - 1  | 15  | NC                   | Green - 2  |
| 6   | *Alarm          | Blue - 1   | 16  | Complete position 4  | Blue - 2   |
| 7   | NC              | Purple - 1 | 17  | Moving               | Purple - 2 |
| 8   | Zone            | Grey - 1   | 18  | Complete position 2  | Grey - 2   |
| 9   | NC              | White - 1  | 19  | * Emergency stop     | White - 2  |
| 10  | Homing Complete | Black - 1  | 20  | Complete position 1  | Black - 2  |

| No. | Signal Name | Color      | No. | Signal Name        | Color      |
|-----|-------------|------------|-----|--------------------|------------|
| 21  | COM-1A      | Brown - 3  | 31  | NC                 | Brown - 4  |
| 22  | COM-1A      | Red - 3    | 32  | Start              | Red - 4    |
| 23  | COM-1B      | Orange - 3 | 33  | NC                 | Orange - 4 |
| 24  | COM-1B      | Yellow - 3 | 34  | Command position 8 | Yellow - 4 |
| 25  | NC          | Green - 3  | 35  | NC                 | Green - 4  |
| 26  | *Hold       | Blue - 3   | 36  | Command position 4 | Blue - 4   |
| 27  | NC          | Purple - 3 | 37  | NC                 | Purple - 4 |
| 28  | Servo ON    | Grey - 3   | 38  | Command position 2 | Grey - 4   |
| 29  | NC          | White - 3  | 39  | NC                 | White - 4  |
| 30  | Reset       | Black - 3  | 40  | Command position 1 | Black - 4  |

\* Option



(A) Output Conenctor (20P)

(B) Input Conenctor (20P)

| No. | Signal Name     | Color      | No. | Signal Name          | Color      |
|-----|-----------------|------------|-----|----------------------|------------|
| 1   | COM-0A          | Brown - 1  | 11  | NC                   | Brown - 2  |
| 2   | COM-0A          | Red - 1    | 12  | Positioning Complete | Red - 2    |
| 3   | COM-0B          | Orange - 1 | 13  | OUT-11               | Orange - 2 |
| 4   | COM-0B          | Yellow - 1 | 14  | Complete position 8  | Yellow - 2 |
| 5   | NC              | Green - 1  | 15  | NC                   | Green - 2  |
| 6   | *Alarm          | Blue - 1   | 16  | Complete position 4  | Blue - 2   |
| 7   | NC              | Purple - 1 | 17  | Moving               | Purple - 2 |
| 8   | Zone            | Grey - 1   | 18  | Complete position 2  | Grey - 2   |
| 9   | NC              | White - 1  | 19  | * Emergency stop     | White - 2  |
| 10  | Homing Complete | Black - 1  | 20  | Complete position 1  | Black - 2  |

| No. | Signal Name | Color      | No. | Signal Name        | Color      |
|-----|-------------|------------|-----|--------------------|------------|
| 21  | COM-1A      | Brown - 1  | 31  | NC                 | Brown - 2  |
| 22  | COM-1A      | Red - 1    | 32  | Start              | Red - 2    |
| 23  | COM-1B      | Orange - 1 | 33  | NC                 | Orange - 2 |
| 24  | COM-1B      | Yellow - 1 | 34  | Command position 8 | Yellow - 2 |
| 25  | NC          | Green - 1  | 35  | NC                 | Green - 2  |
| 26  | *Hold       | Blue - 1   | 36  | Command position 4 | Blue - 2   |
| 27  | NC          | Purple - 1 | 37  | NC                 | Purple - 2 |
| 28  | Servo ON    | Grey - 1   | 38  | Command position 2 | Grey - 2   |
| 29  | NC          | White - 1  | 39  | NC                 | White - 2  |
| 30  | Reset       | Black - 1  | 40  | Command position 1 | Black - 2  |

\* I/O Connector (40P) is the same as the above accessory diagram

## 3. 100/200V Type Specifications

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### 3-4-6 Battery Backup (Absolute Specifications)

#### (1) Battery Specifications

| Column                  | Content   |
|-------------------------|---|
| Type                    | Lithium Battery   |
| Manufacturer            | Toshiba Denchi  |
| Model                   | ER3VP   |
| Nominal Voltage         | 3.6V  |
| Rated Capacity          | 1000mAh   |
| Weight                  | Approximately 8.5g  |
| Battery Sustain Time *1 | Approximately 1000 hours (when ambient temperature is 20°C) |

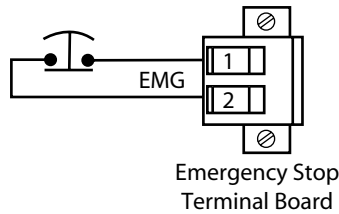
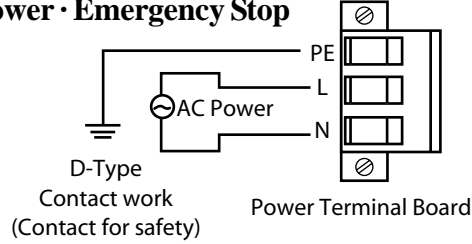
Note 1) The consumed current during absolute data backup is approximately 100 $\mu$ A (approximately 4 $\mu$ A when controller main power is ON).

- \* To avoid breakdown, do not attempt to machine or extend the wire.
- \* Please use IAI specified battery only. Battery exchange is between the battery board. It is not an exchange with the battery unit.
- \* When exchanging the battery, you will need to reset the absolute.

# 3. 100/200V Type Specifications

## 3-5 Wiring

### 3-5-1 Wiring for Power · Emergency Stop



The two EMG terminals are for connecting an emergency stop switch, and is b-contact input. At the time of shipment, a jumper is used to short the two terminals. Do not remove it!

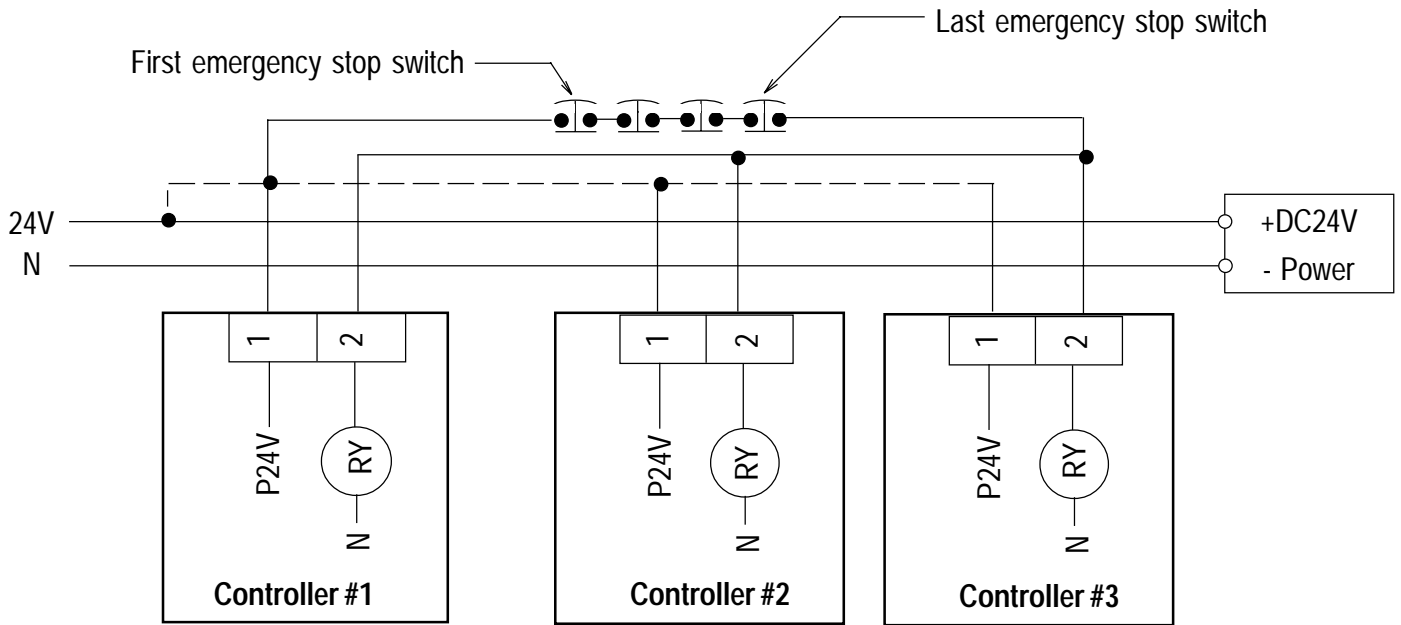
**Caution:** When wiring power on the customer site, please make sure that the following specifications are met.

|                                       |   |  |
|---------------------------------------|---|--|
| Applicable conduit                    | Single line   | $\phi 1.0$ (AWG18)<br>$0.75\text{mm}^2$ (AWG18)      |
| Specifications possible conduit range | Single line   | $\phi 0.4$ (AWG26) ~ $\phi 1.2$ (AWG16)              |
|                                       | Stranded line   | $0.3\text{mm}^2$ (AWG22) ~ $1.25\text{mm}^2$ (AWG16) |
|                                       | Strand diameter   | Over $\phi 0.18\text{mm}$                            |
| Standard type line length             | 11mm  |  |
| Applicable tool for button operation  | Minus Driver (axis diameter $\phi 3$ , blade point width 2.6) |  |

**Caution:** This controller does not have a power switch.

### 3. 100/200V Type Specifications

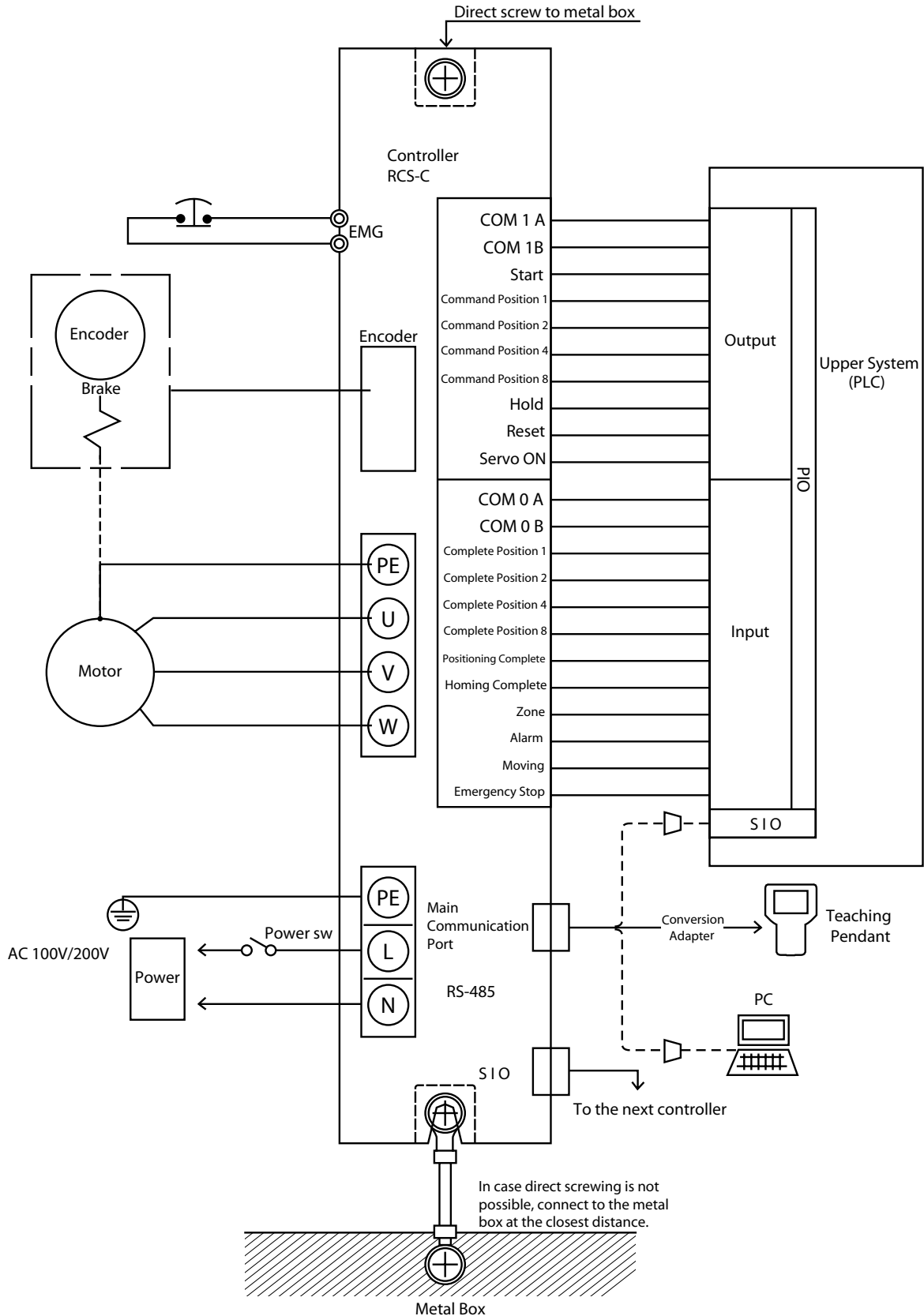
#### 3-5-2 Wiring Method for Connecting Multiple E-Stop Switches onto Multiple Controllers



- As for the last emergency stop switch input, always connect it to the number 5 terminal of each controller.
- Connect number 3 terminal (24V) of each controller onto the first emergency stop switch.
- Internal power (P24V) of each of the controller can be connected to an external power (24V).

# 3. 100/200V Type Specifications

## 3-5-3 External Connection Diagram



### 3. 100/200V Type Specifications

#### 3-5-4 PIO Interface

PIO Interface list for controllers with NPN I/O is indicated as below:

In addition, the PIO cable is unplugged on the external device side for flat cable specifications.

PIO Connector (26 Pin) NPN

| Pin No. | Section | Reference Number | Signal Name | Cable Color |
|---------|---------|------------------|-------------|-------------|
| 1       |         | (1)              | COM0A       | Brown - 1   |
| 3       |         | (2)              | COM0B       | Orange - 2  |
| 5       | Output  |                  | NC          | Green - 1   |
| 7       |         |                  |             | Purple - 1  |
| 9       |         |                  |             | White - 1   |
| 11      |         |                  |             | Brown - 2   |
| 13      |         |                  |             | Orange - 2  |
| 15      |         |                  |             | Green - 2   |
| 17      |         |                  |             | (8)         |
| 19      | (9)     | *Emergency Stop  | White - 2   |             |

| Pin No. | Section | Reference Number | Signal Name          | Cable Color |
|---------|---------|------------------|----------------------|-------------|
| 2       |         | (1)              | COM0A                | Red - 1     |
| 4       |         | (2)              | COM0B                | Yellow - 1  |
| 6       | Output  | (3)              | *Alarm               | Blue - 1    |
| 8       |         | (4)              | Zone                 | Grey - 1    |
| 10      |         | (5)              | Homing Complete      | Black - 1   |
| 12      |         | (6)              | Positioning Complete | Red - 2     |
| 14      |         | (7)              | Command Position 8   | Yellow - 2  |
| 16      |         |                  | Command Position 4   | Blue - 2    |
| 18      |         |                  | Command Position 2   | Grey - 2    |
| 20      |         |                  | Command Position 1   | Black - 2   |

| Pin No. | Section | Reference Number | Signal Name | Cable Color |
|---------|---------|------------------|-------------|-------------|
| 21      |         | (10)             | COM1A       | Brown - 3   |
| 23      |         | (11)             | COM1B       | Orange - 3  |
| 25      | Input   |                  | NC          | Green - 3   |
| 27      |         |                  |             | Purple - 3  |
| 29      |         |                  |             | White - 3   |
| 31      |         |                  |             | Brown - 4   |
| 33      |         |                  |             | Orange - 4  |
| 35      |         |                  |             | Green - 4   |
| 37      |         |                  |             | Purple - 4  |
| 39      |         |                  |             | White - 4   |

| Pin No. | Section | Reference Number | Signal Name        | Cable Color |
|---------|---------|------------------|--------------------|-------------|
| 22      |         | (10)             | COM1A              | Red - 3     |
| 24      |         | (11)             | COM1B              | Yellow - 3  |
| 26      | Input   | (12)             | *Hold              | Blue - 3    |
| 28      |         | (13)             | Servo ON           | Grey - 3    |
| 30      |         | (14)             | Reset              | Black - 3   |
| 32      |         | (15)             | Start              | Red - 4     |
| 34      |         | (16)             | Command Position 8 | Yellow - 4  |
| 36      |         |                  | Command Position 4 | Blue - 4    |
| 38      |         |                  | Command Position 2 | Grey - 4    |
| 40      |         |                  | Command Position 1 | Black - 4   |

**Caution**  
*Ports with \* mark indicate negative logic. Never connect to unused port.*

### 3. 100/200V Type Specifications

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(1) COM0A → Power for output

(2) COM0B → Power for output

Connect DC24V for output between COM0A · COM0B. Polarity does not exist between COM0A · COM0B.  
Pin No. 1 and 2, 3 and 4 are connected internally.

(3) Alarm

Turns OFF during an alarm. During normal operation, stays ON. Homing method is done during power reinstallation. Alarm will remain ON in case of excessive work load, and when movement is not possible due to collision with an obstacle. Take sufficient time for time check.

(4) Zone

Outputs within range set in the parameter.

(5) Homing Complete

Upon applying power, turns ON once initial homing completes. Afterwards, as long as alarm does not occur and power does not turn OFF, continues to stay ON. This will not turn OFF simply by emergency stop input. Turning the home complete signal OFF means homing is executed prior to this next movement:

*Caution: With the absolute specifications, once home location is taught, upon applying power, homing complete signal will turn ON. In case home complete signal turns OFF due to an alarm occurrence, you will need to teach the home location again.*

(6) Positioning Complete

Upon applying power, once the operation preparation completes, turns ON. Turns OFF upon start signal input. Turns ON once movement completes. The timing for the positioning complete ON and Complete position output are the same.

(7) Complete Position

Turns OFF simultaneously as timing once positioning complete turns OFF. All will turn OFF during emergency stop or direct teaching. In case operation is possible afterwards, in case the current actuator position is within the positioning range from the last positioning complete position, outputs its complete position. All will remain OFF in case of being outside of the positioning width. In case operation is possible during push mode, in either from emergency stop or direct teach, all will remain OFF regardless of the current position.

(8) In-motion

Turns ON during movement.  
This signal is used when you want to detect motor stop during hold.

(9) Emergency Stop

Turns OFF during emergency stop. Turns ON during normal operation. Homes during emergency stop release.

(10) COM 1A → Power for input port

(11) COM 1B → Power for input port

Connect DC24V power plus side to either Pin No. 21 ~24 (COM1A · COM 1B) (NPN specifications).  
Pin No. 21 and 22, 23 and 24 are connected internally.

(12) Hold

This is a B-contact input. During movement, remains ON. Turn OFF during HOLD.

(13) Servo ON

When this signal is turned ON, servo is turned ON.

### 3. 100/200V Type Specifications

---

(14) Reset

Once signal is detected, executes alarm reset. In case alarm source is not resolved, alarm will reoccur even after resetting the alarm (you will need to reapply power to “over current alarm (alarm code: C8).” Cancels remaining movement load during hold.

(15) Start

Input for movement start signal.

(16) Command Position

Position select inputs.

This is the relationship between the input pin No. and selected position No. (4 bit binary)

You may input select 16 positions of position 0~position 15.

1 : ON      0 : OFF

|                          |    |                    |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|--------------------------|----|--------------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| PIN<br>No.               | 40 | Command Position 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0  | 1  | 0  | 1  | 0  | 1  |
|                          | 38 | Command Position 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1  | 1  | 0  | 0  | 1  | 1  |
|                          | 36 | Command Position 4 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0  | 0  | 1  | 1  | 1  | 1  |
|                          | 34 | Command Position 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  |
| Selected Position Number |    |                    | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

*Caution:*

*Error operation may occur when selecting an undefined position number and pressing the Start Input ON.*

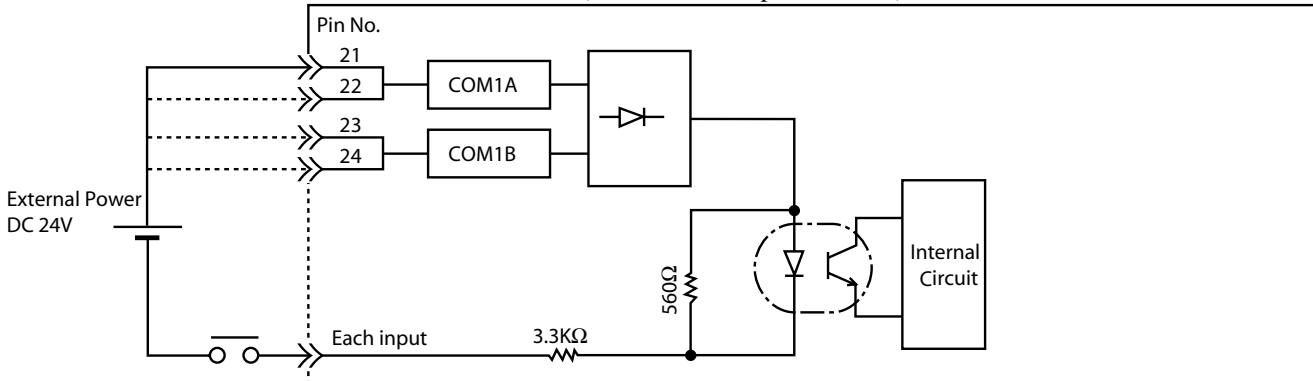
# 3. 100/200V Type Specifications

## 3-5-5 100/200 V Type External I/O Specifications

### Input

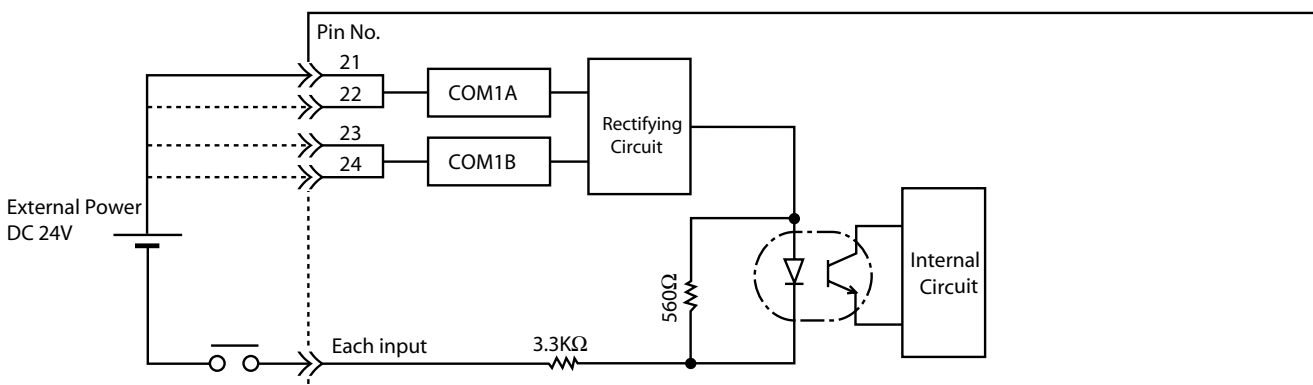
| Column            | Specifications   |
|-------------------|--|
| Number of Inputs  | 8 points   |
| Input Voltage     | DC24V ± 20%  |
| Input Current     | 7mA/1 circuit  |
| Movement Voltage  | ON Voltage . . . Minimum 16V (4.5mA)<br>OFF Voltage . . . Maximum 6V (1.4mA) |
| Insulation Method | Photocoupler   |

Internal Circuit Structure (Standard NPN Specifications)



- Connect plus side of external power to either pin numbers 21~24.
- Connect the common side of input to the minus side of external power.
- Pin numbers 21 and 22 of COM 1A, and pin numbers 23 and 24 of COM 1B are connected internally.

Internal Circuit Structure (Standard PNP Specifications)



- Pin numbers 21 and 22 of COM 1A, and pin numbers 23 and 24 of COM 1B are connected internally.
- Connect external power (plus or minus) to either pin numbers 21~24. Common side of input is connected to the reversed polarity from either pin numbers 21 ~24.

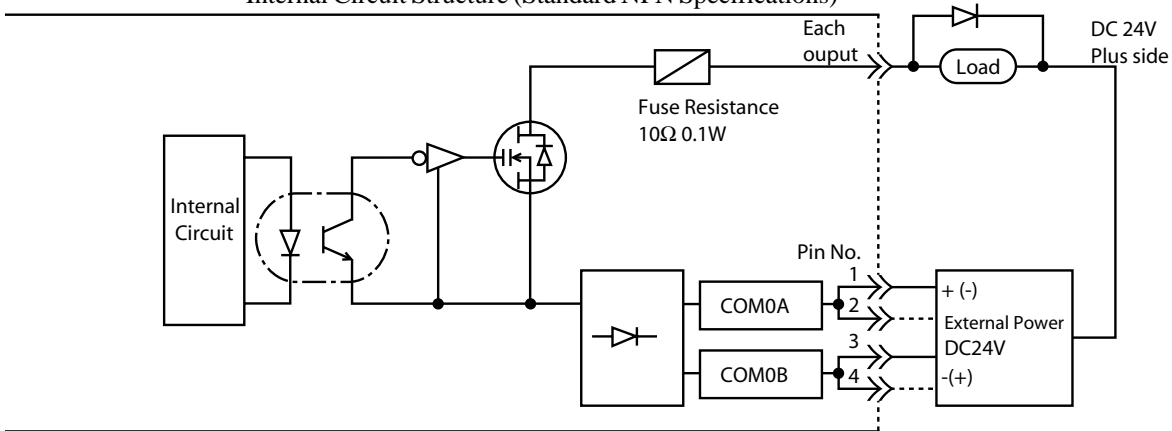
### 3. 100/200V Type Specifications

#### Output

100mA output circuit according to Power MOSFET

| Column                 | Specifications                       |
|------------------------|--------------------------------------|
| Number of Inputs       | 10 points                            |
| Input Voltage          | DC24V /60V (Peak) (No flyhoil diode) |
| Input Current          | 100mA/1 point                        |
| Remaining Voltage      | 1.8V/100mA                           |
| Insulation Method      | Photocoupler                         |
| Overcurrent Protection | Fuse resistance 10Ω0.1W              |

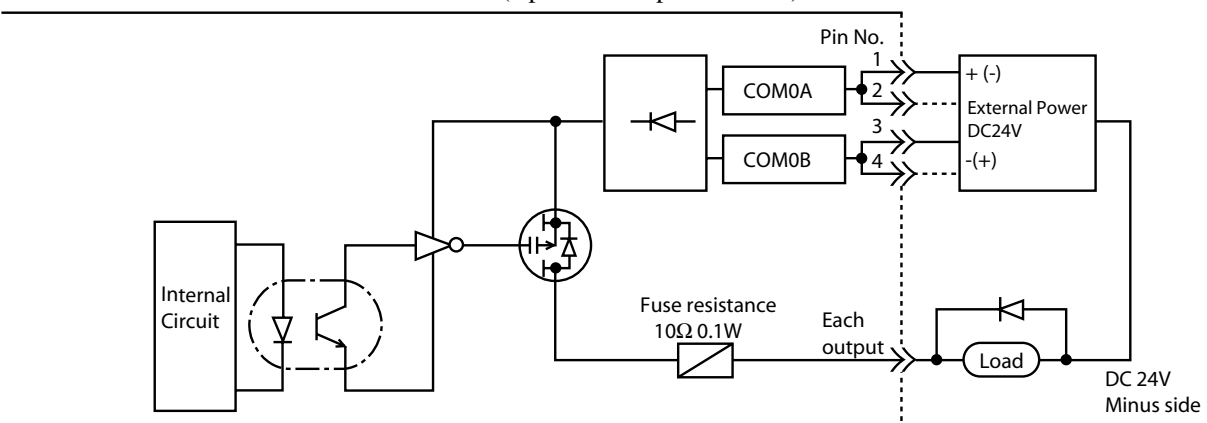
Internal Circuit Structure (Standard NPN Specifications)



- Add DC24V between COM 0A and COM 0B. Polarity does not exist between COM0A and COM 0 B.
- Pin numbers 1 and 2, 3 and 4 are connected internally.

*Note 1: As for output circuit, fly hoil diode does not exist in open drain of Power MOSFET. Always execute fly back voltage control compliance using diode on the L load of relay (this is most effective for spike noise prevention when mounting diode to coil in short distance.*

Internal Circuit Structure (Option PNP Specifications)



## 4. Data Input (Basic)

Since this controller does not have any commands, there is no needed to write any programs. In order to make the actuator move to the assigned position, all you need to do is input the position data into the position data table. In the position table, there are the following 6 columns: Position, Speed, Acceleration/Deceleration, Force, Positioning Width and Acceleration Only MAX. The position table below is displayed by the Teaching Pendant. In the position data, there is Absolute which inputs distance from home, and Incremental which inputs relative transfer load from the current position.

Position Table

| No.  | Position (mm) | Speed (mm/s) | Acc (G) | Push (%) | Pos. Band (mm) | Max ACC Flag (0/1) | ABS/INC Flag (0/1) | Comments |
|------|---------------|--------------|---------|----------|----------------|--------------------|--------------------|----------|
| 0    | 0             | 100          | 0.3     | 0        | 0.1            | 0                  |                    |          |
| 1    | 30            | 100          | 0.3     | 0        | 0.1            | 0                  |                    |          |
| 2 =* | 10            | 100          | 0.3     | 0        | 0.1            | 0                  |                    |          |
| .    | .             | .            | .       | .        | .              | .                  | ~                  | ~        |
| .    | .             | .            | .       | .        | .              | .                  | ~                  | ~        |
| 15   | 100           | 100          | 0.3     | 0        | 0.1            | 0                  |                    |          |

Please make modifications as needed. When modifying the initial value, changes can be made on the “initial value” of the parameter. The initial value differs depending on the actuator type. When changing the initial value, please use “~initial value” of the parameter. The initial value will vary according to actuator type.

\* “=” indicates that this is an Absolute (This is displayed by the Teaching Pendant. With a PC, incremental assigned column will display).

**Caution:**

**For data input, please first execute from position. Input from other data will be rejected. As for position, input may be done up to grider 2 fraction. However, data of position is only recognizes as a multiplier of minimum resolution. In addition, the minimum resolution will vary according to the lead of the actuator. Therefore, the grider 2 fraction of position data that was inputted will write over according to actuator lead.**

Example: Inputted value



Recorded value

50.01

50.03

# 4. Data Input (Basic)

## 4-1 Position Data Table

(1) No.

- Indicates the position number. In case of inputting the relative transfer load, type the Minus Key. In case of input operation using the teaching pendant, “=” will be displayed between the number and position. In case of Absolute, there is no need for

(2) Position

- The distance from home (in mm).  
 Absolute Coordinate Assign: The distance from home (in mm).  
 You may not input negative value.  
 Relative Coordinate Assign: The distance from home (in mm).  
 You may also input negative value.

| No. | Position |  |
|-----|----------|--|
| 0   | 30       |  |
| 1   | = 10     |  |
| 2   | = -10    |  |
| 3   | 100      |  |
|     |          |  |

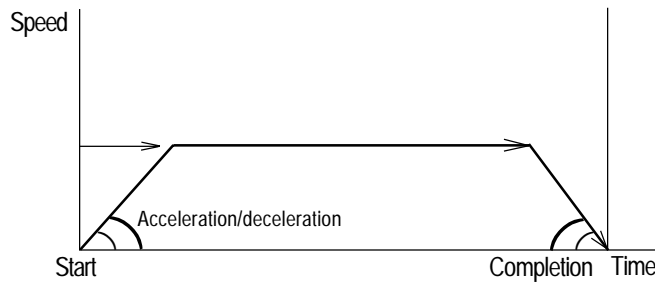
- ←→ Absolute Coordinate Assign 30mm from home
- ←→ Relative Coordinate Assign Plus 10mm from current location
- ←→ Absolute Coordinate Assign -10mm from current location
- ←→ Absolute Coordinate Assign 100mm from current location

(3) Position

- The speed at which the actuator moves (mm/sec).  
 The initial value will differ according to actuator type.

(4) Acceleration/Deceleration

- Inputs the acceleration/deceleration of when the actuator



Acceleraton/deceleration speed G ····· MIN 0.01G slow rise  
 Max 1.00G fast rise

(5) Push

- Selects either the Positioning Mode or Push Mode.  
 The initial value is set as 0.  
 0: Positioning Mode (=normal operation)  
 Other than 0: Push mode (%)
- In Push Mode, input the % of max current of the servo motor at which you would like the push to end.

**Caution:**  
 When the push power is too small, push malfunction may occur due to driver

# 4. Data Input (Basic)

## (6) Positioning Width

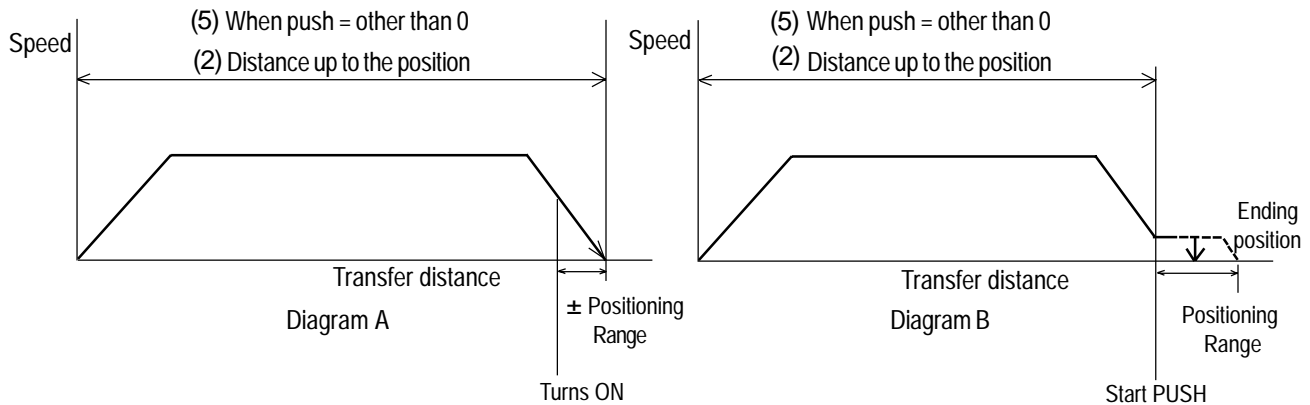
As for the positioning width, depending on the setting value of 5th column, either 0 or other than 0, its function will vary.

### 3(A) Push = 0 (Positioning Mode)

- The positioning mode uses position widths as a location to turn ON the position complete output prior to actual point data.
- The initial value is set as 0.1mm (see diagram A).

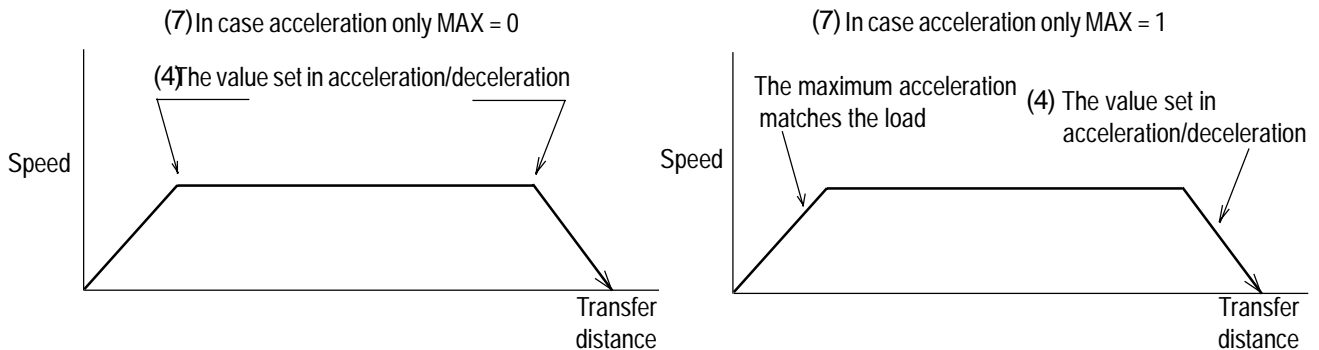
### (B) Push = besides 0 (Push Mode)

- Inputs the maximum push load (distance from the final point) in the push mode (mm) (see diagram B).
- When the push direction is a negative direction from the displayed coordinate, a “minus” sign should be placed next to the position width.



## (7) Acceleration only MAX

- Selects either the assigned acceleration or the maximum acceleration. Inputs are either 1 or 0. The initial value is set as 0.
  - 0: Assigned acceleration  
The value placed in the ACC/DEC Speed column will become the actual acceleration/deceleration value.
  - 1: Maximum acceleration  
This will automatically utilize the maximum acceleration matched to the load. Deceleration remains as the assigned value.



## 4. Data Input (Basic)

### 4-1-1 Push Force During Stop

When executing push mode, input current limit value (%) into push of the position data table. With the RCS, push force be at a current limit value of 70%. Although by increasing/decreasing the current limit value, you can increase/decrease the push force during stop, normal operation is not possible under 30%. See the chart below in regards to push force at a current limit value of 70% according to type.

|           | Type   | Motor W | Speed Type | Push Power N (kgf) |
|-----------|--------|---------|------------|--------------------|
| Rod Type  | RA 35  | 20      | L          | 95 (9.7)           |
|           |        |         | M          | 47 (4.8)           |
|           |        |         | H          | 23 (2.4)           |
|           | RA 45  | 30      | L          | 142 (14.5)         |
|           |        |         | M          | 70 (7.2)           |
|           |        |         | H          | 35 (3.6)           |
|           | RA 55  | 60      | L          | 178 (18.2)         |
|           |        |         | M          | 89 (9.1)           |
|           |        |         | H          | 44 (4.5)           |
|           |        | 100     | L          | 296 (30.3)         |
|           |        |         | M          | 149 (15.2)         |
|           |        |         | H          | 74 (7.6)           |
|           | RB7525 | 30      | L          | 142 (14.5)         |
|           |        |         | M          | 70 (7.2)           |
|           |        |         | H          | 35 (3.6)           |
|           |        | 60      | M          | 143 (14.6)         |
|           |        |         | H          | 71 (7.3)           |
|           |        |         |            |                    |
|           | RB7530 | 60      | L          | 238 (24.3)         |
|           |        |         | M          | 118 (12.1)         |
|           |        |         | H          | 59 (6.1)           |
| 100       |        | M       | 198 (20.2) |                    |
|           |        | H       | 99 (10.1)  |                    |
|           |        |         |            |                    |
| RB7530    | 60     | L       | 296 (30.3) |                    |
|           |        | M       | 149 (15.2) |                    |
|           |        | H       | 74 (7.6)   |                    |
|           | 100    | M       | 222 (22.7) |                    |
|           |        | H       | 111 (11.4) |                    |
|           |        |         |            |                    |
| RB7535    | 100    | L       | 142 (14.5) |                    |
|           |        | M       | 70 (7.2)   |                    |
|           |        | H       | 35 (3.6)   |                    |
|           | 150    | M       | 222 (22.7) |                    |
|           |        | H       | 111 (11.4) |                    |
|           |        |         |            |                    |
| Flat Type | F45    | 30      | L          | 142 (14.5)         |
|           |        |         | M          | 70 (7.2)           |
|           |        |         | H          | 35 (3.6)           |
|           | F55    | 60      | L          | 178 (18.2)         |
|           |        |         | M          | 89 (9.1)           |
|           |        |         | H          | 44 (4.5)           |
|           |        | 100     | L          | 296 (30.3)         |
|           |        |         | M          | 149 (15.2)         |
|           |        |         | H          | 74 (7.6)           |

**Caution: The accuracy for push force is not guaranteed. The above is standard only.**

# 4. Data Input (Basic)

## 4-2 Explanation on Mode

### 4-2-1 Positioning Mode (Push) = 0

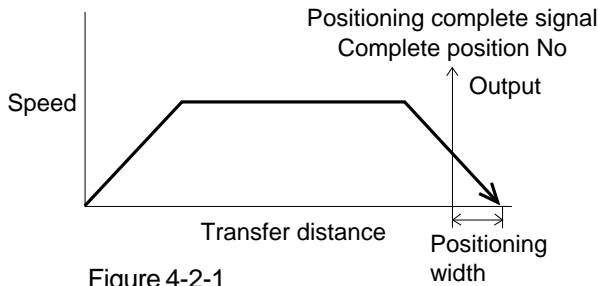


Figure 4-2-1

### 4-2-2 Push Mode (Push) = Other than 0

#### (1) When push is successful

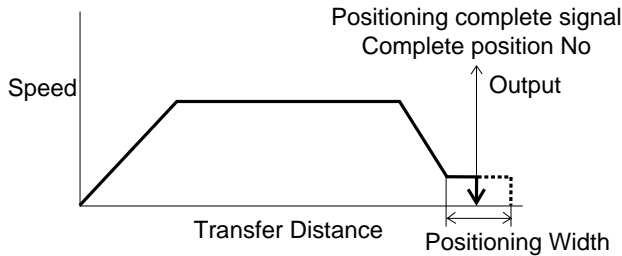


Figure 4-2-2

From the position shown in Figure 4-2-3, the positioning complete output turns ON prior to the positioning width portion. Also, this location activates the position number outputs.

After reaching the position shown in Figure 4-2-3, actuator moves forward at 75 RPM. Once the actuator pushes the work and the parameter passes the setting time with the servo motor current achieving the push value, the completion position turns ON. The completion position number outputs also turn ON.

*Note: If needed, set the "push determination time" on the parameter. 255msec is default value.*

Actuator will continue to push work.

**Warning:**

**The actuator will continue to push the work with set power after push % has been reached. The push amount is determined by the push value in point table.**

**Caution: The low speed during push movement is fixed and can not be changed (75 RPM).**

# 4. Data Input (Basic)

## (2) When push fails (blank shot)

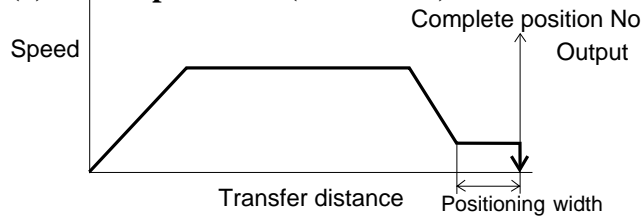


Figure 4-2-3

Upon reaching the position shown in Figure 3-2-2, the actuator moves forward at low speed. When the servo motor current does not reach current restriction value in the positioning band, the positioning completion output will not turn ON even when the actuator moves to the positioning band range. In this case, only the complete position number outputs turn ON (please allow for enough time-out check treatment).

## (3) Upon push, work moves increases.

1. When the work moves in the push direction

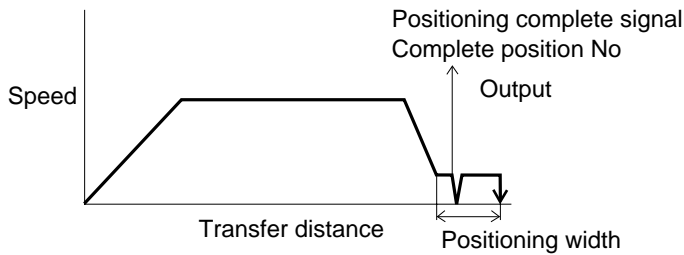


Figure 4-2-4

If the work moves in the push direction after the positioning complete output turns ON, the actuator will push the work within the positioning band range. The positioning complete ON and complete position number outputs will not change. In-motion output will remain ON. In-motion output will turn OFF when motion stops.

2. When the work moves in the opposite of push direction  
(when the actuator is pushed back due to a reaction force from work)

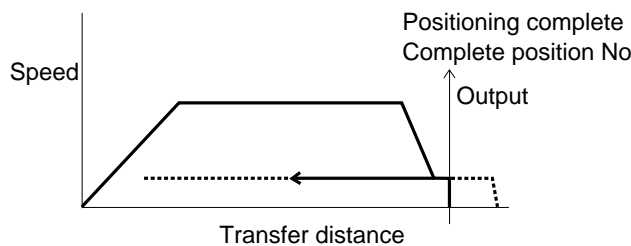
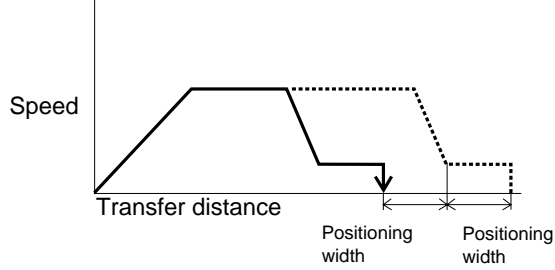


Figure 4-2-5

When the reaction force of the work is greater than the push force of the actuator, and the actuator is pushed back after the positioning complete output turns ON, the actuator will be pushed back until the forces balances out. The positioning complete ON and complete position number outputs will not change. In-motion output will remain ON until motion stops.

## 4. Data Input (Basic)

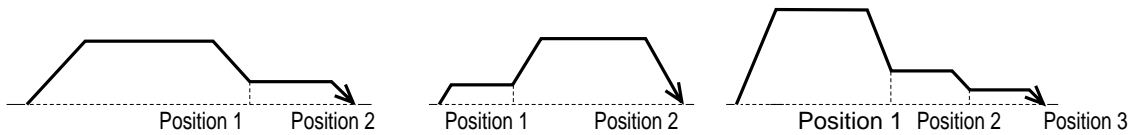
### (4) When the input value of positioning width is wrong



When a mistake is made on the code of the positioning width, as the left diagram shows, only the width (positioning complete width x 2) will be off, so please be careful.

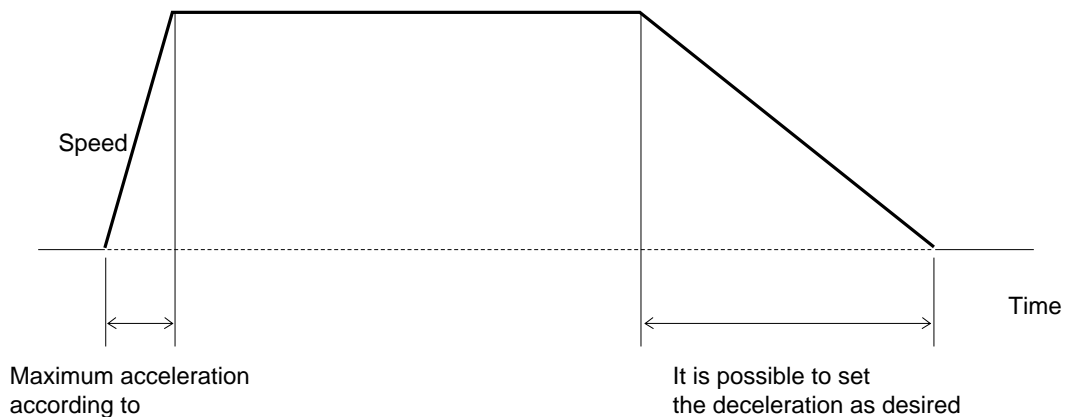
### 4-2-3 Speed Change Movement During Transfer

Multiple speed control is possible in one movement. Speed will go slower or faster at any given point. However, position is needed every time speed is changed.



### 4-2-4 Movement with Variable Acceleration • Deceleration Values

By inputting 1 into "MAX ACC Flag (0/1)" of position data, transfer movement may be made using variable acceleration and deceleration values. The acceleration value is the maximum speed that matches the load. The deceleration value is the value input in the "ACC (G)" of the position data table.

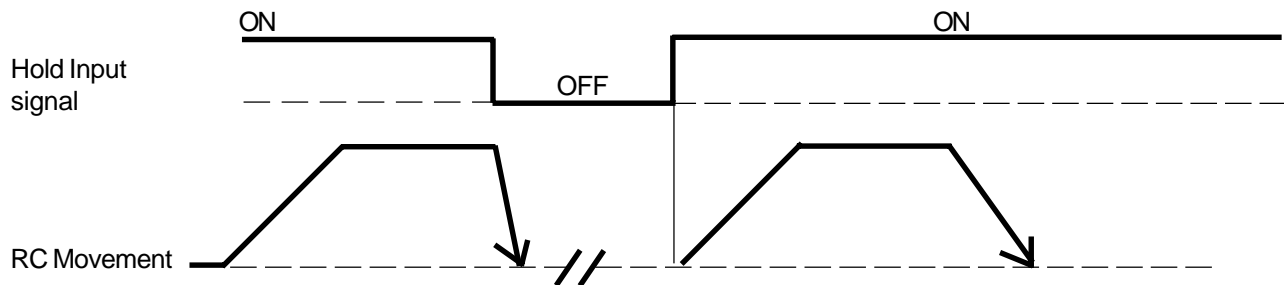


## 4. Data Input (Basic)

---

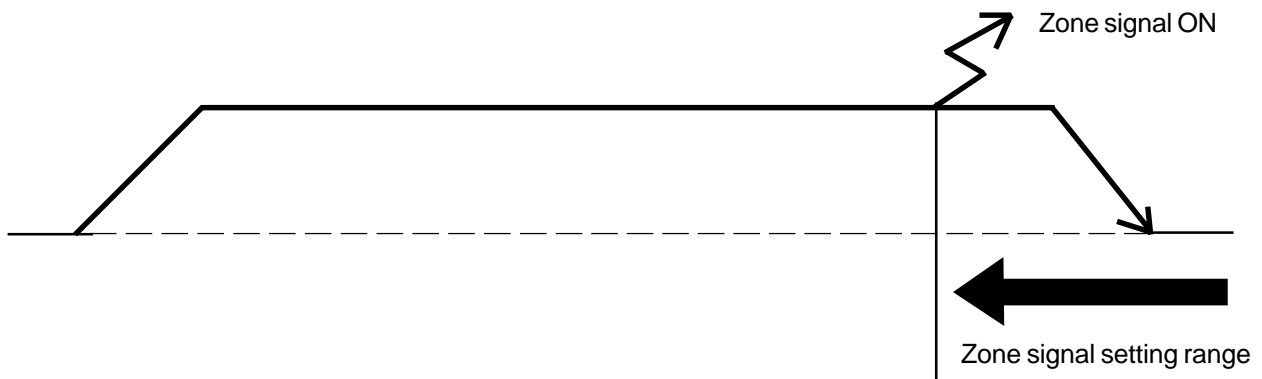
### 4-2-5 Hold Input

This is used for temporary stop. The actuator will make a quick stop according to the external input signal P I/O Pin 10 pin hold input). Based on safety compliance, the signal will become a B-contact input (reversed logic). When the hold input is turned OFF, the actuator will stop at that point and will move again only when the hold input is turned back ON.



### 4-2-6 Zone Signal Output

The zone, as shown below, is an area set to output a signal when the actuator enters its boundaries. By setting the zone parameter beforehand, once a moving slider enters that territory, the zone signal P I/O Pin 22 will turn ON and remain ON within the zone territory setting, it is possible to assign even during the middle of the stroke).

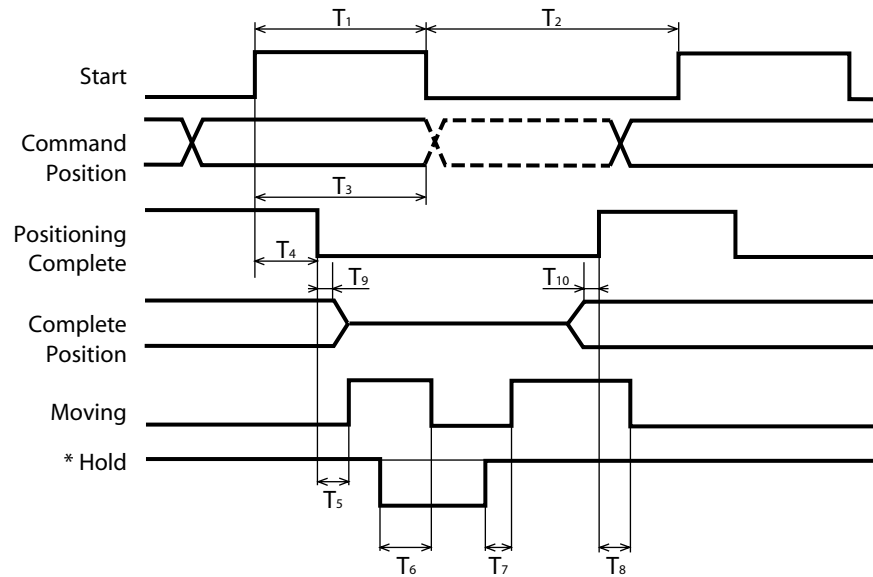


### 4-2-7 Homing

During power-UP or upon alarm release, you will need to home. After selecting the position number, and START (PNP - toggle + 24 VDC to Pin 3: NPN - toggle GND to Pin 3) is applied, first homing is executed. Upon homing, homing complete output P I/O Pin 21 will turn ON (standard specifications). You may not execute just homing from P I/O. In addition, in case you wish to move to the home position in normal mode, we recommend you set the position number to where 0 was input into the position of position data, and then, move to that position.

With the absolute specifications, once home location is taught, there is no need to home after connecting power.

## 4. Data Input (Basic)



| ACC./DEC. | Content   | Minimum value | Maximum value |
|-----------|---|---------------|---------------|
| T1        | Start ON minimum time width                                   | 4msec         | --            |
| T2        | Start OFF minimum time width                                  | 4msec         | --            |
| T3        | Start ON → Command position hold time                         | 4msec         | --            |
| T4        | Start ON → Positioning complete OFF delay time                | --            | 4msec         |
| T5        | Positioning complete OFF → ON during moving delay time        | --            | 1msec         |
| T6        | Hold OFF → OFF during moving delay time                       | --            | *1            |
| T7        | Hold ON → ON during moving delay time                         | --            | 4msec         |
| T8        | Positioning complete ON → OFF during moving delay time        | --            | 1msec         |
| T9        | Positioning complete OFF → OFF during moving delay time       | 0.1msec       | 1msec         |
| T10       | Complete position output → Positioning complete ON delay time | 0.1msec       | 1msec         |

\*2

\*1: Maximum value will depend on Acceleration/deceleration.

\*2: to view complete position, upon positioning complete ON, please allow for time more than scan time of the sequencer.

# 5. Application (Practice)

## 5-1 Power-Up

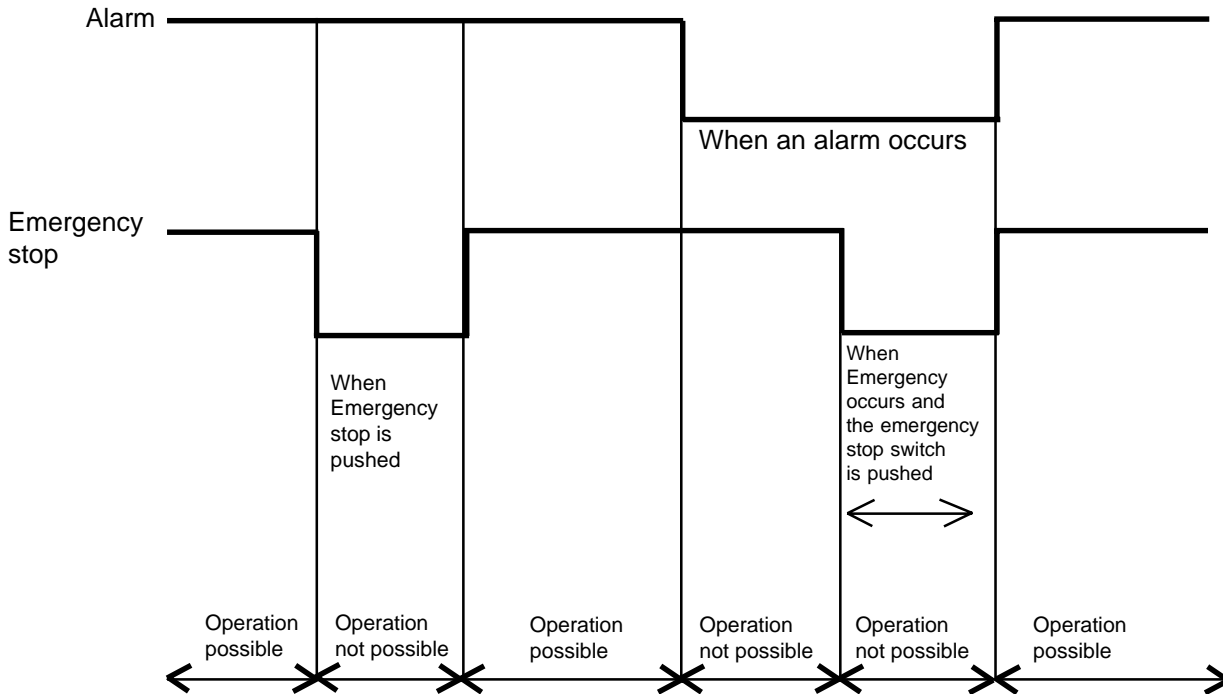
- (1) Connect the motor • brake cable and encoder cable to the controller.
- (2) Connect the upper PLC to the P I/O Connector using the attached flat cable.
- (3) When connecting more than 1-axis, address each controller by using the dip switches.  
For details, please refer to the “specifications” section under the dip switch settings.
- (4) Supply main power (24V) to the controller terminal board.
- (5) Supply P I/O Power (24V).
- (6) **Turn the P I/O Hold Input ON. (NPN) GND Pin 10      24V (PNP)**
- (7) Normal status is when the RDY, RUN LED turns ON, and abnormal status is when the ALM turns ON.  
Please refer to the Error Code List located on Page 59 and so on in this manual.

After the above operation, preparation is completed.

**Caution:**  
*When the P I/O is powered before the main power or when the power source is common, upon installing power, the P I/O output may be in an unstable status for approximately 1msec. As for signal into Input I/O, please execute after the Positioning Completion Signal turns ON after Power-Up.*

### 5-1-1 Movement Capable Status

- (1) Servo will turn ON the same time the power is turned ON. Once the power-Up is complete, the positioning completion output turns ON.
- (2) The relationship of P I/O alarm • emergency stop output and the operation status is indicated in the diagram below:



# 5. Application (Practice)

---

## 5-2 Procedure For Initial Homing (Absolute Specifications)

### 5-2-1 Power-UP Procedure

- (1) Connect the motor • brake cable and encoder cable to the controller (Note 1).
- (2) Connect the upper PLC to the P I/O Connector using the attached flat cable.
- (3) When connecting more than 1-axis, address each controller by using the dip switches.  
For details, please refer to the “specifications” section under the dip switch settings.
- (4) Supply main power (24V) to the controller terminal board.
- (5) Supply PI/O Power (24V).
- (6) Connect the battery.
- (7) Turn the PI/O of Hold Input ON (GND Pin 10 [NPN] - Supply 24V [PNP]).
- (8) Reset the alarm (Refer to Section 4-2-2, “Alarm Reset” in this manual).
- (9) Normal status is RDY, RUN LED turns ON, and abnormal status is when ALM LED is ON.
- (10) Begin homing (Refer to Section 4-2-3, “Homing,” in this manual).

**Caution (1):**

***The actuators for absolute are the only actuators that can operate using RCP Controller Absolute specifications.***

**Caution (2):**

***During the initial power installation, abnormal detection for absolute encoder always outputs. This is not abnormal.***

# 5. Application (Practice)

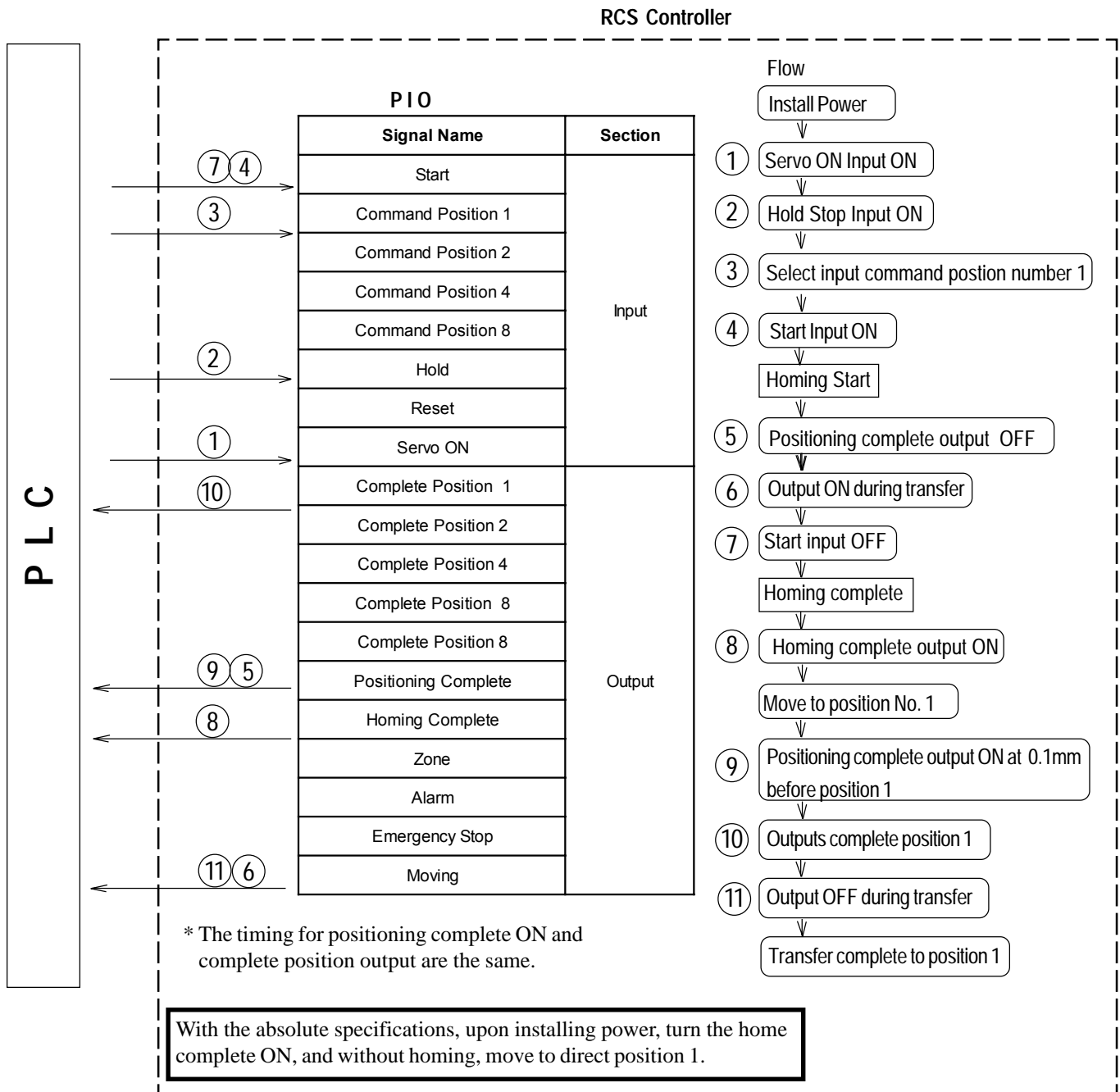
## 5-3 Move After Power-Up (Standard)

Operation application example:

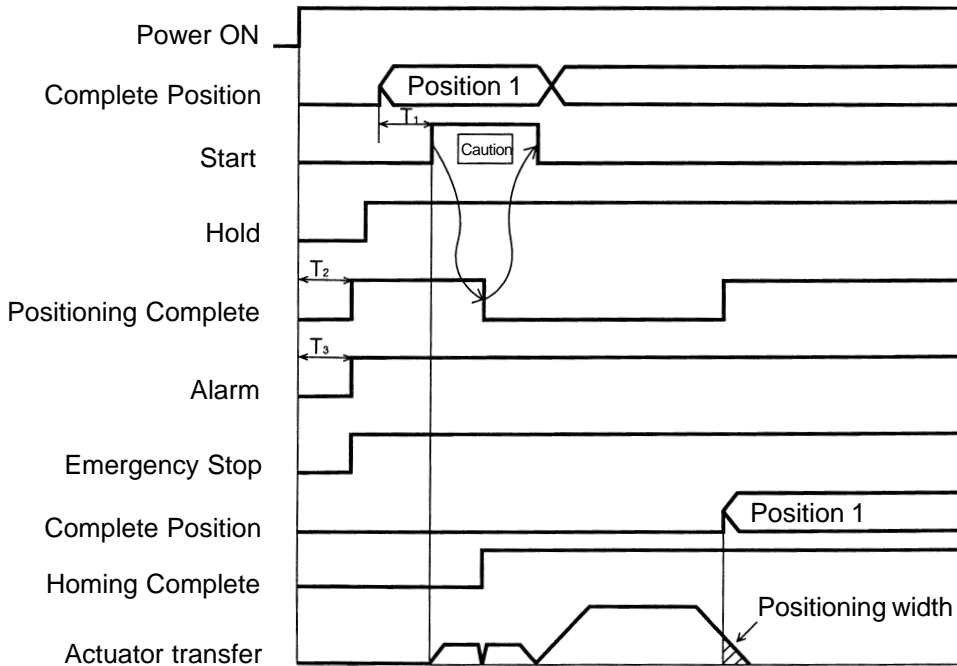
After Power-Up, move to point 150mm from home at a speed of 200mm/sec.

**Position data table (column with dark line indicate the input insert)**

| No. | Position | Speed | Acc/Dec | Push | Positioning Width | Acc. only MAX |
|-----|----------|-------|---------|------|-------------------|---------------|
| 0   | 0        | 100   | 0.3     | 0    | 0.1               | 0             |
| 1   | 150      | 200   | 0.3     | 0    | 0.1               | 0             |
| ⋮   |          |       |         |      |                   |               |
| ⋮   |          |       |         |      |                   |               |



# 5. Application (Practice)



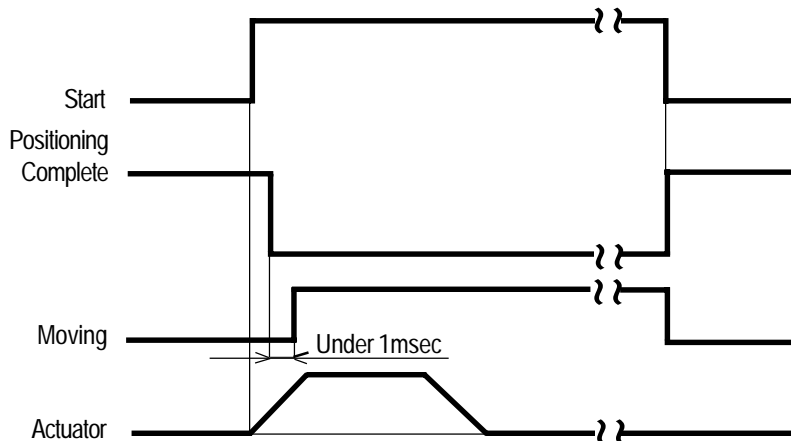
While moving towards a position, positioning complete output will turn OFF, when the actuator completes position, positioning complete turns ON.

When system is RDY and positioning is complete, positioning complete output turns ON.

- T1: Over 5msec                      Time from Command Position Select Input to Start Input ON.
- T2: Over 250msec                Time from PowerON to Operation Preparation Complete.
- T3: Over 50msec                 Time from Power ON to Alarm Output ON.

**Caution:**  
**Positioning complete Output will turn OFF once the start signal turns ON.**  
**You may execute Start Signal OFF only after confirming that the Positioning Complete Output is turned OFF.**

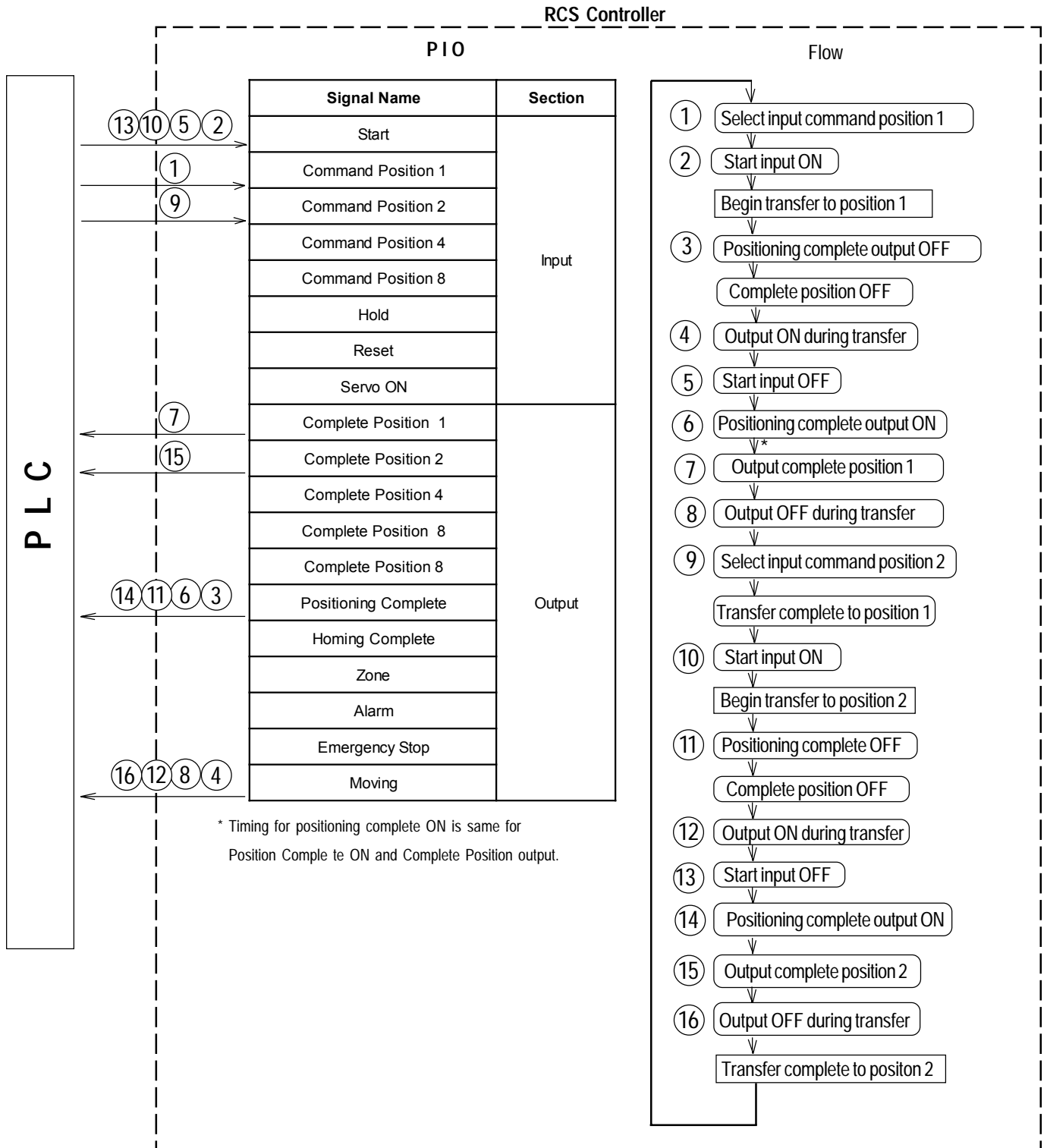
**As the diagram below shows, if you leave the Start Input as ON, the Positioning Complete Output will not turn ON even after the actuator transfer completes.**



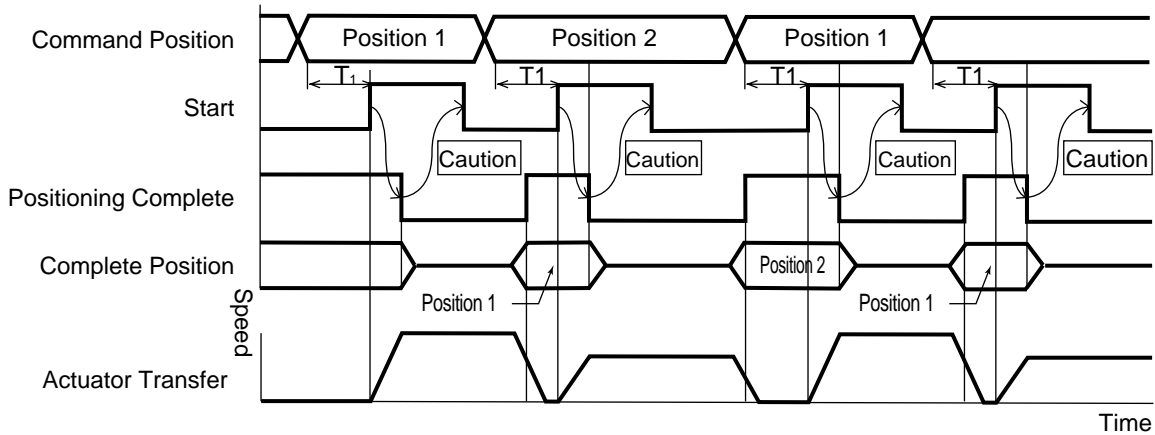
# 5. Application (Practice)

## 5-4 Positioning Mode (2 point space reciprocation)

Movement example: Reciprocate 2 positions. Assign the position 1 at 250mm from home, and Position 2 at 100mm from home. Set speed to 200mm/sec for Position 1 and 100mm/sec for Position 2. For both positions, assign the positioning width to 0.



# 5. Application (Practice)



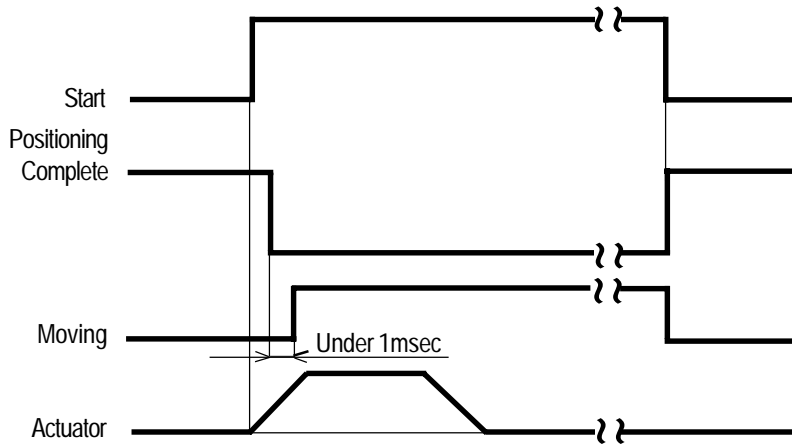
$T_1$ : Over 5msec Time from Command Position Select Input to Start Signal ON

(However, please consider the scan time of the upper controller)

**Caution:**

*Positioning complete Output will turn OFF once the start signal turns ON.  
You may execute Start Signal OFF only after confirming that the Positioning Complete Output is turned OFF.*

*As the diagram below shows, if you leave the Start Input ON, the Positioning Complete Output will not turn ON even after the actuator transfer completes.*



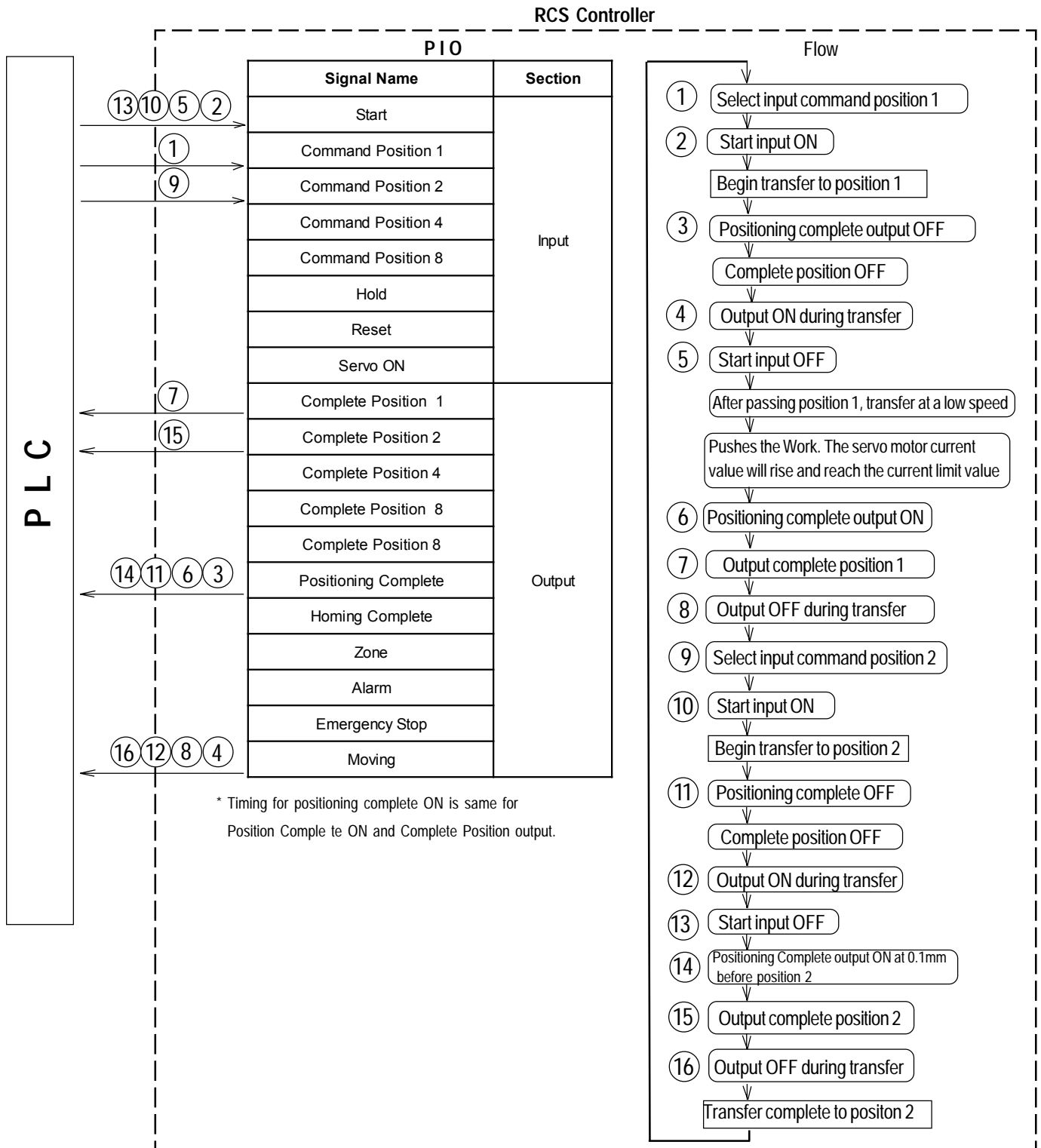
## 5-5 Push Mode

Movement Example: Use via Push Mode and Positioning Mode. Assign the Position 1 at 280mm from home and the Position 2 to 50mm from home. Move to Position 1 in Push Mode. Use the Push Mode to move to Position 2 (match to opposite motor side direction). Assign the maximum push to 2mm, and the current limit value during push to 50%.

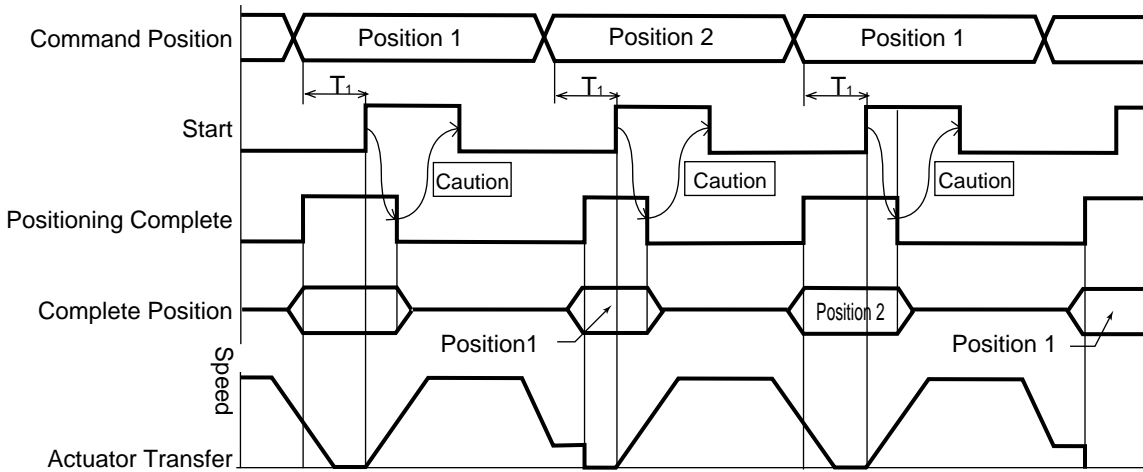
# 5. Application (Practice)

**Position Data Table (Columns with thick lines indicate input insert)**

| No. | Position | Speed | Acc./Dec.Speed | Push | Positioning Width | Acc. only MAX |
|-----|----------|-------|----------------|------|-------------------|---------------|
| 0   | *        | *     | *              | *    | *                 | *             |
| 1   | 25 0     | 200   | 0.3            | 50   | 2                 | 0             |
| 2   | 50       | 100   | 0.3            | 0    | 0.1               | 0             |



# 5. Application (Practice)



$T_1$ : Over 5msec Time from Command Position Select Input to Start Signal ON

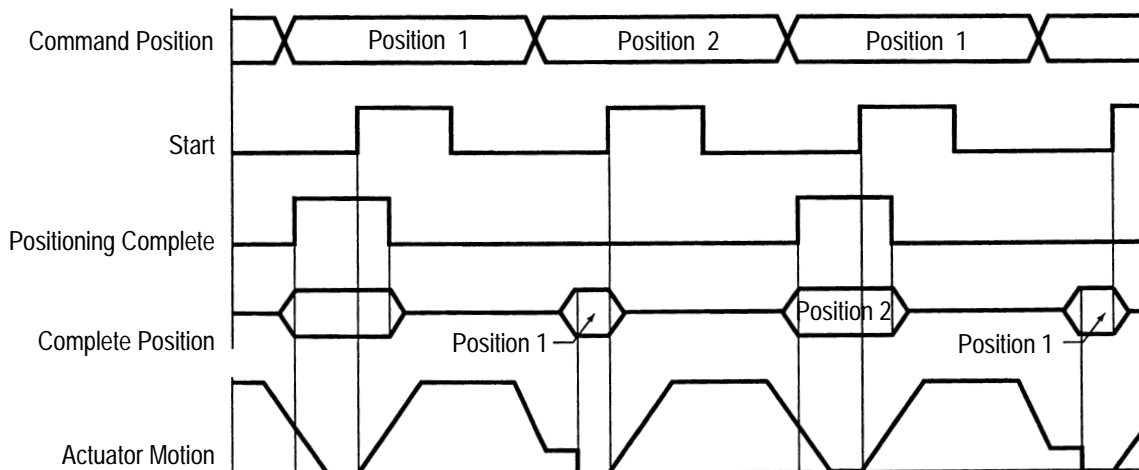
(However, please consider the scan time of the upper controller)

**Caution:**

**Once the Start Signal turns ON, the Positioning Complete Output will turn OFF. Please execute Start Signal OFF only after confirming that the Positioning Complete Output turns OFF.**

**Caution:**

**When the push completes stroke, as the diagram below shows, the Positioning Complete Output will not turn ON, only the Complete Position outputs.**



# 5. Application (Practice)

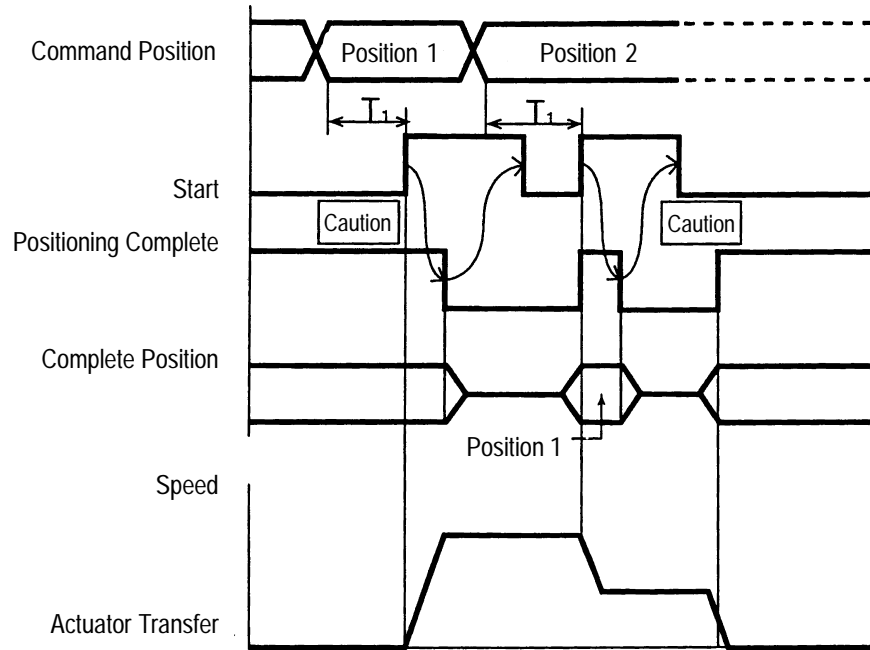
## 5-6 Speed Change Movement During Transfer

**Movement Example:** During movement, speed decreases towards given location. Assign Position 1 at 150mm away from home, and Position 2 at 200mm away from home. The location will be near the home away from the initial position. Assign Position 2 as the carry-over position, and move to Position 1 at a speed of 200mm/sec and from Position 1 to 2 move 100mm/sec.

**Method:** In this case, motion is executed consecutively, first with Position 1, then followed by Position 2. However, before stopping at Position 1, it is necessary to first execute Select Input Start Signal Input after setting the Command Position. To achieve this, set the Pos band for Position 1 and right after Position 1 is complete, input the Start Signal for Position 2 (Command Position inputs should be set during movement to Position 1).

**Position Data Table (Columns with thick lines indicate input insert)**

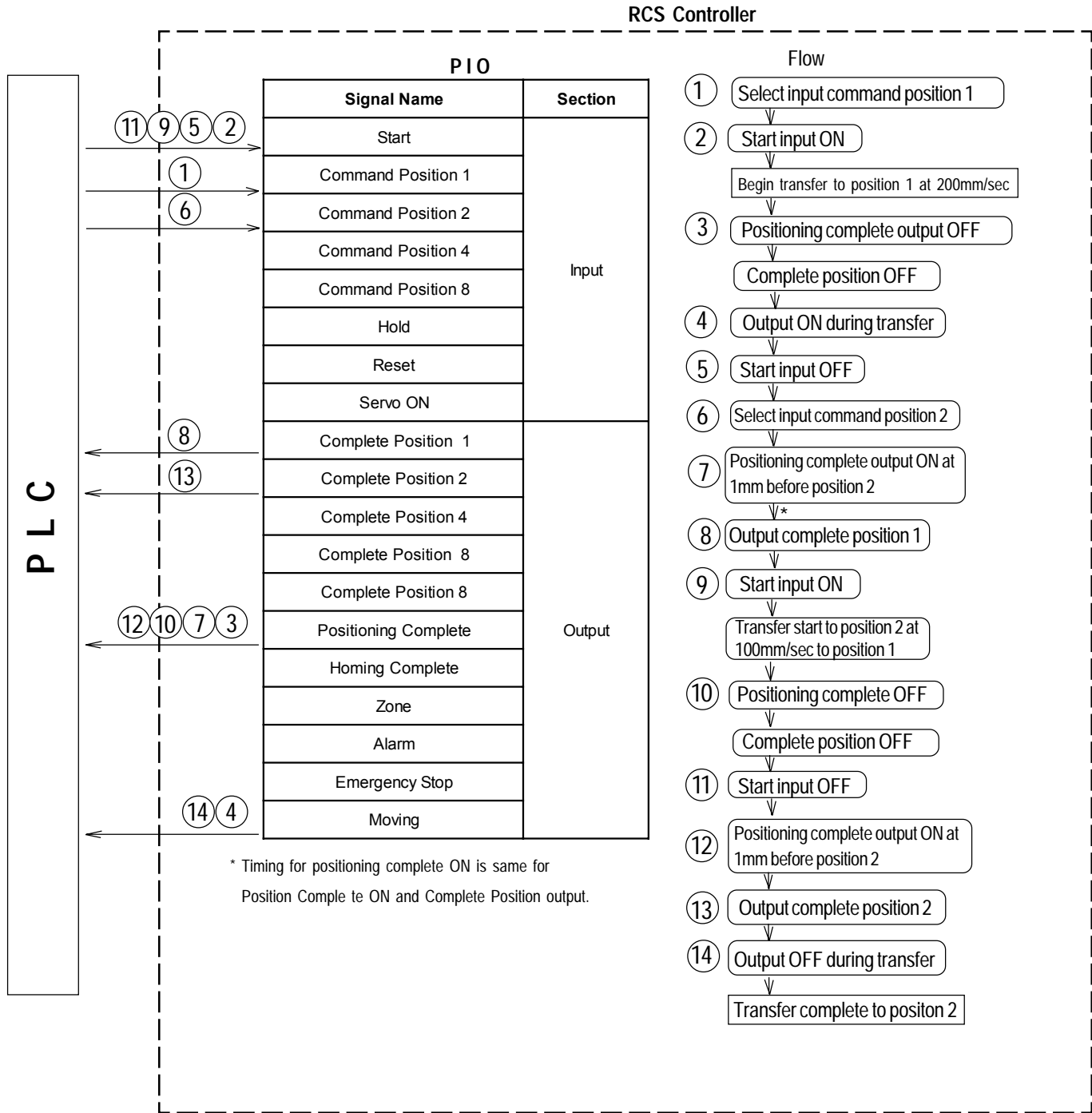
| No. | Position | Speed | Acc | Push | Pos. Band | MAX ACC | ABS/INC |
|-----|----------|-------|-----|------|-----------|---------|---------|
| 0   | *        | *     | *   | *    | *         | *       |         |
| 1   | 150      | 200   | 0.3 | 0    | 1         | 0       |         |
| 2   | 200      | 100   | 0.3 | 0    | 0.1       | 0       |         |
| ⋮   |          |       |     |      |           |         |         |
| ⋮   |          |       |     |      |           |         |         |



T1: Over 5msec Time from Command Position Select Input to Start Signal ON

**Caution:**  
 Once the Start Signal turns ON, the Positioning Complete Output will turn OFF.  
 Please execute Start Signal OFF only after confirming that the Positioning Complete Output turns OFF.

# 5. Application (Practice)



# 5. Application (Practice)

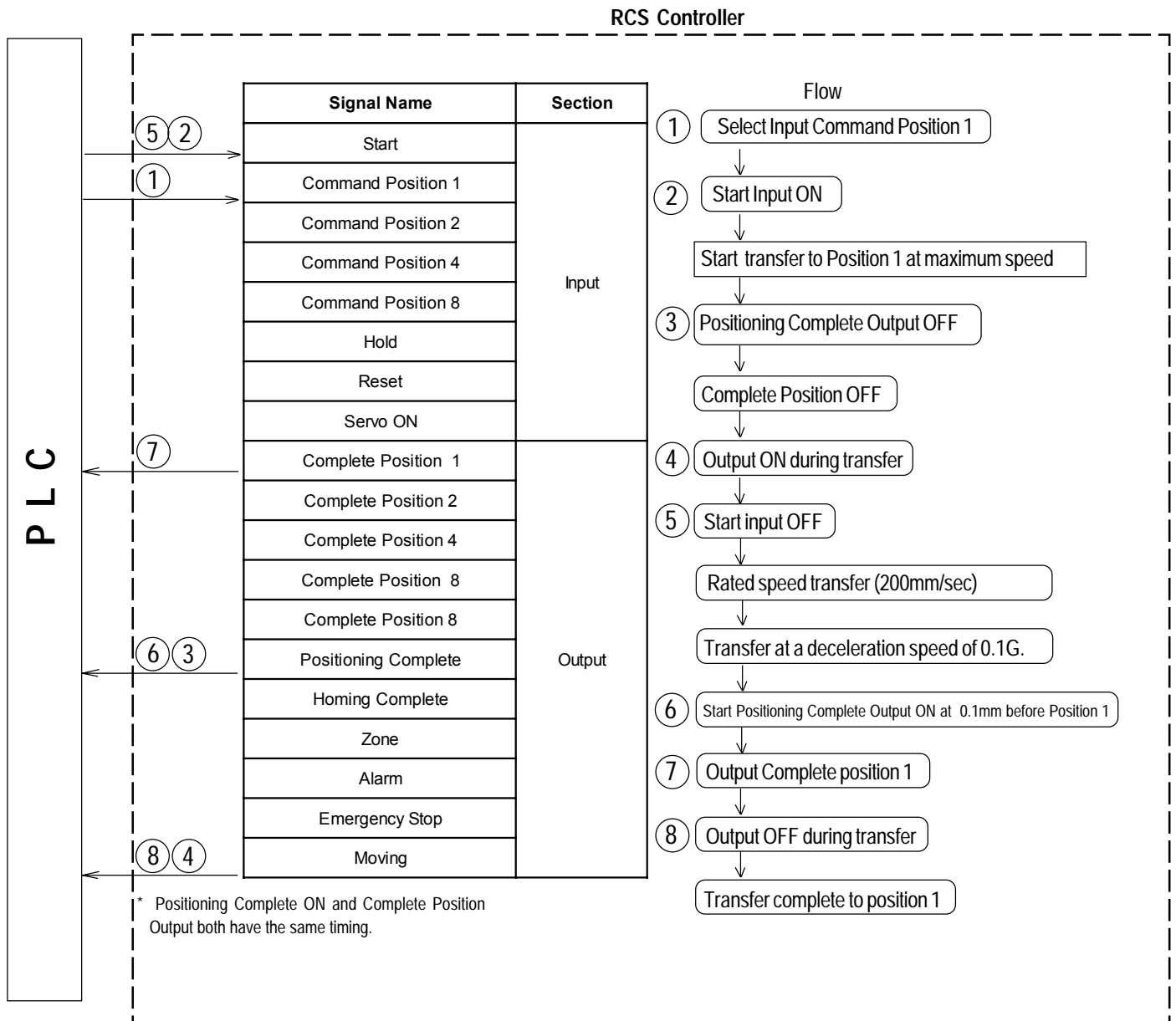
## 5-7 Movement Using Different Acceleration Value • Deceleration Value

**Movement Example:** Positioning is executed at a speed of 200mm/sec at a location (Position 1) 150mm away from home. Acceleration is transferred at a maximum acceleration and deceleration of 0.1G that are matched to the load.

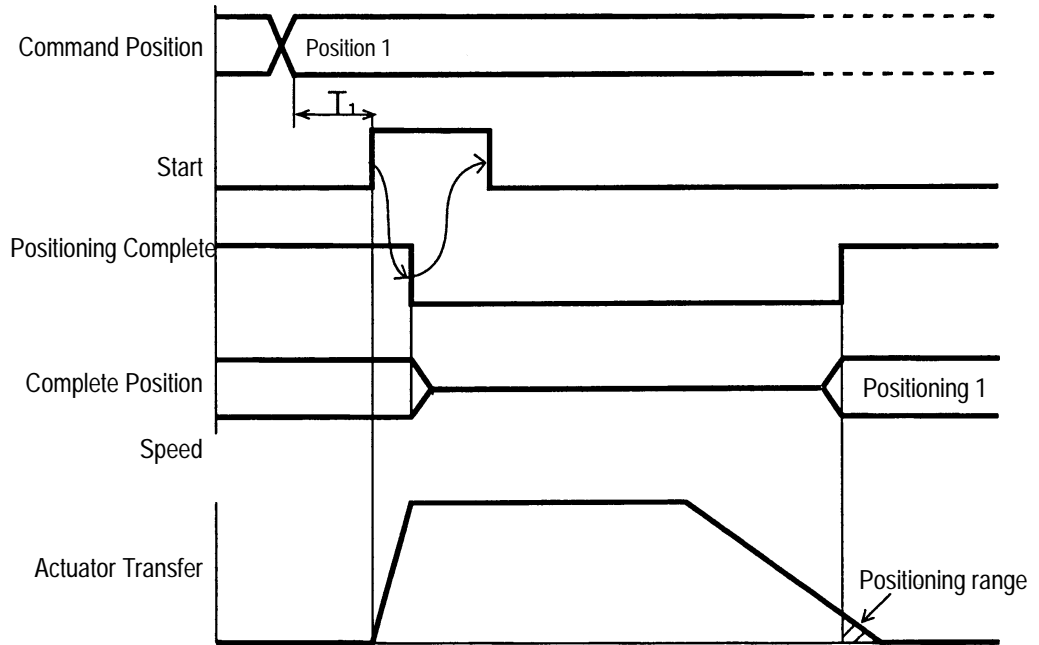
**Method:** By inputting “1” into MAX ACC of the position data, the acceleration will be the maximum acceleration which matches the load.

**Position Data Table (Columns with thick lines indicate input insert)**

| No. | Position | Speed | Acc | Push | Pos. Band | MAX ACC |
|-----|----------|-------|-----|------|-----------|---------|
| 0   | *        | *     | *   | *    | *         | *       |
| 1   | 150      | 200   | 0.1 | 0    | 1         | 1       |
| ... |          |       |     |      |           |         |



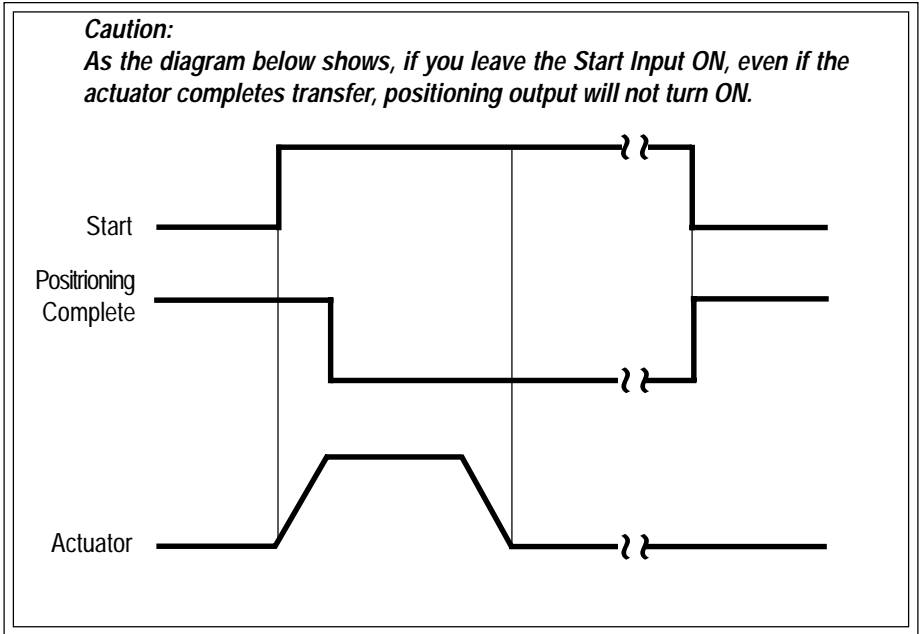
# 5. Application (Practice)



T1: Over 5msec Time from Command Position Select Input to Start Signal ON

(However, please consider the scan time of the upper controller)

**Caution:**  
 Once the Start Signal turns ON, the Positioning Complete Output turns OFF.  
 Please execute Start Signal OFF only after confirming that the Positioning Complete Output turns OFF.

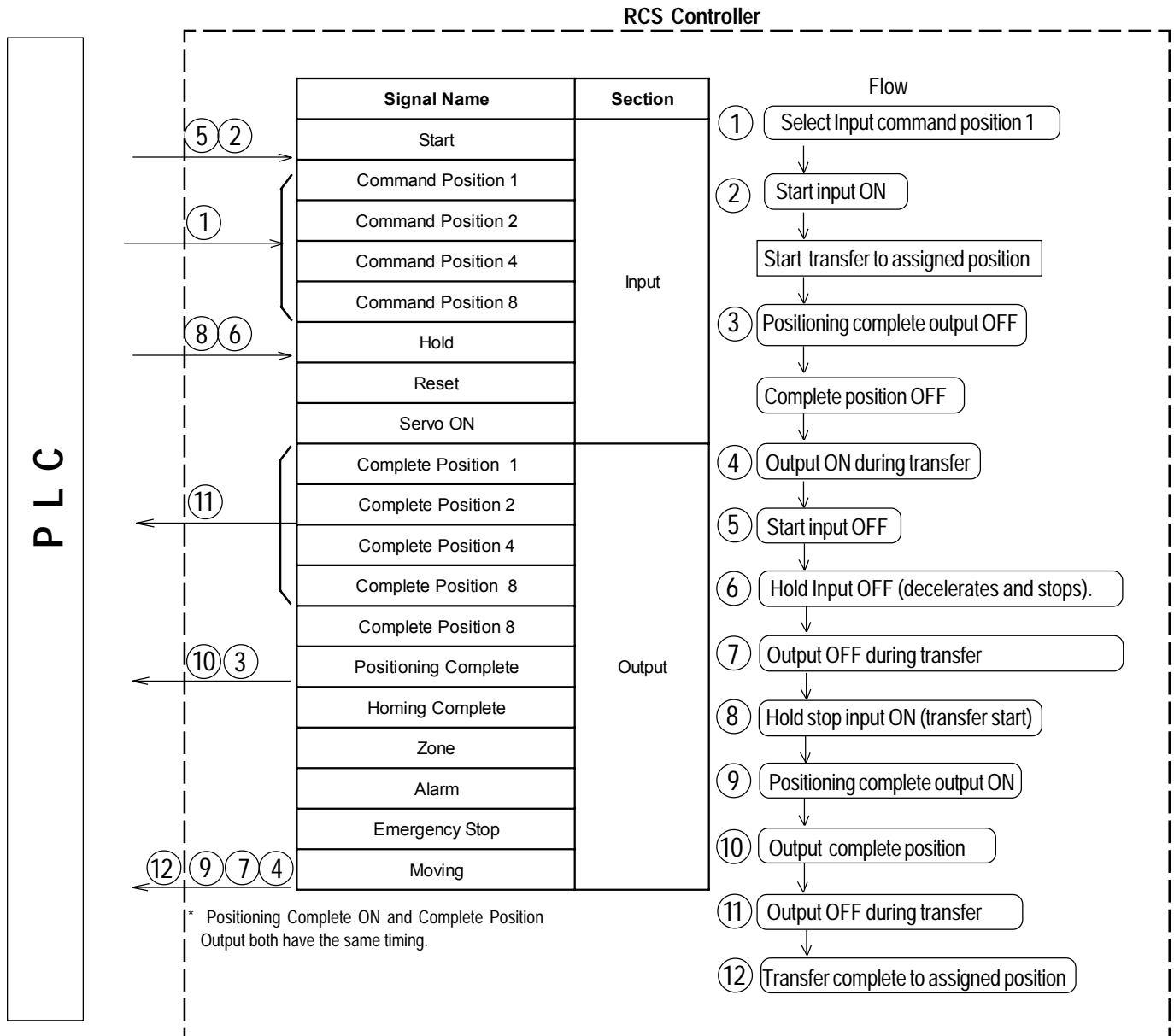


# 5. Application (Practice)

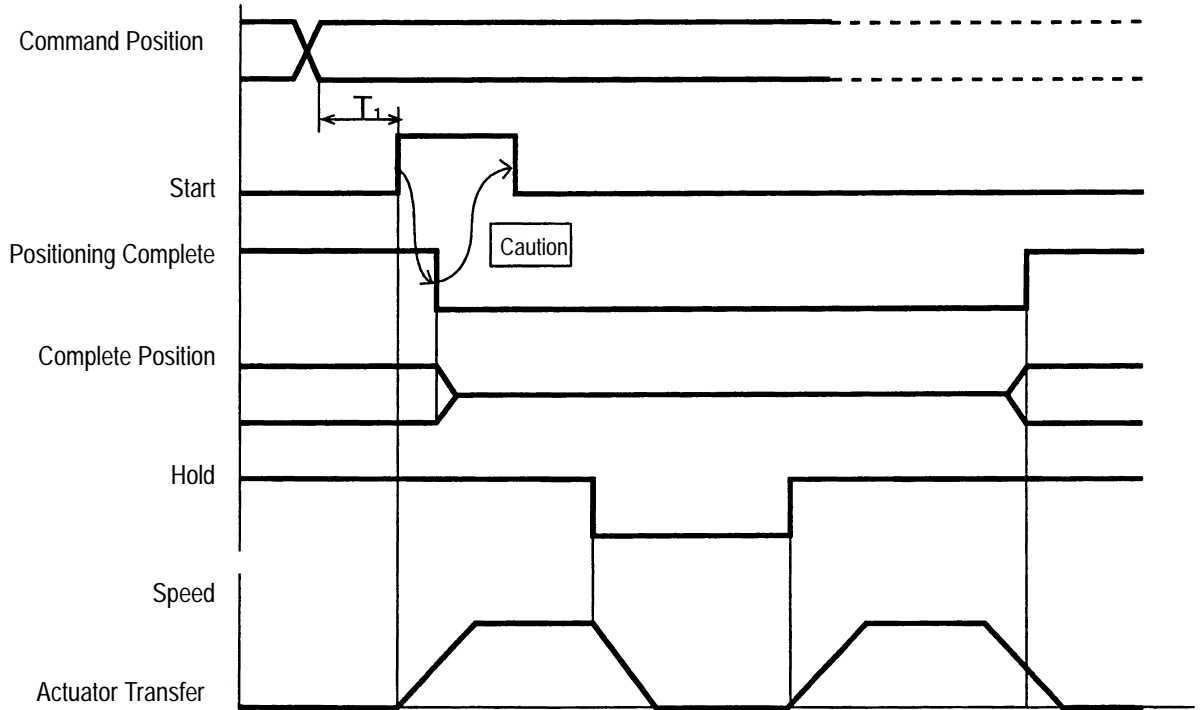
## 5-8 Hold Input

**Movement Example:** Temporary stops the movement of the actuator.

**Method:** Uses the Hold Input.



# 5. Application (Practice)

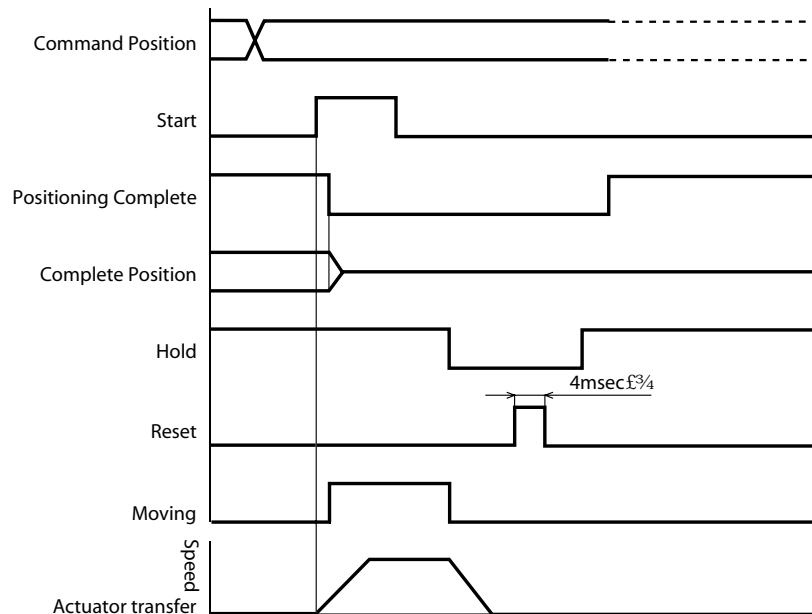


T1: Over 5msec Time from Command Position Select Input to Start Signal ON

(However, please consider the scan time of the upper controller)

**Caution:**  
 Once the Start Signal turns ON, the Positioning Complete Output turns OFF.  
 Please execute Start Signal OFF only after confirming that the Positioning Complete Output is turned OFF.  
 Frequent use of Sudden Stop Input will shorten the actuator's life span.

You can cancel the remaining transfer load by turning ON the reset input during hold (you can detect and cancel reset signal riser).



# 5. Application (Practice)

## 5-9 Zone Signal Output

### Movement Example:

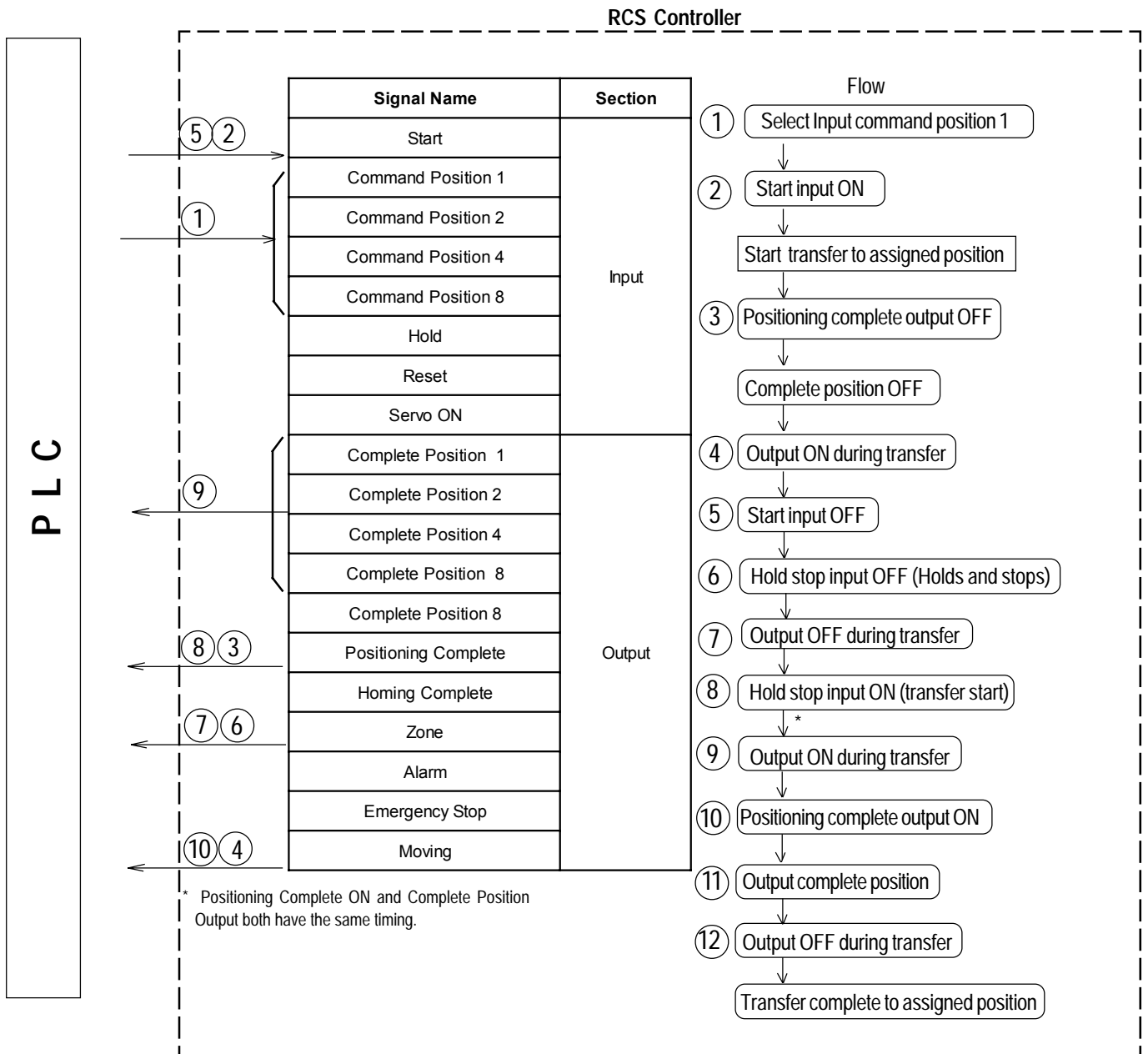
During motion, Zone Signal will turn ON output from 40mm position to 120mm position, then turns OFF ( $40\text{mm} \leq \text{Zone Signal Output} \leq 120\text{mm}$ ).

### Method:

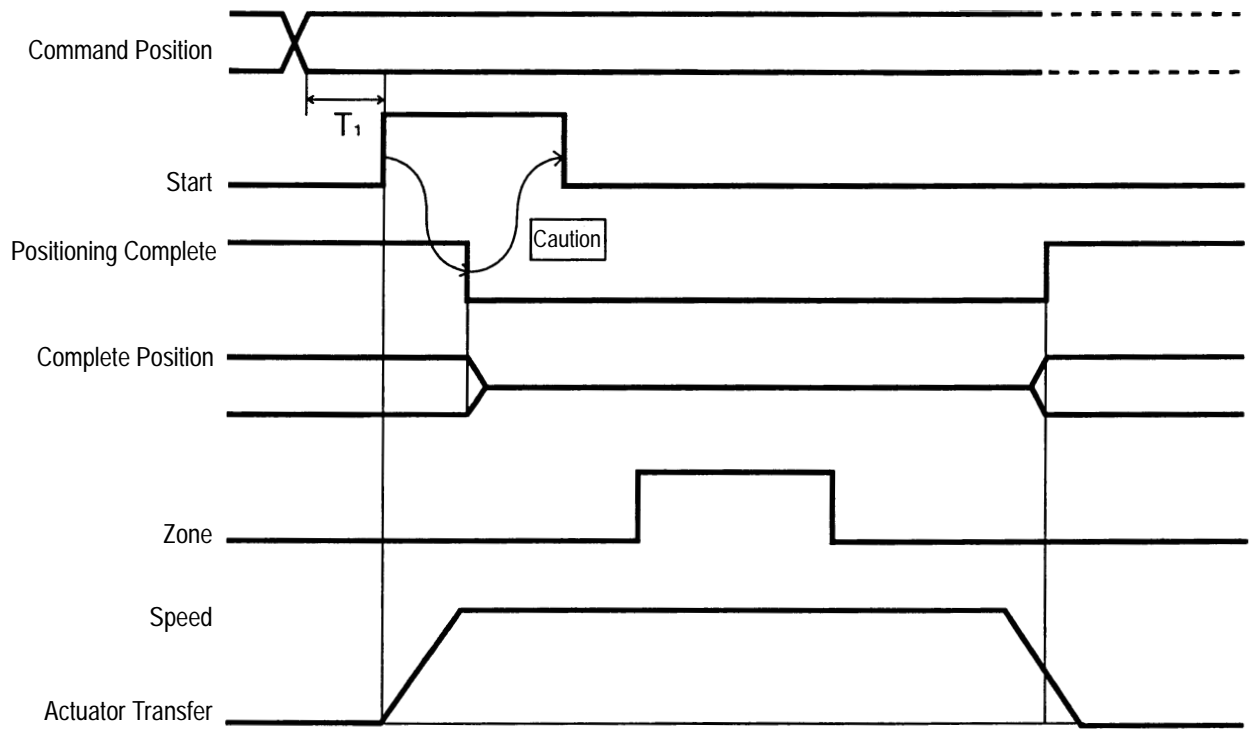
Zone Signal Output boundary is set in the Parameter Zone Value and Zone Boundary Value -.

Input as the following:

|                       |     |
|-----------------------|-----|
| Zone Boundary Value + | 120 |
| Zone Boundary Value - | 40  |



# 5. Application (Practice)



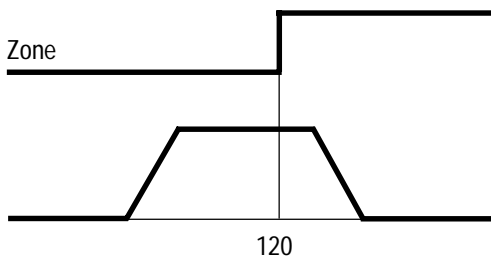
T1: Over 5msec Time from Command Position Select Input to Start Signal ON

(However, please consider the scan time of the upper controller)

**Caution:**  
 Once the Start Signal turns ON, the Positioning Complete Output turns OFF.  
 Please execute Start Signal OFF only after confirming that the Positioning Complete Output has turned OFF.

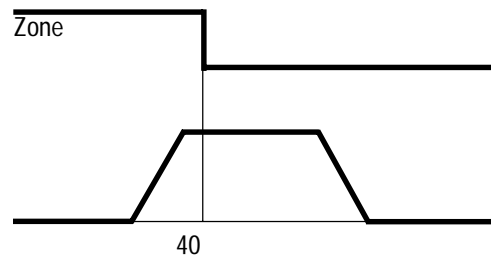
Other zone outputs (examples):

Zone Output at over 120



|                       |                       |
|-----------------------|-----------------------|
| Zone Boundary Value + | Maximum Stroke Length |
| Zone Boundary Value - | 120                   |

Zone output at under 40



|                       |    |
|-----------------------|----|
| Zone Boundary Value + | 40 |
| Zone Boundary Value - | 0  |

# 5. Application (Practice)

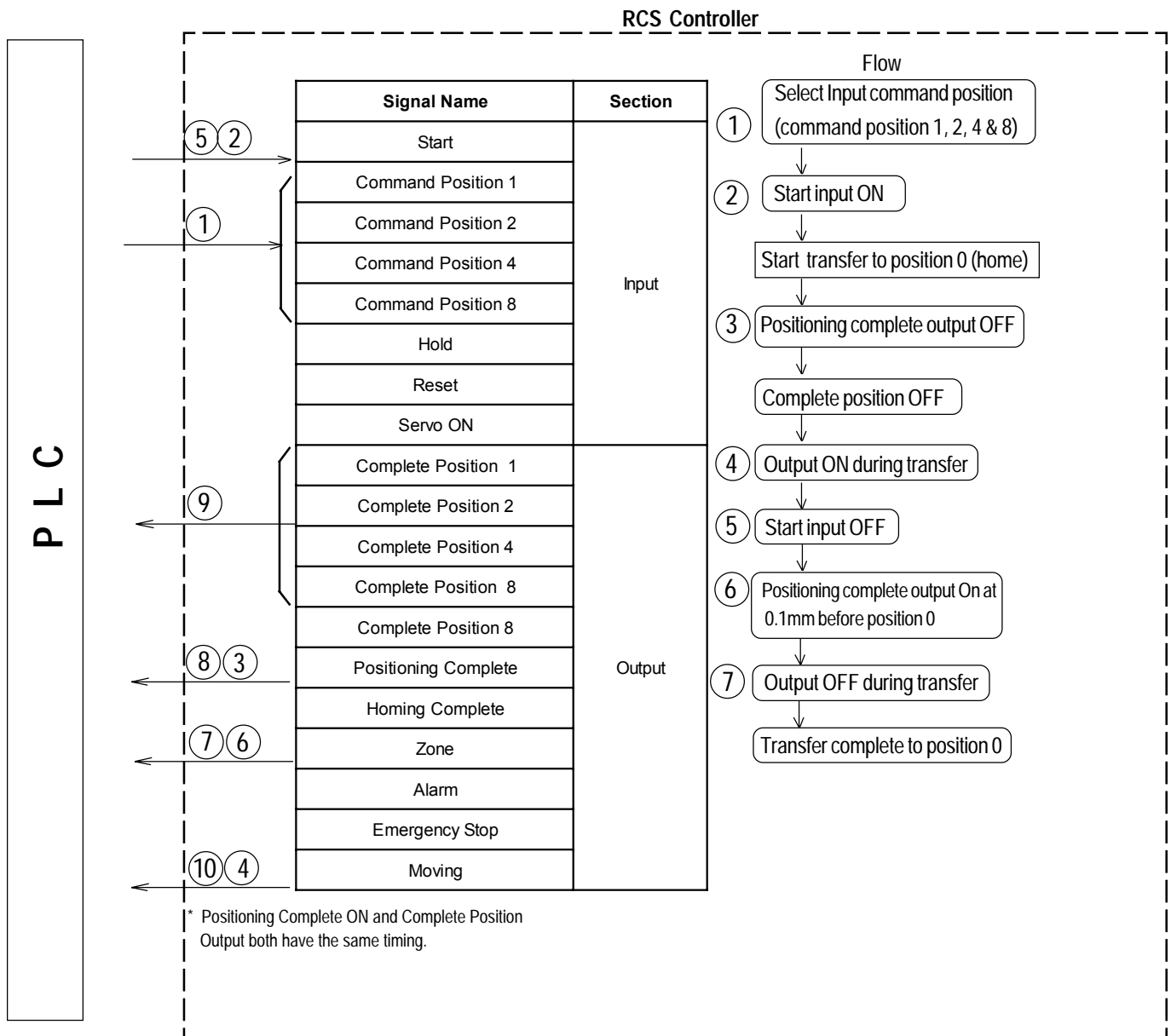
## 5-10 Transfer to Home

**Movement Example:** You cannot home using only PIO. Homing occurs when controller is told to move to a point prior to homing.

**Method:** This is a method which forces a point data of distance 0 from the home, and moves to that location after homing is complete.

**Position Data Table (Columns with the thick lines indicate the input insert)**

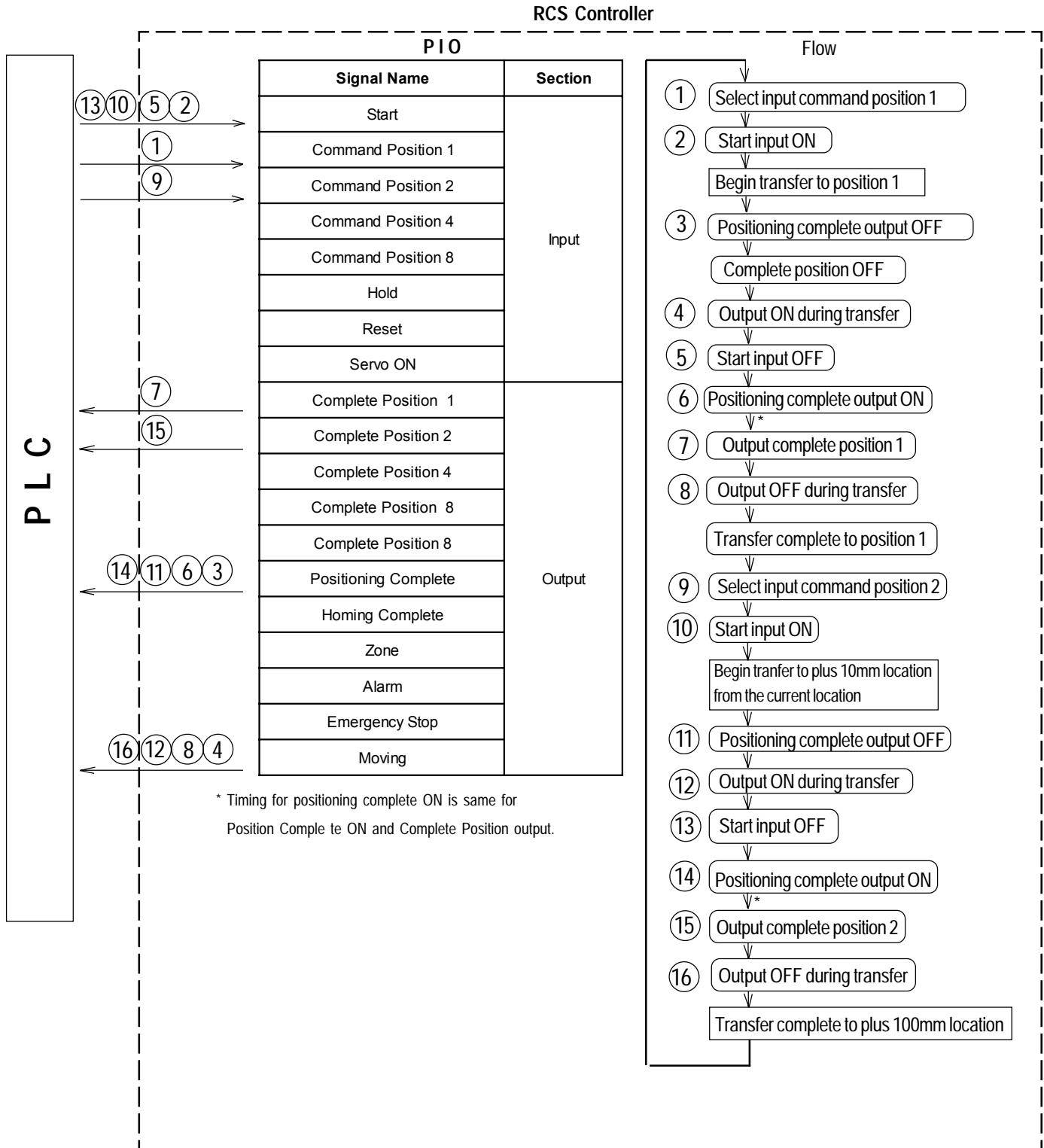
| No. | Position | Speed | Acc | Push | Pos. Band | Max Acc | ABS/INC |
|-----|----------|-------|-----|------|-----------|---------|---------|
| 0   | 0        | 100   | 0.3 | 0    | 0.1       | 0       |         |
| 1   | *        | *     | *   | *    | *         | *       |         |
| ⋮   |          |       |     |      |           |         |         |



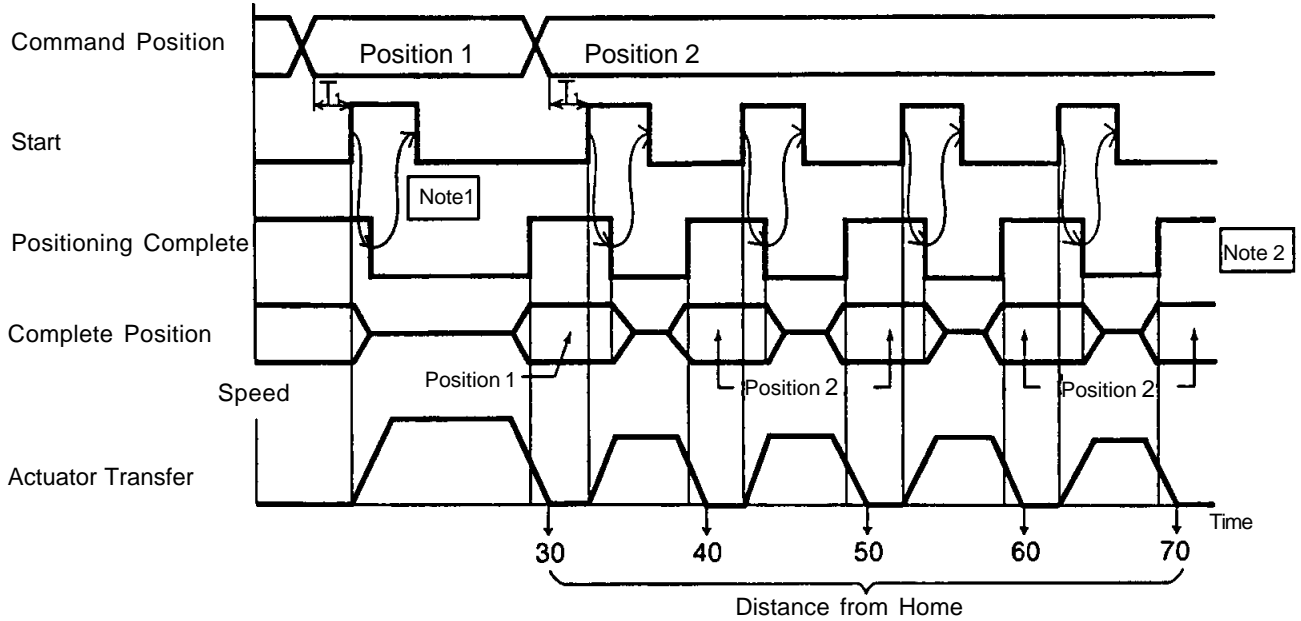
# 5. Application (Practice)

## 5-11 Incremental Movement in Relative Coordinate

Movement example: Move to position 30mm from home, and from there, move the actuator in an increment of 10mm. The transfer speed from home to the 30mm location is set at 100mm/sec, and the 10mm incremental movements are set at 20mm/s.



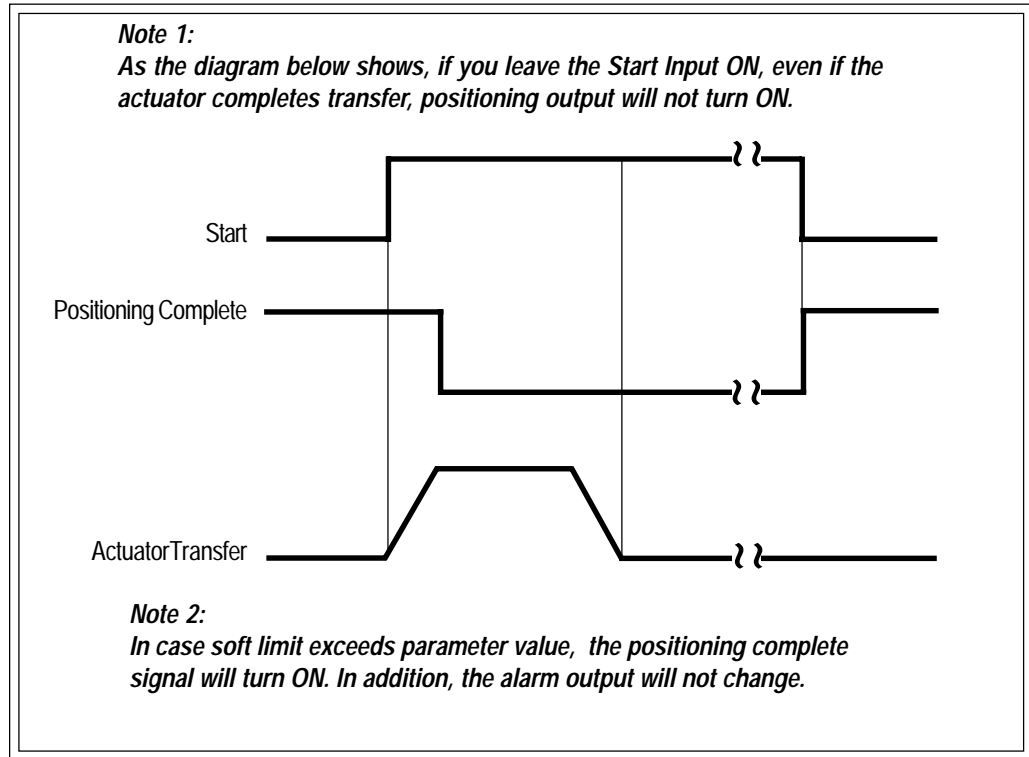
# 5. Application (Practice)



T1: Over 5msec Time from Command Position Select Input to Start Signal ON

(However, please consider the scan time of the upper controller)

**Caution:**  
 Once the Start Signal turns ON, the Positioning Complete Output turns OFF.  
 Please execute Start Signal OFF only after confirming that the Positioning Complete Output has turned OFF.



# 5. Application (Practice)

## 5-12 Caution Regarding Relative Coordinate Assign

### (1) Caution During Positioning Movement

When selecting a relative position through the I/O and toggling the Start Input, during actuator motion towards another point, the distance of the next point selected will be added to the initial position of the point. If the next point is in the negative direction relative to the first point, the actuator moves to a position as the result of the subtraction of the 2 positions.

Example: When the Start Input of Position 2 is executed during movement to Position 1 (Table 5-12-1), moves to the position 40mm away from home.

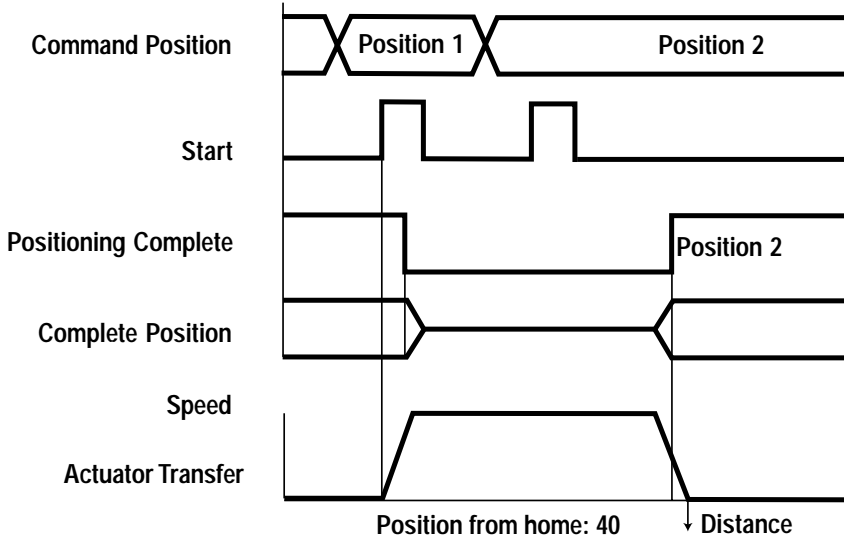
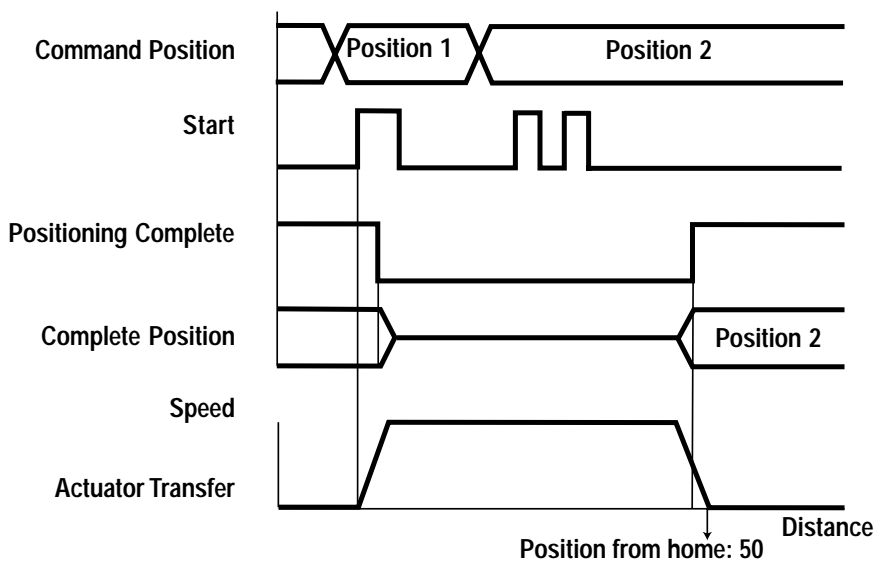


Table 5-12-1

| No. | Position | Speed |
|-----|----------|-------|
| 0   | *        | *     |
| 1   | 30       | 100   |
| 2   | 10       | 100   |
| ⋮   | ⋮        | ⋮     |

In addition, when the Start Input is executed numerous times during position movement, the actuator moves to a position that is five times the distance of the initial position input.

Example: In case Start Input of Position 2 is executed (Table 5-12-1 above) twice during movement towards Position 1, the actuator moves to a position approximately 50mm away from home.



# 5. Application (Practice)

## (2) Caution During Push Movement

If a relative position is selected while the actuator is in motion to another position during Push Mode, the actuator moves to a position that is summation of the primary and secondary positions.

Example: The Start Input of Position (Table 5-12-1) is executed during movement towards Position 1 during Push Mode and the actuator moves to a position that is 10mm away from the Input Position 1. Total displacement is 60mm from home.

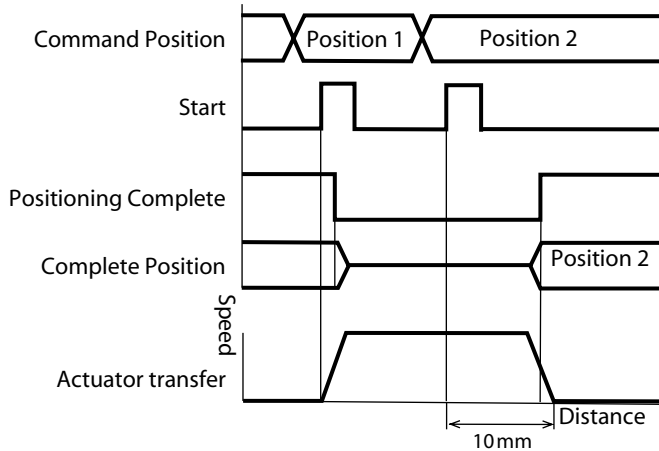


Table 5-12-2

| No. | Position | Speed |
|-----|----------|-------|
| 0   | *        | *     |
| 1   | 50       | 100   |
| 2   | 10       | 100   |
| ⋮   | ⋮        | ⋮     |

## (3) Accumulation Error Due to Consecutive Relative Transfer

The position data only recognizes a minimum resolution. The minimum resolution is specified according to lead and number of encoder pulse. Therefore, an error may occur between the value input in the position and the corresponding movement of the actuator. When a relative transfer is executed consecutively, this error will accumulate.

The maximum error range per each actuator type is listed in the tables below:

|             | Type | Motor W | Speed Type | Screw Lead | Maximum error $\mu$ |
|-------------|------|---------|------------|------------|---------------------|
| Slider Type | SA4  | 20      | L          | 2.5        | 0.2                 |
|             |      |         | M          | 5          | 0.3                 |
|             |      |         | H          | 10         | 0.6                 |
|             | SA5  | 20      | L          | 3          | 0.2                 |
|             |      |         | M          | 6          | 0.4                 |
|             |      |         | H          | 12         | 0.7                 |
|             | SA6  | 30      | L          | 3          | 0.2                 |
|             |      |         | M          | 6          | 0.4                 |
|             |      |         | H          | 12         | 0.7                 |
|             | SSR  | 60      | M          | 6          | 0.4                 |
|             |      |         | H          | 12         | 0.7                 |
|             | SMR  | 100     | M          | 10         | 0.6                 |
| H           |      |         | 20         | 1.2        |                     |
| 150         |      | M       | 10         | 0.6        |                     |
|             |      | H       | 20         | 1.2        |                     |
| Flat Type   | F45  | 30      | L          | 2.5        | 0.2                 |
|             |      |         | M          | 5          | 0.3                 |
|             |      |         | H          | 10         | 0.6                 |
|             | F55  | 60      | L          | 4          | 0.2                 |
|             |      |         | M          | 8          | 0.5                 |
|             |      |         | H          | 16         | 1.0                 |
|             |      | 100     | L          | 4          | 0.2                 |
|             |      |         | M          | 8          | 0.5                 |
|             |      |         | H          | 16         | 1.0                 |

|          | Type   | Motor W | Speed Type | Screw Lead | Maximum error $\mu$ |
|----------|--------|---------|------------|------------|---------------------|
| Rod Type | RA35   | 20      | L          | 2.5        | 0.3                 |
|          |        |         | M          | 5          | 0.6                 |
|          |        |         | H          | 10         | 1.2                 |
|          | RA45   | 30      | L          | 2.5        | 0.2                 |
|          |        |         | M          | 5          | 0.3                 |
|          |        |         | H          | 10         | 0.6                 |
|          | RA55   | 60      | L          | 4          | 0.2                 |
|          |        |         | M          | 8          | 0.5                 |
|          |        |         | H          | 16         | 1.0                 |
|          |        | 100     | L          | 4          | 0.2                 |
|          |        |         | M          | 8          | 0.5                 |
|          |        |         | H          | 16         | 1.0                 |
|          | RB7525 | 30      | L          | 2.5        | 0.8                 |
|          |        |         | M          | 5          | 1.6                 |
|          |        |         | H          | 10         | 3.3                 |
|          |        | 60      | M          | 5          | 1.6                 |
|          |        |         | H          | 10         | 3.3                 |
|          |        |         | RB7530     | 60         | L                   |
|          | M      | 6       |            |            | 2.0                 |
|          | H      | 12      |            |            | 3.9                 |
|          | 100    | L       |            | 6          | 2.0                 |
| M        |        | 12      |            | 3.9        |                     |
| RB7535   |        | 100     |            | L          | 4                   |
|          | M      |         | 8          | 2.6        |                     |
|          | H      |         | 16         | 5.2        |                     |
|          | 150    | M       | 8          | 2.6        |                     |
|          |        | H       | 16         | 5.2        |                     |

## 6. Parameter List

### Parameter List

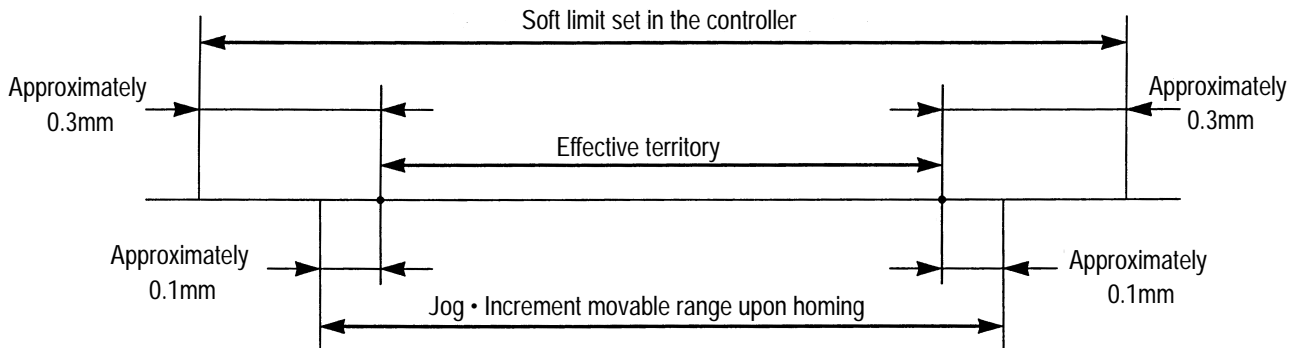
|   |   |   |
|---|---|---|
| Zone Limit + side (mm)                          | Maximum value of zone output.   |   |
| Zone Limit - side (mm)                          | Minimum value of zone output.   |   |
| Soft Limit + side (mm)                          | Sets the soft limit value in the plus direction.  |   |
| Soft Limit - side (mm)                          | Sets the soft limit value in the minus direction.   |   |
| HOME Direction (0:Motor/1: Reverse)             | Sets the homing direction.  |   |
| Push Recognition Time (msec)                    | During a move, if the push % is sustained for this amount of time, the position complete output turns ON.     |   |
| Servo Gain No.                                  | Set the servo gain.   |   |
| Initial Speed Setting (mm/sec)                  | Speed initial value of position data table.   |   |
| Initial Acceleration Setting (G)                | Acc in position data table.   |   |
| Initial Position Band (mm)                      | Acc in position data table.   |   |
| Acceleration Only Max's Flag Initial Amount     | MAX Acc initialization of position data table.  |   |
| Current limit value during positioning stop (%) | Determines the stop maintenance after positioning   | * |
| Current limit value during homing (%)           | Sets the current limit value during machine end impact due to homing (at the time of shipment 100%)           | * |
| Movement flag during stop                       | Sets effect · ineffect of dynamic brake during stop.<br>0: Ineffect<br>1: Effect (at the time of shipment, 1) |   |

\*: To change the value, please contact your IA representative.

To change the soft limit on the user side, please set a value that extends 0.3mm on the outer side of the effective territory.

Example: In case of setting the effective territory from 0mm~80mm

Soft limit + side 80.3  
Soft limit - side -0.3



# 7. Alarm List

- In case you wish to change the home direction, position data already input will all clear. As needed, please record the data.
- Reversed homing direction is not possible for the Rod Type Actuators (RSA • RMA types).
- The homing direction setting for the In-Line Type Actuators (SSR • SMR types) is opposite.  
(0: Normal 1: Reverse)

**Caution:** Upon executing parameter changes, please cycle the controller power.  
The parameter will overwrite but some may not be effected by simply turning OFF • ON the emergency stop switch and PORT switch.

## 7. Alarm List

When an alarm occurs, ALM of the Controller LED Display will blink. The alarm content can be understood by the combination of the PIO Alarm Output and Complete Position Output.

○ = ON    ● = OFF

| Alarm | Complete Position No. |   |   |   | Alarm Content                     | Alarm Code* |
|-------|-----------------------|---|---|---|-----------------------------------|-------------|
|       | 8                     | 4 | 2 | 1 |                                   |             |
| ○     | /                     | / | / | / | Normal                            | /           |
| ●     | ●                     | ○ | ● | ○ | CPU abnormal                      | 0FA         |
| ●     | ●                     | ○ | ○ | ● | Wrong EEPROM Data Setting         | 0B0, 0B1    |
| ●     | ●                     | ○ | ○ | ○ | Homing abnormal                   | 0BE         |
| ●     | ○                     | ● | ● | ● | Servo malfunction                 | 0C0         |
| ●     | ○                     | ● | ● | ○ | Electric conversion area abnormal | 0B8~0CA     |
| ●     | ○                     | ● | ○ | ○ | Excessive deviation abnormal      | 0D8, 0DC    |
| ●     | ○                     | ○ | ● | ● | Excessive load abnormal           | 0ED         |
| ●     | ○                     | ○ | ● | ○ | Encoder breakage                  | 0E4~0E7     |
| ●     | ○                     | ○ | ○ | ○ | Corruption of EEPROM data         | 0F8         |

1. Cycle power to clear the alarm.
2. If the alarm does not clear by the above procedure, the controller or the encoder cable may be damaged.

## 7. Alarm List

If a malfunction is encountered while using the PC software or teaching pendant, an error will appear. Please refer to the Error Table below.

**Caution: When connecting to the host using the SIO, please make sure to refer to the error code list of the “Robo Cylinder Communication Protocol List.”**

Error Table

| Code | Error Description               | Common Solutions   |
|------|---------------------------------|--|
| 040  | Emergency Stop                  | Emergency stop status.   |
| 05A  | Transmission Error              | Abnormal Communication, Check for noise. Inspect all serial ports and cables involved.   |
| 05B  | Transmission Framing Error      |  |
| 05D  | Start Text Error                |  |
| 05E  | End Text Error                  |  |
| 07F  | BCC Error                       |  |
| 061  | FNCCHR, W Address Error         | Serial string needs to be formatted correctly.   |
| 062  | 1 Operand Error                 | Incorrect Data Command (possibly an operation not allowed with the controller type).   |
| 063  | 2 Operand Error                 | Incorrect Data Command (possibly an operation not allowed with the controller type).<br>In case of another placed controller, there could be an initialization of rotation numbers which surpasses 2000rpm against the SW7-ON, SW8-off against the controller.<br>Incorrect Data Command Rejection (could be an operation not allowed with the controller type). |
| 064  | 3 Operand Error                 | Incorrect Data Command (possibly an operation not allowed with the controller type).   |
| 067  | BCC Error                       | Incorrect Data Command. Characters other than 0~9 is included in the BCC.  |
| 070  | RUN-OFF, Transfer Command       | Execution Requirement Incompatible Command Rejection (possibly due to External POP command).   |
| 071  | No homing, PTP                  |  |
| 073  | Servo ON, Error Reset           |  |
| 074  | Communication Error             |  |
| 075  | During homing, movement command | When release is not possible with the controller power reinstalled, you will need to either execute a common parameter edit or initialize the controller.  |
| 0B0  | Bank 30 Error (Parameter)       | Execute a common parameter edit or initialize the controller.  |
| 0B1  | Bank 31 Error (Point)           | When release is not possible with the controller power installed, you will need to either execute a common parameter edit or initialize the controller.<br>1. Cycle power to controller<br>2. Possibly, parameters need to be set correctly.   |
| 0BE  | Homing Timeout                  | Check physical connection of the motor and actuator. Actual movement may not be happening.   |

## 7. Alarm List

---

| Code | Error Description          | Common Solution  |
|------|----------------------------|--|
| 0C0  | Excess Speed               | Please reduce the payload or lower the velocity and ACC/DEC.   |
| 0C1  | Servo Error                |  |
| 0C8  | Overcurrent                | Motor main circuit may have short circuited., due to a spontaneous excessive load. This alarm will not home unless reapplying power. |
| 0C9  | Excess Voltage             | Load may be too big. Please check also for mechanical binding.   |
| 0CA  | Excess Heat                | Ambient temperature may be too high.   |
| 0D8  | Deviation Overflow         | Please check the mechanical binding.   |
| 0DC  | Excess Push Movement Range | Possible excess movement range during push movement.   |
| 0E0  | Excess Load                | Load may be too big. Please check for mechanical binding. `  |
| 0E4  | Encoder Transmission Error | This is the transmission error of encoder reception. Either the noise or reception IC board may have broken down.                    |
| 0E5  | Encoder Reception Error    |  |
| 0E6  | Encoder Counter Error      | This is the counter error of the encoder. This occurs when number of rotation exceeds 5000rpm.                                       |
| 0E7  | No A, B and Z Feedback     | Please check the encoder/cable.  |
| 0E8  | No A and B Pulse Feedback  |  |
| 0F8  | Fixation Memory Breakage   | Controller initialization is needed.   |
| 0FA  | Abnormal CPU               | CPU shows abnormal movement. Noise may have entered.   |
| 101  | Over Run Error (S)         | Check the competition in baud rate • SIO main station subordinatesstations (during update)   |
| 102  | Framing Error (S)          | Check the competition in baud rate cable • short • noise SIO main station • subordinate stations                                     |
| 104  | SCI R-QUE OV (S)           | Receiving external excessive data (during update).   |
| 105  | SCI S-QUE OV (S)           | SCI transmission QUE over flow (during update)   |
| 106  | Termi R-BF OV (S)          | Receiving external excessive data (during update).   |
| 10A  | Motorola Sum error         | Update program file is abnormal (during update).   |
| 10B  | Motorola S Record Error    | Update program file is abnormal (during update).   |

## 7. Alarm List

| Code | Error Description                             | Common Solution  |
|------|---|--|
| 10C  | Motorola S Address Error                      | Abnormal update program file (during update).  |
| 10D  | Motorola S File Name Error                    | Abnormal update program file (during update).  |
| 10E  | Timing Limit (W) (S)                          | Please check TB-CPU Base Flash ROM address setting DIP-SW (during update).                       |
| 10F  | Timing Limit (E) (S)                          |  |
| 111  | Timing Limit (P) (S)                          |  |
| 112  | Input Data Error                              | Input value is irregular. Please input allowable data.   |
| 113  | Input Under Error                             | Input value is under. Please input allowable data.   |
| 114  | Input Over Error                              | Input value is over. Please input allowable data.  |
| 115  | Homing Incomplete                             | Unallowed operation is being executed during the homing incomplete status. First execute homing. |
| 116  | Test Position Data Exist                      | During position addition, first delete or clear the final position data.                         |
| 117  | No Movement Data                              | When movement must be done, position data is not available.                                      |
| 118  | Non-connect Axis Selection                    | Non-connect axis has been selected (there's no error).   |
| 119  | TB Parameter Excess Rotating Number           | TB internal area parameter allowable rotating number after update has exceeded.                  |
| 11A  | Flash Verify Error: S                         | Please check TB-CPU Base Flash ROM address setting DIP-SW.                                       |
| 11B  | Flash ACK Time Out: M                         |  |
| 11C  | Flash Verify Error M                          |  |
| 11D  | Flash ACK Time Out                            |  |
| 11E  | Pair Data Mismatch Error                      | Please input while being cautious about the matching data's large • small relationship.          |
| 11F  | Absolute Value Under Error                    | The absolute value of the input value is under. Please input allowable data.                     |
| 120  | Initial Factor Error                          | The factor input data during controller initialization is abnormal. Please input allowable data. |
| 121  | Push Search End Over                          | Excess stroke in the push search end location. Please modify the positioning width.              |
| 122  | During distribution, multiple axes connection | Axis No. distribution must always be executed with a single axis being connected.                |
| 180  | Axis No. changes is OK                        | (No error).  |

## 7. Alarm List

---

| Code | Error Description            | Common Solution   |
|------|------------------------------|---|
| 181  | Controller initialization OK | (This is not an error).   |
| 182  | Home Change All Clear        | (This is not an error).   |
| 201  | Emergency Stop               | (This is not an error).   |
| 20A  | During movement, Servo OFF   | During movement., Servo has been turned OFF.  |
| 20C  | During movment, Start ON     | During movement, Servo has been turned ON.  |
| 20D  | During movement, STP-OFF     | During movement, STP has been turned OFF.   |
| 20E  | Soft Limit Over              | Soft Limit Over is detected during movement in the Teaching Pendant.  |
| 20F  | Push Blank -Shot Detection   | Push Blank-Shot was detected during movement using the Teaching Pendant.  |
| 301  | Over Run Error (M)           | Please check for cable short noise • SIO main station •   |
| 302  | Framing Error (M)            | Please check the completion for cable controller power • SIO main station • subordinate stations.                   |
| 304  | SCI R-QUE OV (M)             | Receiving external excessive data.  |
| 305  | SCI S-QUE OV (M)             | SCI transmission QUE over flow (during main station mode).  |
| 306  | Termi R-BF OV (M)            | Receiving external excessive data.  |
| 307  | Memory Comman breakage       | Command from the controller is broken down. Due to unknown cause, please record all error list before TB power OFF. |
| 308  | Response Time Out (M)        | Please check the completion for cable controller power • SIO main station • subordinate stations.                   |
| 309  | Termi Right Address Error    | Termi right address unestablished error.  |
| 30A  | Packet R-QUE OV              | Receiving external excessive data.  |
| 30B  | Packet S-QUE OV              | Packet transmission QUE over flow.  |
| 30C  | No connection error          | Please check the completion for cable controller power • SIO main station • subordinate stations.                   |

## 7. Alarm List

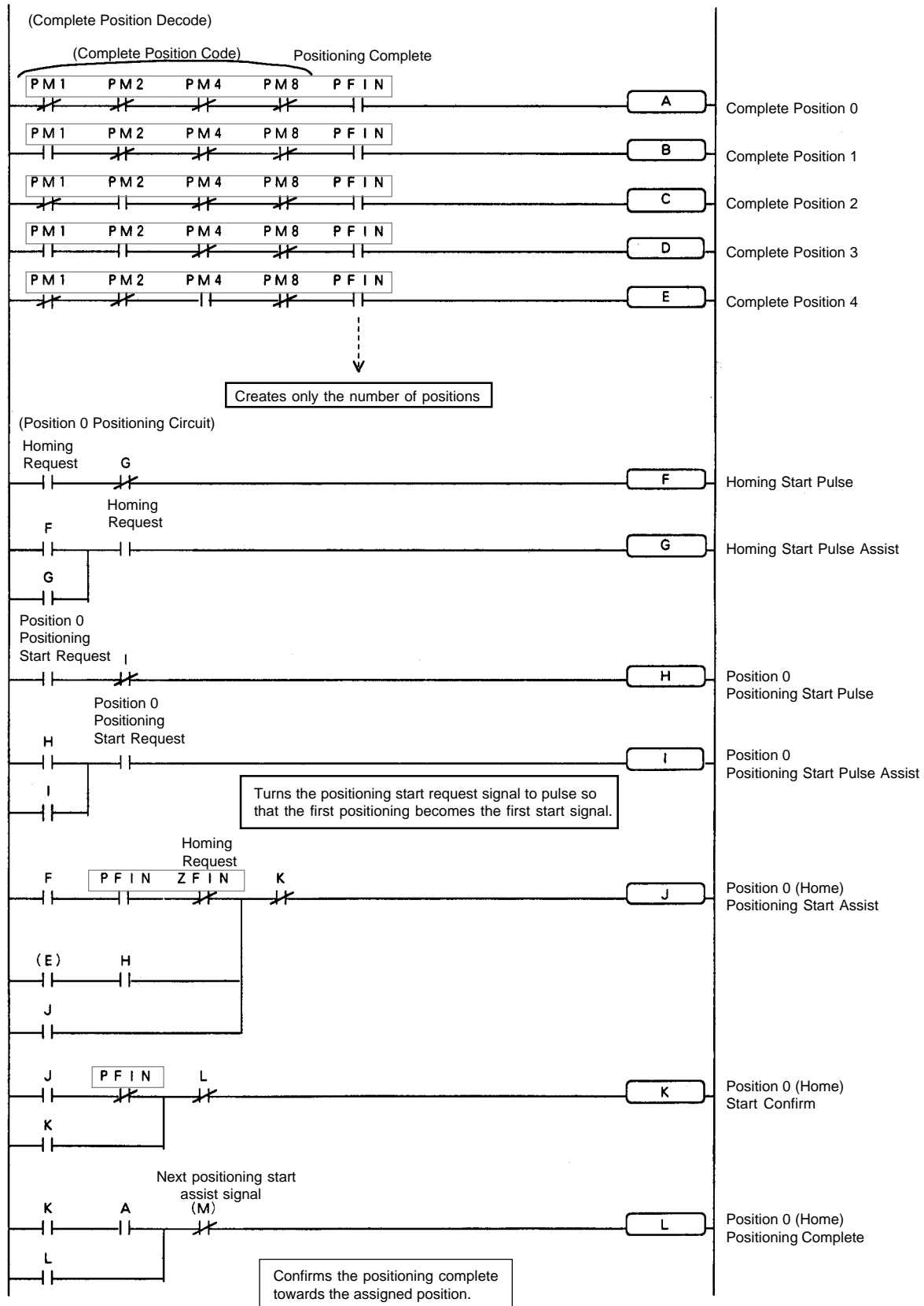
| Code | Error Description                             | Common Solution  |
|------|---|--|
| 10C  | Motorola S Address Error                      | Abnormal update program file (during update).  |
| 10D  | Motorola S File Name Error                    | Abnormal update program file (during update).  |
| 10E  | Timing Limit (W) (S)                          | Please check TB-CPU Base Flash ROM address setting DIP-SW (during update).                       |
| 10F  | Timing Limit (E) (S)                          |  |
| 111  | Timing Limit (P) (S)                          |  |
| 112  | Input Data Error                              | Input value is irregular. Please input allowable data.   |
| 113  | Input Under Error                             | Input value is under. Please input allowable data.   |
| 114  | Input Over Error                              | Input value is over. Please input allowable data.  |
| 115  | Homing Incomplete                             | Unallowed operation is being executed during the homing incomplete status. First execute homing. |
| 116  | Test Position Data Exist                      | During position addition, first delete or clear the final position data.                         |
| 117  | No Movement Data                              | When movement must be done, position data is not available.                                      |
| 118  | Non-connect Axis Selection                    | Non-connect axis has been selected (there's no error).   |
| 119  | TB Parameter Excess Rotating Number           | TB internal area parameter allowable rotating number after update has exceeded.                  |
| 11A  | Flash Verify Error: S                         | Please check TB-CPU Base Flash ROM address setting DIP-SW.                                       |
| 11B  | Flash ACK Time Out: M                         |  |
| 11C  | Flash Verify Error M                          |  |
| 11D  | Flash ACK Time Out                            |  |
| 11E  | Pair Data Mismatch Error                      | Please input while being cautious about the matching data's large • small relationship.          |
| 11F  | Absolute Value Under Error                    | The absolute value of the input value is under. Please input allowable data.                     |
| 120  | Initial Factor Error                          | The factor input data during controller initialization is abnormal. Please input allowable data. |
| 121  | Push Search End Over                          | Excess stroke in the push search end location. Please modify the positioning width.              |
| 122  | During distribution, multiple axes connection | Axis No. distribution must always be executed with a single axis being connected.                |
| 180  | Axis No. changes is OK                        | (No error).  |
| 181  | Controller initialization is OK               |  |
| 182  | Home change all clear                         |  |
| 201  | Emergency Stop                                |  |
| 20A  | Servo OFF during movement                     | Servo was turned OFF during movement.  |
| 20B  | CSTR-ON during movement                       | Start was turned ON during movement.   |

# 8. \*Supplement

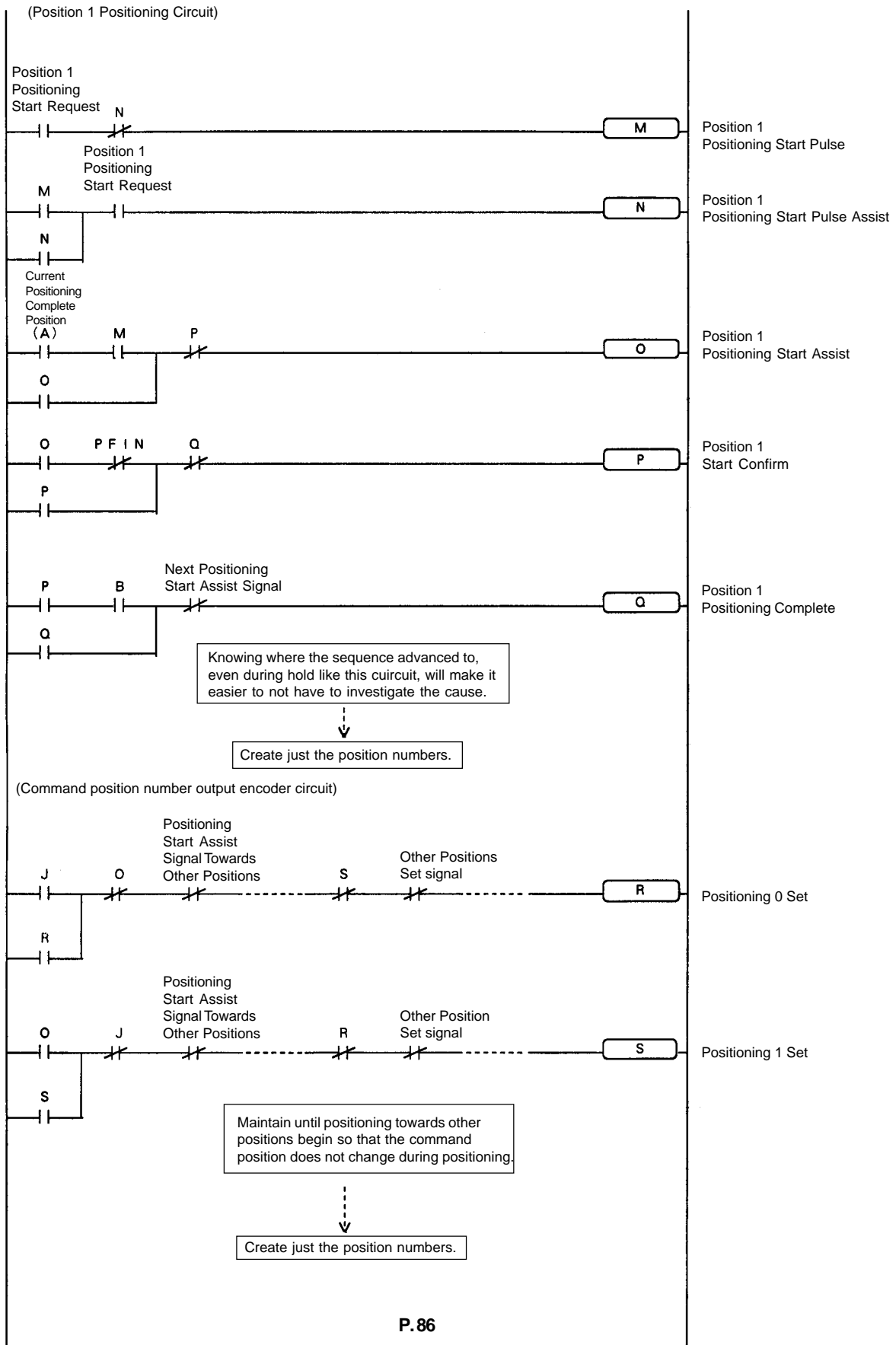
## RCP Positioning Sequence Basic Examples:

The following are basic sequence examples to create positioning sequence for the RC.

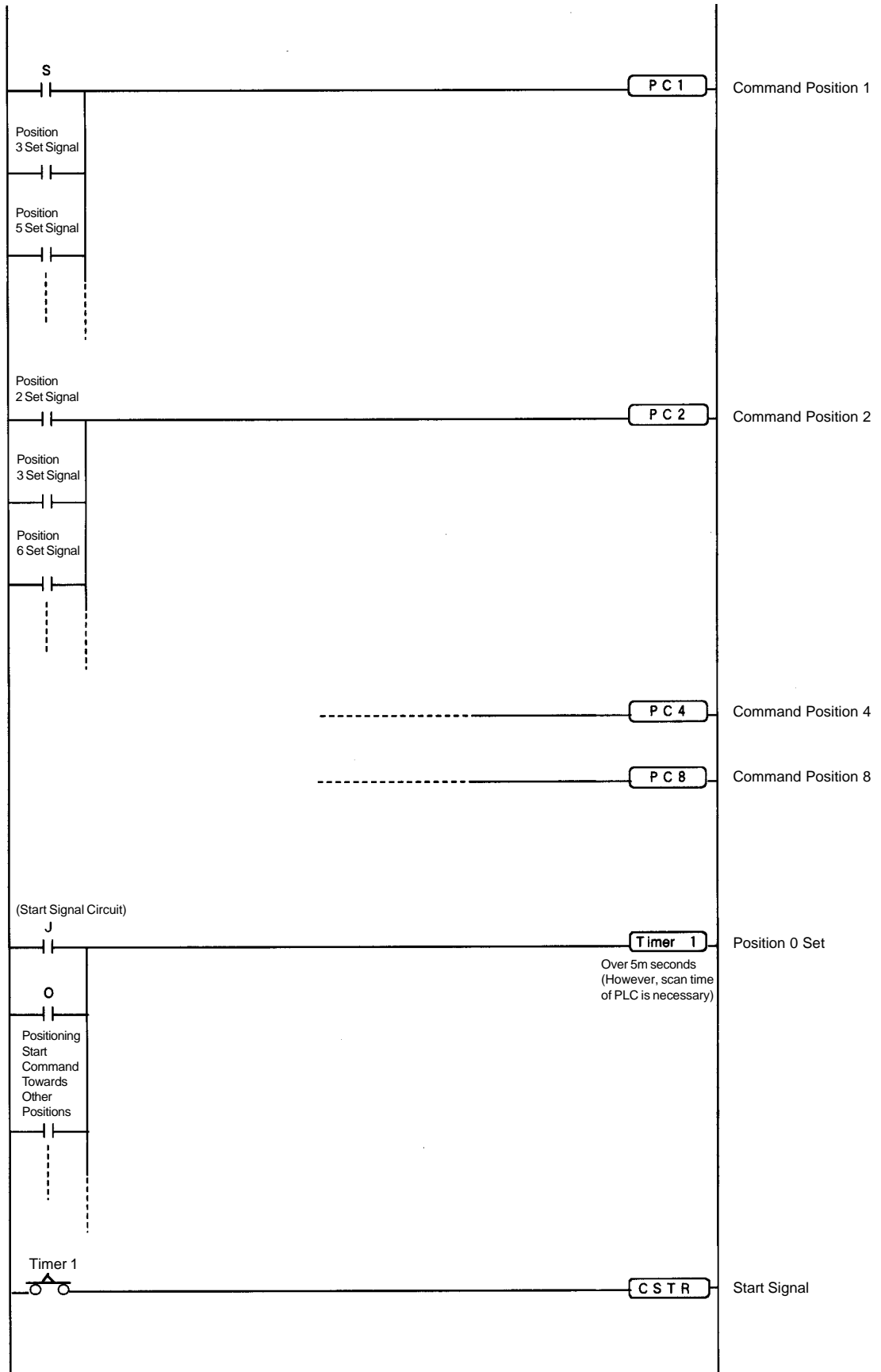
□ indicates PIO signal for the RC Controller.



# 8. \*Supplement



# 8. \*Supplement



# Before You Begin

---

Please be aware of the following before you begin operating the RCP Controller:

**(1) Hold · Servo ON Signal**

When operating the RCS (Robo Cylinder), you will need to turn ON the Hold & Servo ON Signal Input Signal of PIO.



In case the Hold Stop Input Signal of PIO remains ON, RC will not move due to hold status. Therefore, please be careful.

**(2) Although the exterior of the power 100V type controller and 200V type controller is the same, applying 200V type to 100V type will cause damage. Please be extra careful when connecting power.**

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