

*Installation  
and  
Maintenance  
Manual*

# HIT Take-out Robot

■ HIT-100S/D

■ HIT-200S/D



Read this manual completely prior to installing, operating or performing maintenance on this equipment





## **Selling, Installing and Using the Product not in Manufacturing Country**

- When this product and any parts of the product is to be taken foreign country after delivery to the original purchaser, the purchaser should obtain legal permission to export the products according the laws in both exporting and importing country. HY Robotics Co., Ltd. will not have any responsibility whatsoever if seller, purchaser and user exports the products without following the requirement procedure.

## **Disclaimers**

- Every effort was made to ensure that the information in this manual was complete and accurate at the time of printing. However the content and any information in this manual is subject to change without notice.
- HY Robotics Co., Ltd. assume no responsibility for any errors or omissions in this document
- Any recommendation about manual amendment is always welcomed.
- The content include in this manual is intended to use as reference data for operating machines. HY Robotics Co. Ltd is not legally bound in any way whatsoever by these data.
- HY Robotics Co., Ltd. assumes no responsibility whatsoever for damage or lost profits resulting from modification, disassembly, misuse, inadequate installation environment, or any other situation beyond our control.
- HY Robotics Co., Ltd assumes no responsibility whatsoever for damage or lost profits resulting from the use of this equipment.
- The information contained herein is the property of HY Robotics Co., Ltd. and shall not be reproduced in whole or in part without prior written approval of HY Robotics Co., Ltd.

**HIT INSTRUCTION MANUAL**

**Ver 1.0**

## Attention Marks

### Danger, Warning, Caution, Notice

This document use following attention mark for the safety of operation



If the actions indicated in a “ DANGER” are not complied with, death or serious damage of major equipment could results.



If the actions indicated in a “ WARNING” are not complied with, serious injury or major equipment damage could results.



If the actions indicated in a “ CAUTION” are not complied with, some injury or damage could results.

***NOTICE***

A “ NOTICE “ provides supplementary information, emphasized a point or procedure, or gives a tip for easier operation.

## OPERATIONAL WARNINGS



### DANGER

- Professionals familiar with the structural engineering principles related to the installation of large industrial equipment must install the robot in a safe and secure manner. The information on the following pages can be used as a guide to help install this robot. The customer must have the installation plan for the selected site verified to be adequate by a structural engineer or a similarly qualified professional. HY Robotics Co.Ltd can not accept any responsibility for damage due to improper installation
- The robot motion area is as follows; this area is the dangerous area of the robot. Be sure to operate the robot outside the safety fence. If you enter the robot motion area during Operation, a serious accident could result.



## WARNING

- Do not enter robot motion area or inside the safety guard during robot operation. Do not touch or do not allow other objects interfere with the safety fence.
- Do not remove or open safety guard during robot operation. Do not operate robot inside of the safety guard .
- Do not place any cups or bottle that containing water or liquid on the top of robot or controller. It may cause of electric shock.
- Do not place any small metal (Clip, Screw, Tool, etc) on the robot body and control box. If such a piece of metals get in to the inside of robot body or controller, a electric short may occur and cause of fire.
- Do not place any heavy obstacle or object on the robot body and controller. It may damage the robot surface as well as deform the structure of robot and it may fall directly to the person.
- Do not use an extremely flammable spray near by the robot. It may cause a fire.
- If any air leakage is detected from robot , stop immediately the robot or activate E-Stop function. Lock out and Tag out until the problem fixed.
- When an error occur during operation, stop the robot immediately, find the cause of error and follow the step to re-start robot.
- Make sure following before turn on the power of robot
  - Confirm there in no person in the motion area of robot
  - Confirm the location of handy controller and tool is required place
  - Confirm there is no obstacle on the robot and in the area of robot motion



## WARNING

- If any of the following cases should occur, stop the operation with E-Stop button immediately and turn off the power. If you continue the operation of machine under such conditions, a fire may result in the worst case.
  - When fume rises from the robot body or control box, or the outside surface of the robot emits abnormal heat.
  - When there is any abnormal noise from the robot.
  - When any water, or foreign obstacle is inside of the robot
- Stop the robot immediately when abnormal symptom happens during operation. When an error occurs during operation, the robot stops and alarm sounds and the error code displays on the handy controller. Press Stop button to silence the alarm. Check error table for a description of the error.



## CAUTION

- If the following items are contained to the air, do not use it. Use only clean air.
  - Acid
  - Organic solvents
  - Chlorine gas
  - Sulfur dioxide
  - Compressor oil
- Do not drop or give any strong shock the handy controller. It may be cause of malfunction.  
\_\_\_\_\_
- Handle with care with pneumatic line. It may be cause of leaks.
- Make sure the operation environment (Motion area, Safety Guard) should be proper for operation of machine equipments.
- Operate the robot with only healthy, good and normal health and mental condition.
- Do not contact teach palm pendant (Controller) to the water or oil
- Make sure the operating environment is as follows  
Operation Temperature : 0℃ ~+ 40℃ (32°F ~+ 104°F)  
Storage Temperature : -25℃ ~+ 55℃ (-13°F ~ + 131°F)  
Humidity : 35 % RH ~85 % RH (without condensation ).





## CAUTION

- When setting up the robot arm in the mold area by manual operation, take really care that the robot arm does not contact with the mold or tie bar. Make sure to operate the robot outside the safety guard.
- Do not use an operation fluid other than clean compressed air
- Regulate the air pressure as specified.
- If robot will not operate for several days or long period of the time due to plant shutoff or vacation, Turn OFF the control power.
- Proper working clothes, helmet and protective shoes required for operating and setting up the robot (Personal protective Equipment)
  - Do not operator robot without safety helmet or shoes.
  - Do not wear necktie and necklace, bracelet etc

## MAINTENANCE WARNINGS



### WARNING

- Before cleaning, inspecting, repairing, adjusting, or performing maintenance on the take-out, be sure to turn OFF the control power and pull out the plug and follow Lock out / Tagout Procedure. If you attempt to perform the cleaning without turning OFF the control power, electric shock, may happen.
- Only a qualified person is allowed to open the cover or panel of the take-out robot.
- Assign one qualified person who will control safety of the robot, and need to be trained by the manufacturing company or agency how to control robot and about safety
- Be sure to release pneumatic pressure before replacing a filter bowl.
- Before handling ROM, turn off the control power. Use ROM Remover to pull the ROM out. Do not drop the ROM and expose it to strong shock.

## POWER RELATED WARNINGS



### WARNING

- Handle with care with power cable, do not pull and bend. Do not place heavy object on the cable (No folk lift passing on the power cable). Use cable tie to organize power cable for safety. (Damaged cable could be the cause of fire or electric shock.
- Using unspecified Extension cable cause abnormal symptoms including heat and fire.
- Only qualified personal should try to install Electrical power and ground to the robot.
- Connect the earth terminal of the plug to the earth terminal of the plug socket

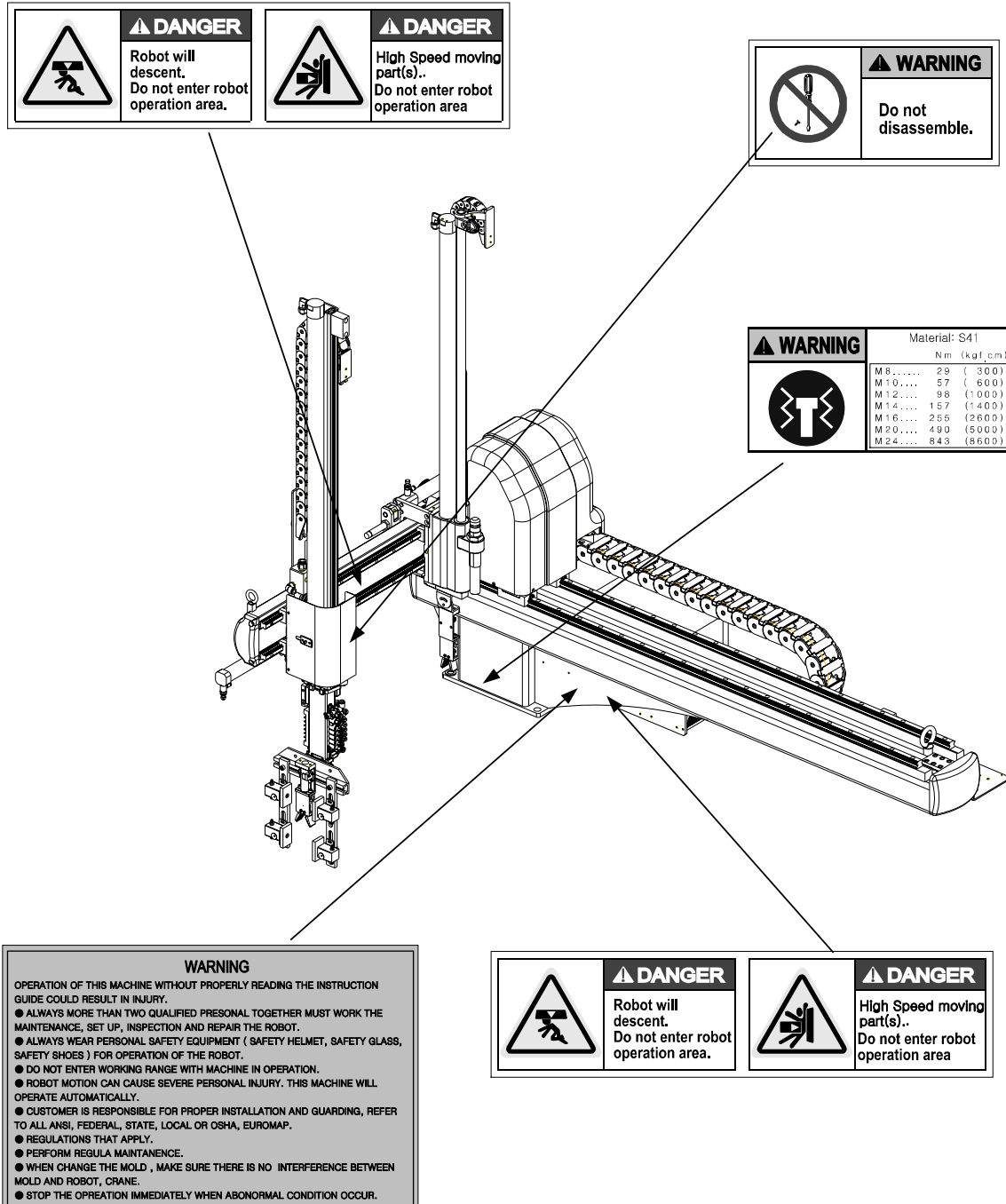


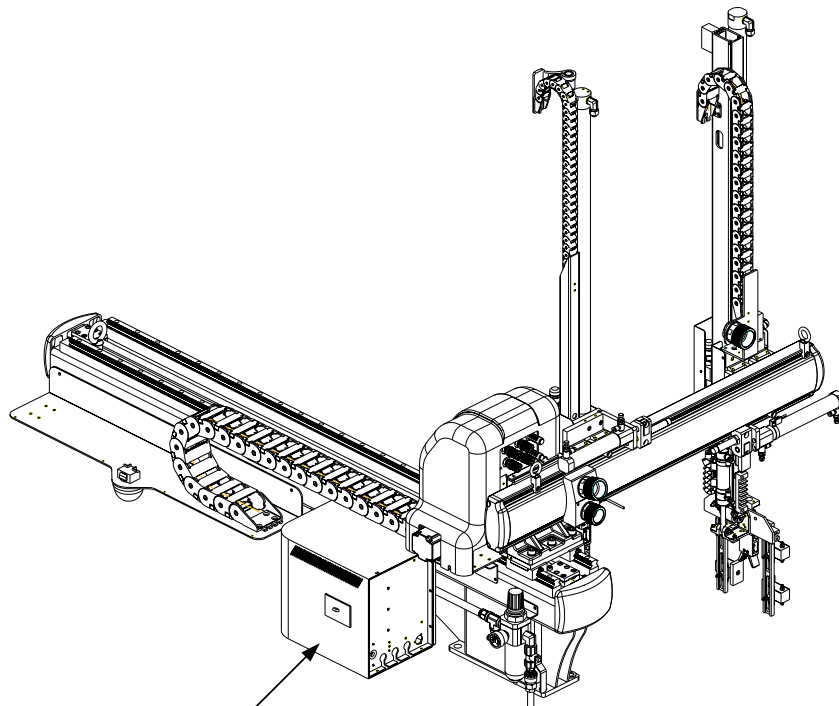
## WARNING

- Power off when connect or disconnect any connector of robot
- Lockout / Tagout before opening the control box
- Connect the earth terminal of the plug to a class D grounding terminal

## Safety Signs

There are safety signs on the robot body as below figures. Respect and follow the messages on these signs when operating or performing maintenance on the robot. Do not peel off these labels or signs





	<p><b>▲ WARNING</b></p> <p>Do not disassemble.</p>	<p><b>▲ DANGER</b></p> <p>HIGH VOLTAGE. Before servicing turn off, lock out/tag out.</p>	<p><b>▲ CAUTION</b></p> <p>PROTECTIVE EARTH. Establish and maintain protective earth ground according to the user's manual.</p>
--	--	--	---

# Contents

<b>1</b>	<b>INSTALLATION .....</b>	<b>13</b>
1.1	ROBOT ASSEMBLY .....	15
1.1.1	Robot Assembly .....	15
1.1.2	Packing List.....	16
1.1.3	Robot Assembly .....	18
1.1.4	Drill and Tap .....	25
1.1.5	Adaptor Plate Installion. ....	25
1.1.5	Robot Attachment. ....	26
1.1.6	How to lifting Robot body. ....	28
1.2	ELECTRIC INTERFACE WIRING.....	30
1.2.1	Mount Terminal Strip.....	31
1.2.2	Wiring Power Source.....	32
1.2.3	Mold Open Complete Signal .....	33
1.2.4	Safety Door Signal.....	34
1.2.5	Auto Injection Signal.....	35
1.2.6	Ejector Forward Signal .....	36
1.2.7	Full Auto Signal .....	37
1.2.8	Cycle Start ( Take-Out Complete) .....	38
1.2.9	Mold Open Interlock.....	39
1.2.10	Mold Close Interlock .....	40
1.2.11	Ejector Interlock.....	41
1.2.12	IMM to Robot EMO Circuit.....	42
1.2.13	Robot to IMM EMO Circuit.....	43
1.2.14	Check Wiring .....	44
1.3	SPI CONNECTION METHOD ( EUROMAP 12 ).....	45
1.3.1	Wiring Power Source.....	46
1.3.2	Mold Open Complete Signal .....	47
1.3.3	Safety Door Signal.....	48
1.3.4	Auto Injection Signal.....	49
1.3.5	Full Auto Signal .....	50
1.3.6	Ejector Forward Signal .....	51
1.3.7	Mold Close Interlock .....	52

1.3.8	Mold Open Interlock.....	53
1.3.9	Ejector Interlock.....	54
1.3.10	IMM to picker EMO Circuit.....	55
1.3.11	Picker to IMM EMO Circuit .....	56
1.3.12	Air Connect .....	57
<b>2</b>	<b>MAINTENANCE .....</b>	<b>59</b>
2.1	CHECK.....	61
2.1.1	Power ON.....	61
2.1.2	Turning System OFF.....	62
2.1.3	Manual Operation .....	63
2.1.4	Interlock Confirmation .....	66
2.1.5	Emergency Off.....	72
2.1.6	Restoring Emergency Off.....	72
2.2	ADJUSTMENT AFTER MOLD CHANGE .....	73
2.2.1	Air regulator.....	73
2.2.2	Vacuum Verification Sensor Adjustment.....	74
2.2.3	Adjust Kick/Return Cylinder.....	75
2.2.4	Down Stroke Adjustment.....	77
2.2.5	Gripper Angle Adjustment.....	78
2.2.6	Adjustment Gripper Sensor Location.....	79
2.2.7	Speed Control for Down, Kick, Rotation.....	80
2.2.8	Cushion Control for Up, Kick, Swing.....	83
<b>3</b>	<b>REGULAR MAINTENANCE .....</b>	<b>85</b>
3.1	PREVENTATIVE MAINTENANCE SCHEDULE .....	87
3.2	CLEANING THE ROBOT.....	89
<b>4</b>	<b>APPENDIX.....</b>	<b>91</b>
A.	SPECSAPCATION .....	93
B.	EXTERNAL DIMENSION .....	93
C.	SAFE GUARDED SPACE.....	94
D.	AIR CHART .....	95
E.	INTERLOCK .....	96
F.	INPUT/ OUTPUT .....	98



# 1 Installation

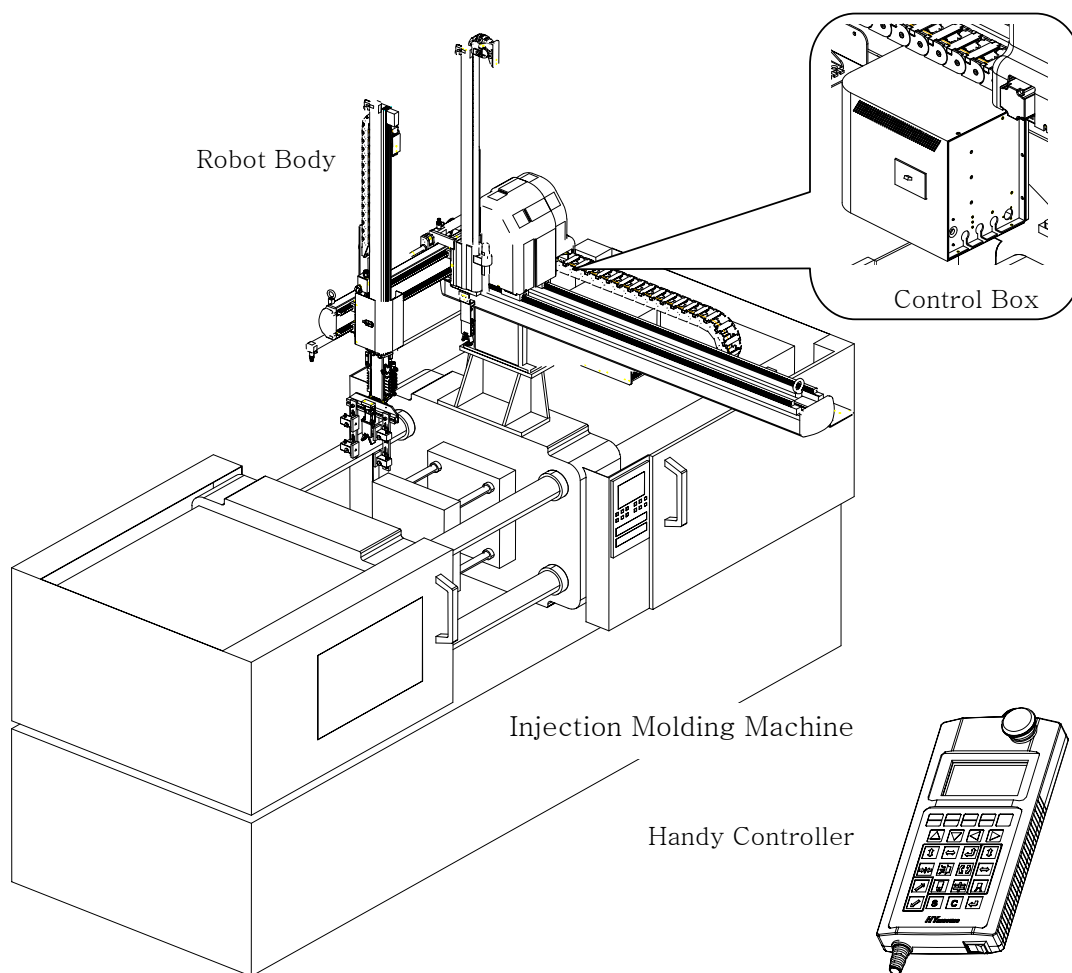


## 1.1 Robot Assembly

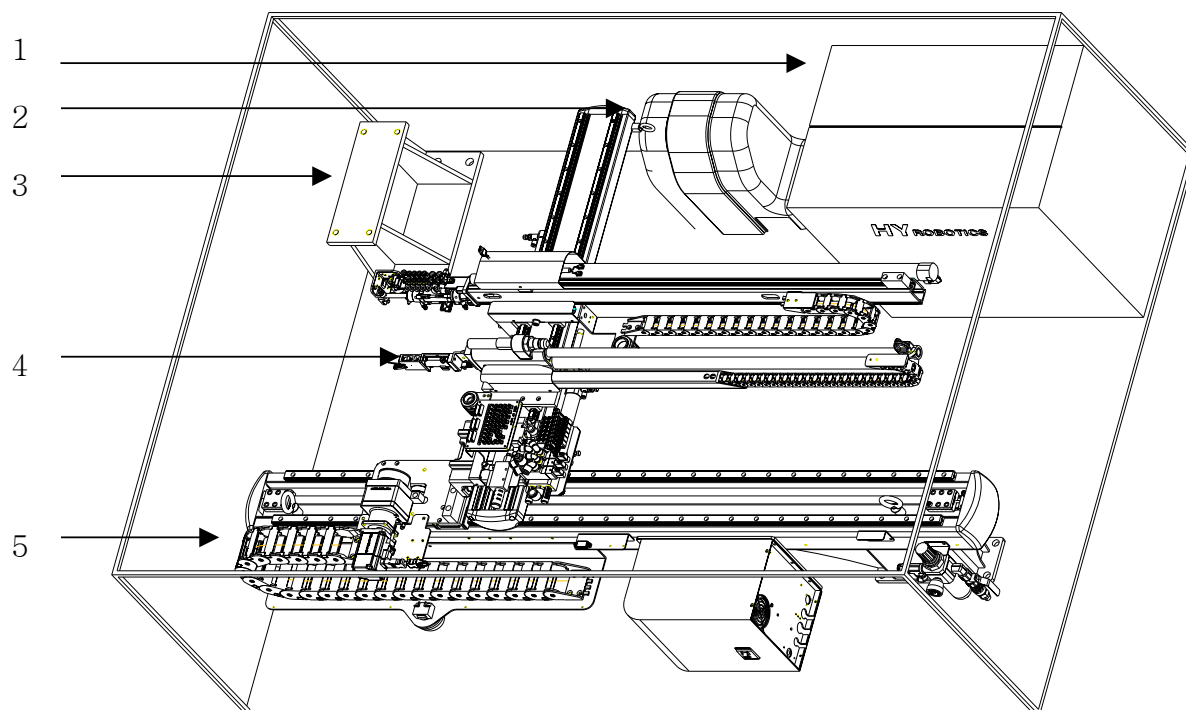
### 1.1.1 Robot Assembly

This Robot is consisted of

- Robot Body
- Interlock and Control Box
- Handy Controller



### 1.1.2 Packing List

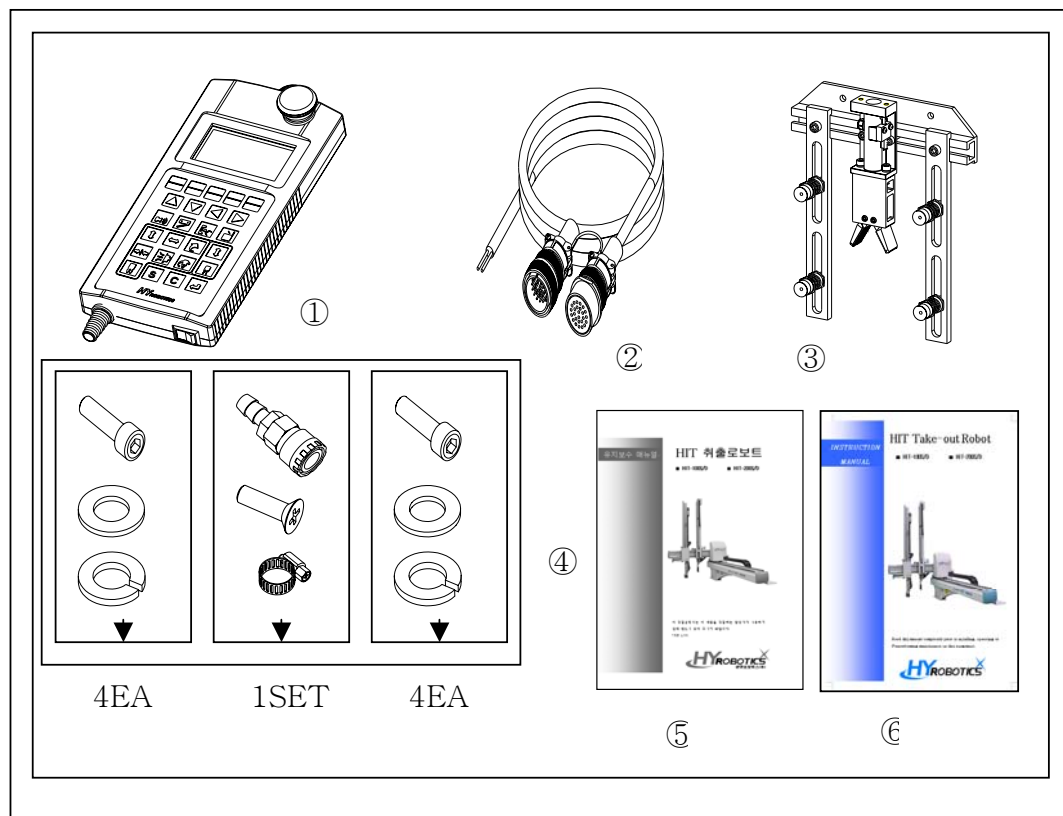


#### Packing and Installation Hardware List

- 1 Accessory box
- 2 Valve box cover
- 3 Body base
- 4 Body A.
- 5 Body B.

\* Check below parts are included in the robot box.

- 1 Handy Controller
- 2 Interlock cable
- 3 Installation accessory
- 4 User Manual
- 5 Installation / Maintenance Manual



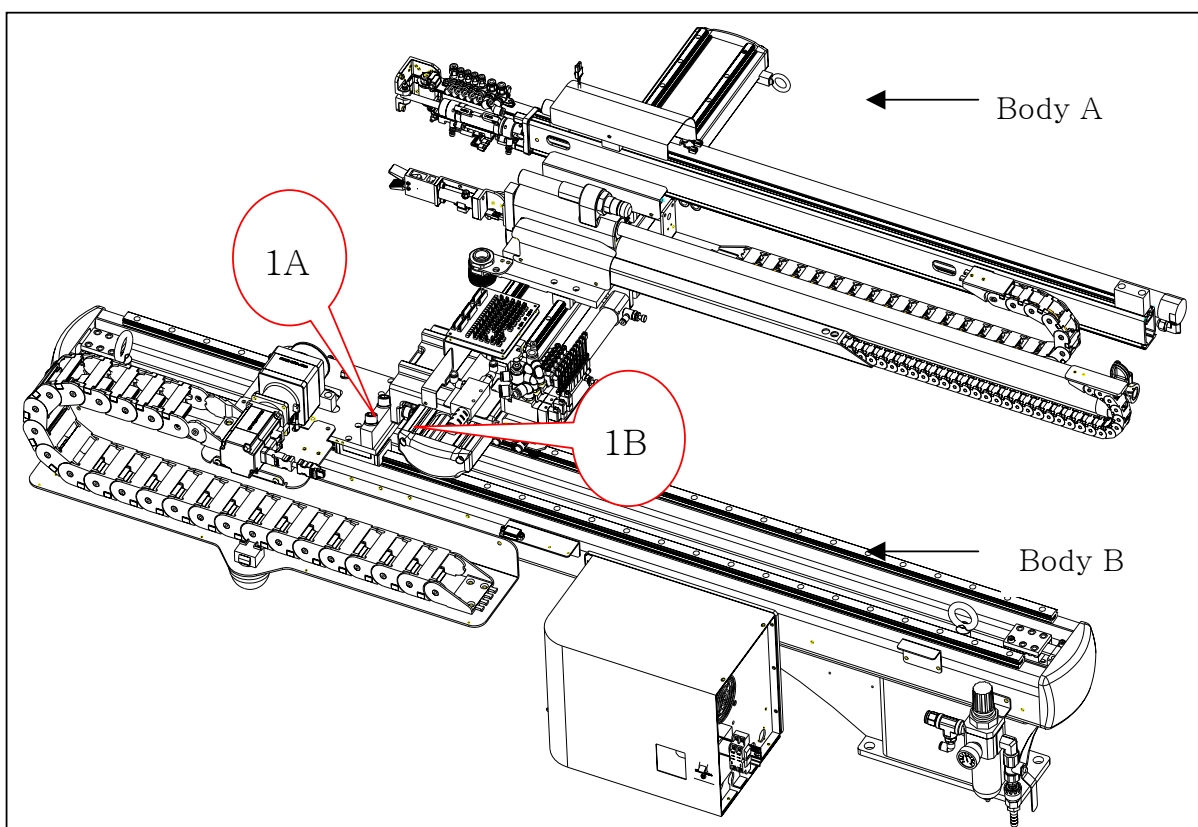
### 1.1.3 Robot Assembly

#### CAUTION

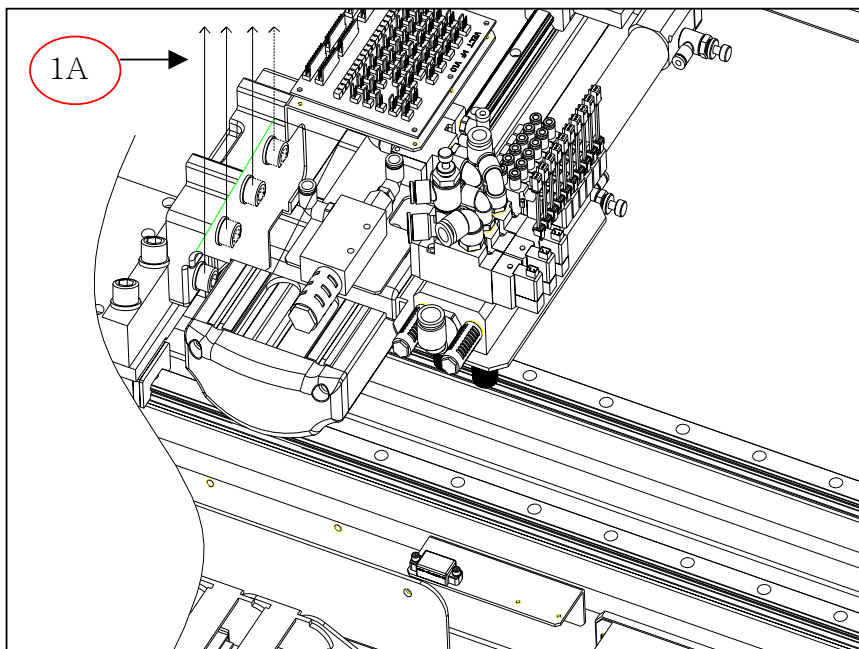
- Assign more than three men as a team for one robot installation. Robot weight is about 134 Kg. Use proper equipment for lifting Robot (Crane, Fork lift with wire chains or slings )
- Lifting robot with crane or forklift must be performed by authorized personnel only.
- Failure to observe this caution may result in injury or damage.

#### ● STEP 1

Confirm the Body A and Body B are not damaged during shipping and handling. If body damaged, report to freight company. Locate robot box to safe place to use crane or fork lift.



## ● STEP 2

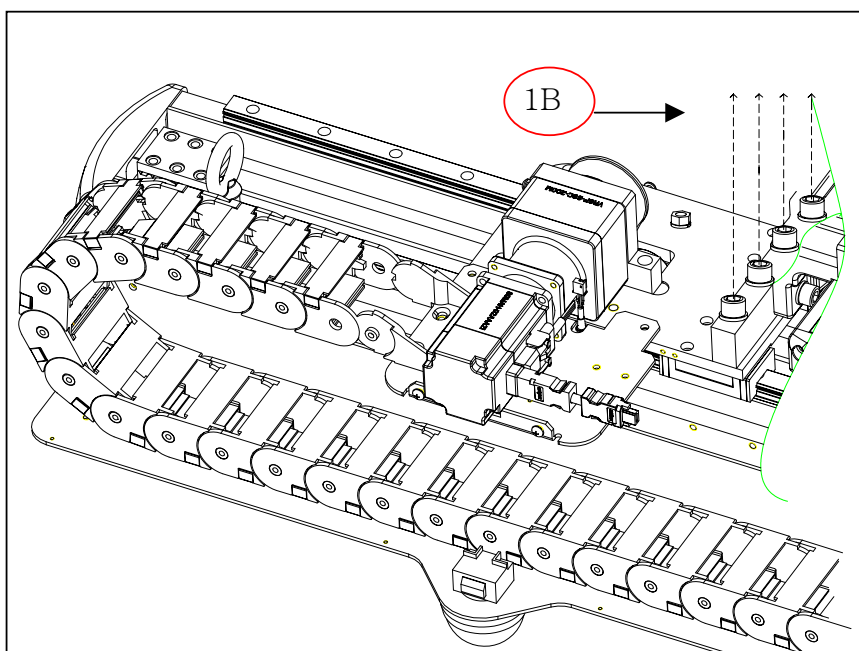


### ● NOTE

Loosen the bolts in 1A.

\*Keep the loosened bolts in secure place, it will be used assemble the robot body.

## ● STEP 3



### ● NOTE

Support End of Kick Robot body before loosen bolts in 1B. It might fall.

Loosen the bolts in 1B.

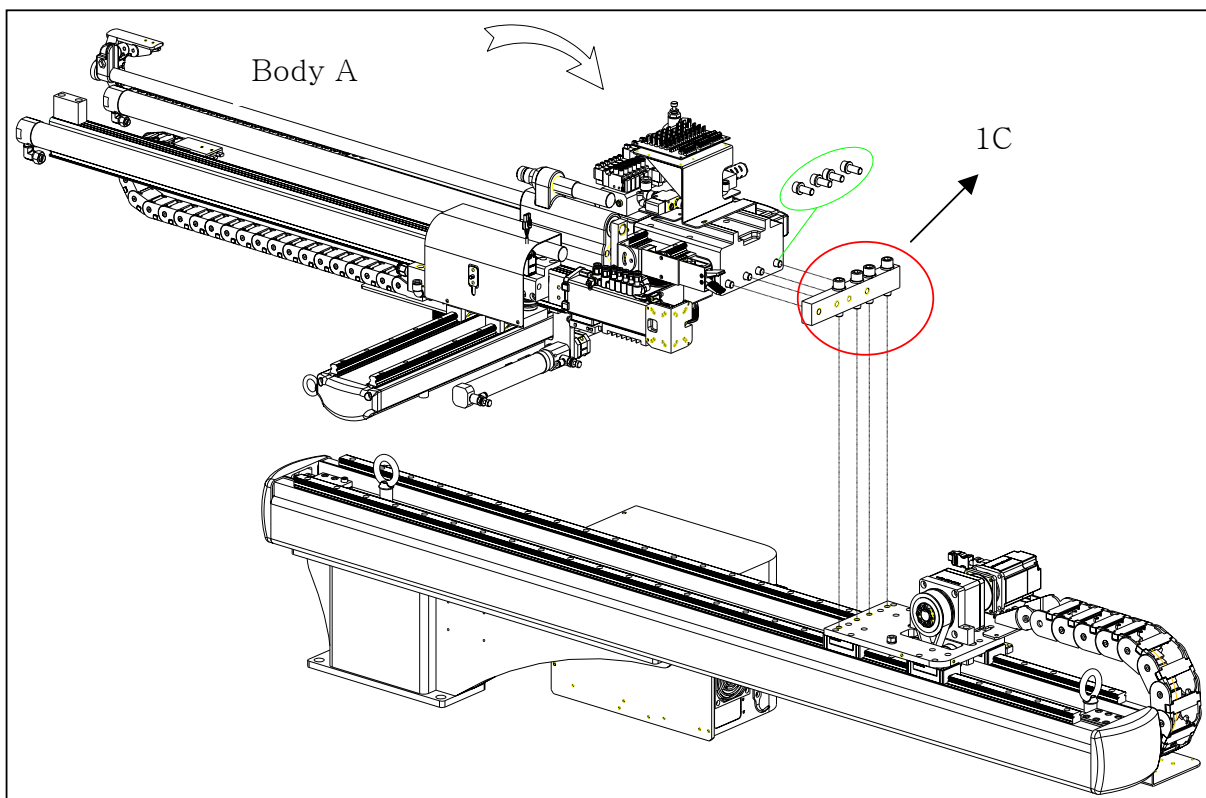
\*Keep the loosened bolts in secure place, it will be used assemble the robot body.

### ● STEP 4

After remove the bolts in 1A and 1B, robot Body A can be separated from Body B

Keep 1C block in Secure place.

Rotate Robot body 90 Deg to straight up. ( WARNING : Handle with Extremely Care )

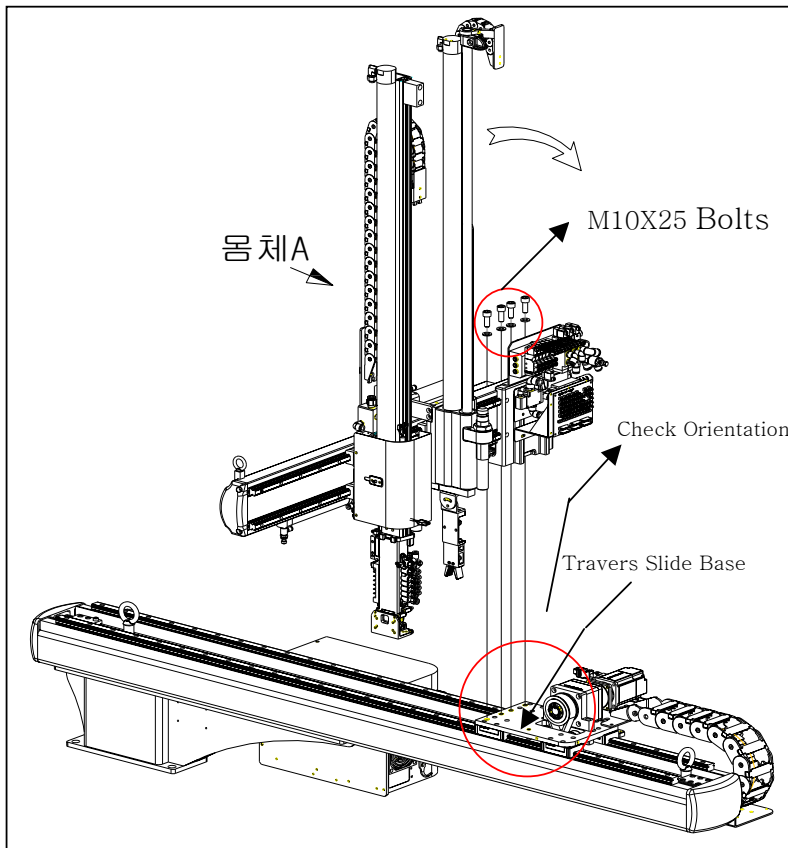


### ⚠ CAUTION

- Assign more than three men as a team for one robot installation.  
Use proper equipment for lifting Robot  
(Crane, Fork lift with wire slings )
- Failure to observe this caution may result in injury or damage.



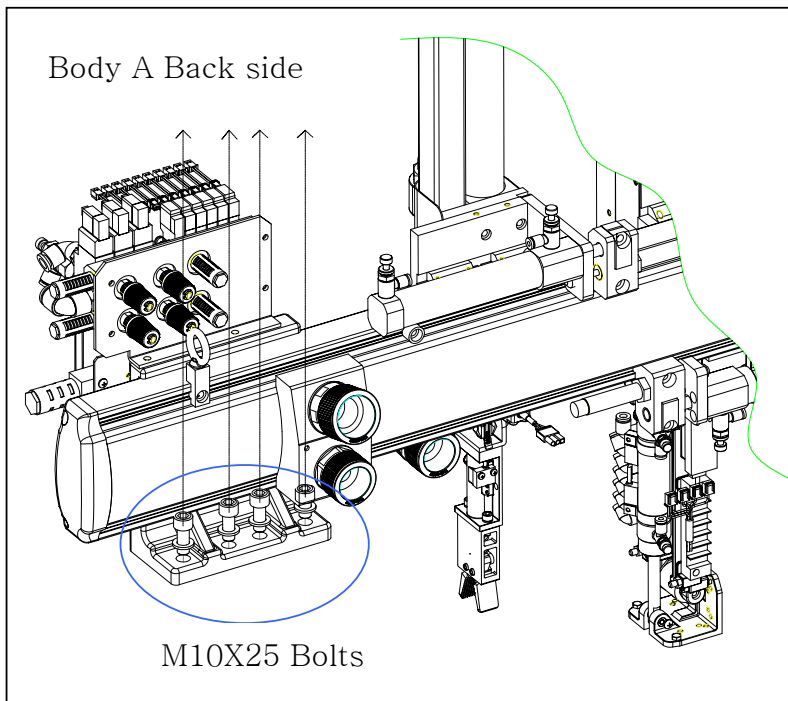
## ● STEP 5



### ● NOTE

After Straight up Body A, connect M10X25 Bolts 4EA to Travers Slide Base on the Robot Body B

\*Make sure robot kick body or Arm to be installed on the opposite side of Control Box.

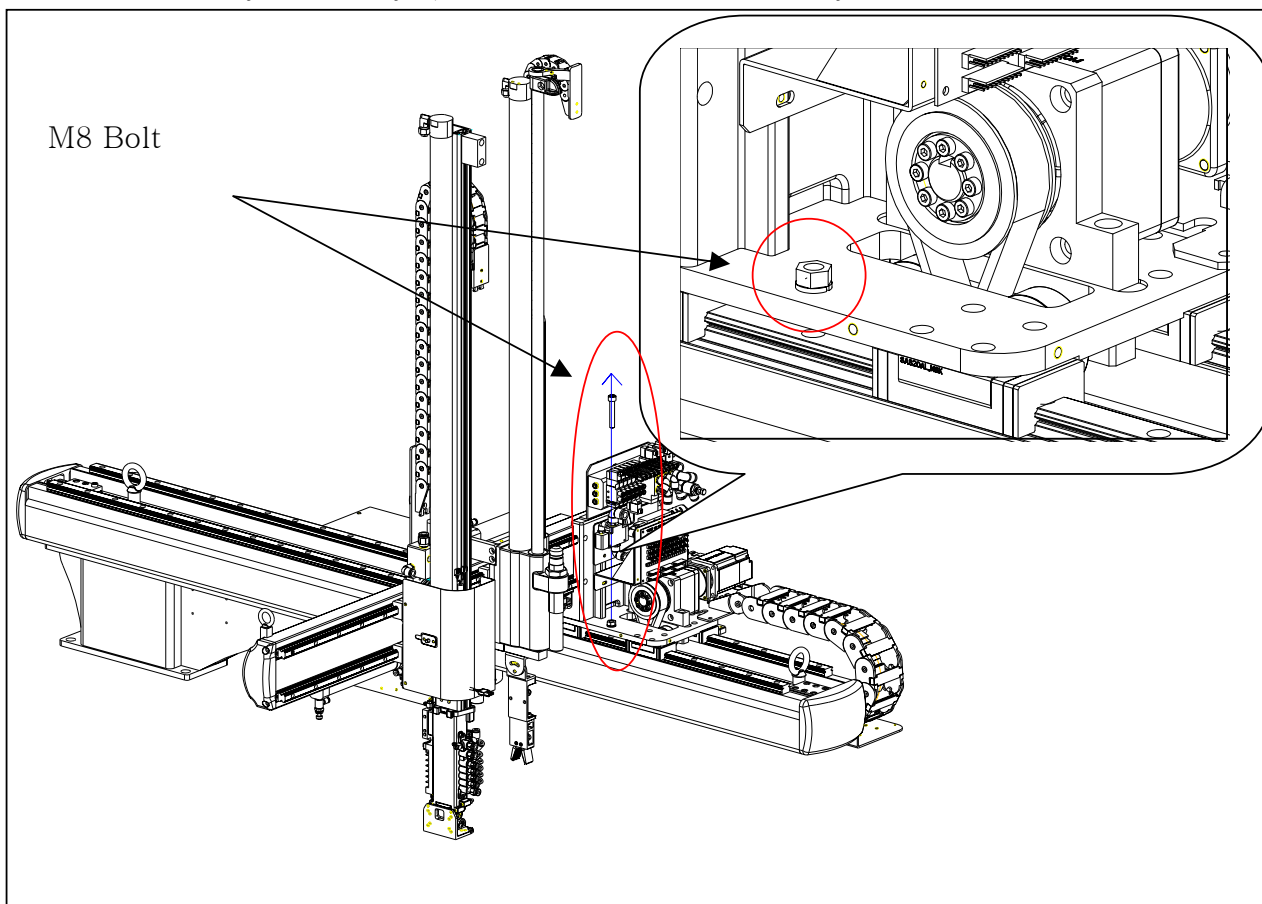


### ● NOTE

Tighten M10X25 bolts as in figures. Use lock tight liquid for bolts installation.

## ● STEP 6

After assemble Body A and Body B, must remove M8 bolts from body.

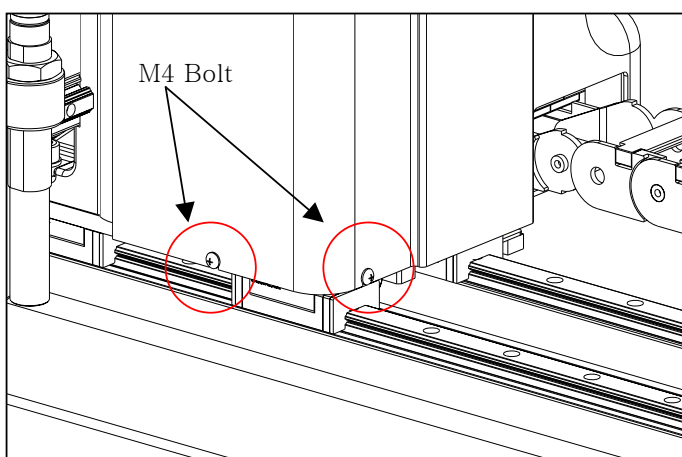
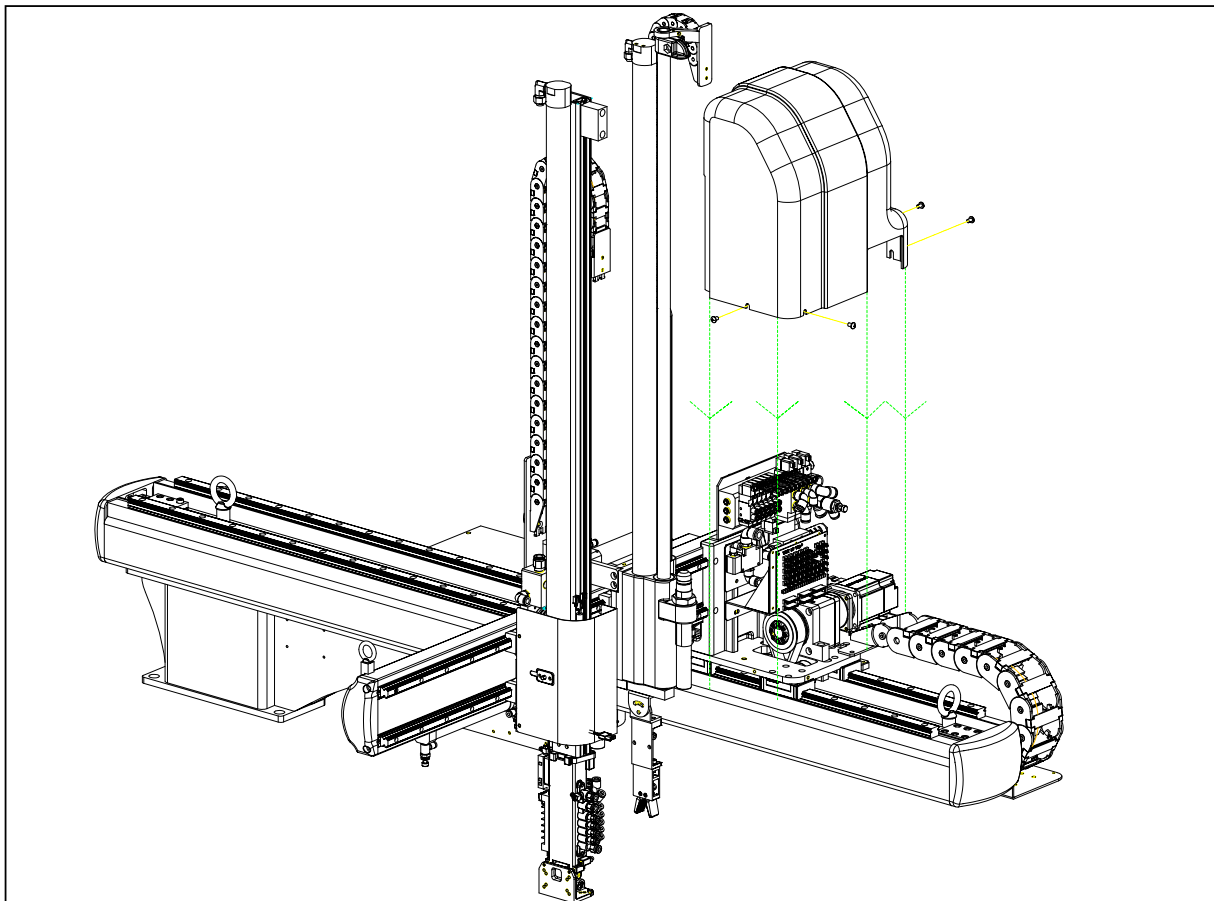


### CAUTION

Avoid excessive vibration or shock during transportation and handling.  
The system consists of precision components, so failure to observe this caution may adversely affect performance.

**● STEP 7**

Install Valve cover on the robot body as below figures

**● NOTE**

Install Valve cover with M4 Bolts which included in Installation Kit

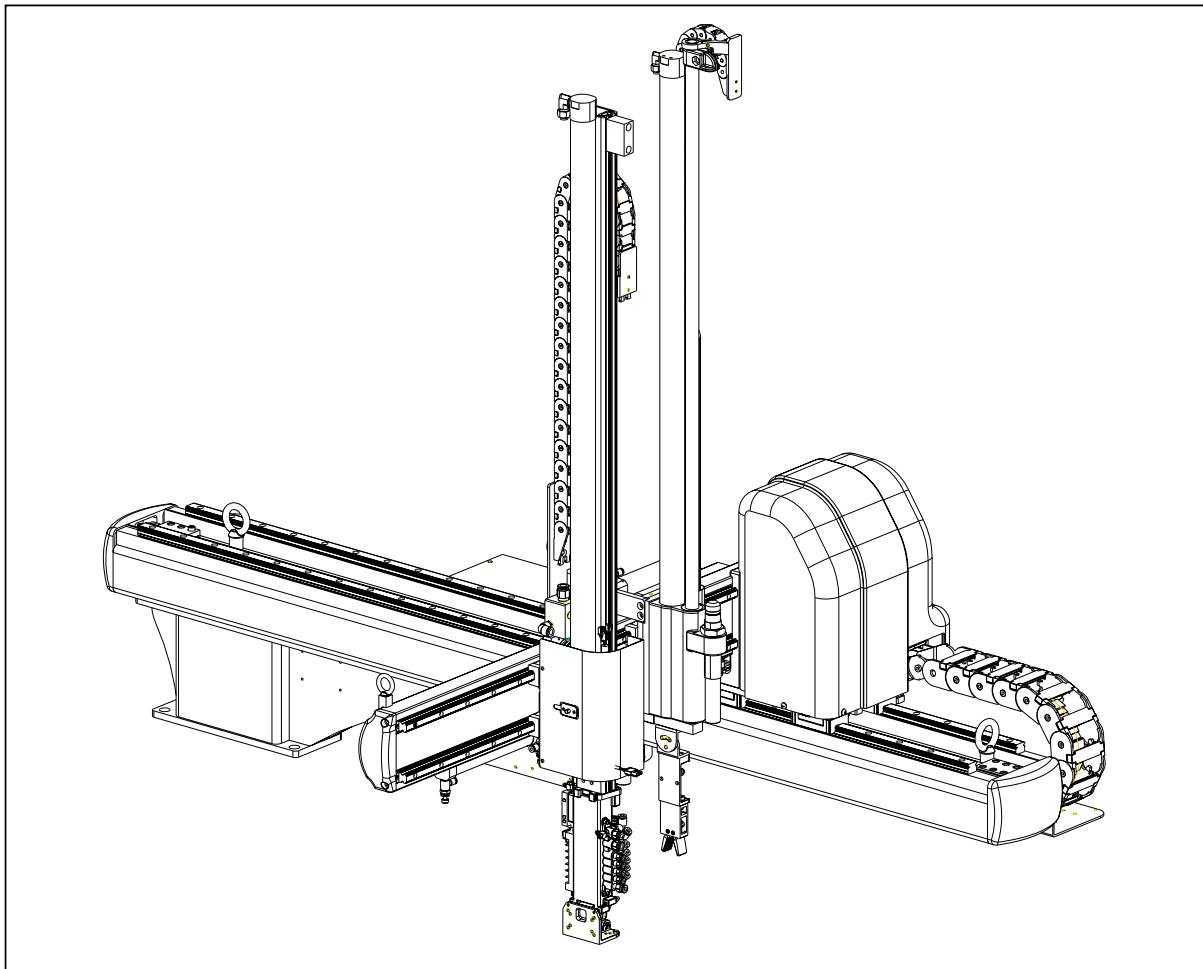
Total 4 x M4 Bolts Required

## ● STEP 8

Confirm the robot installed as below figures

Confirm there is no damage on Electric wiring and no air leak on air tubing

You have finished robot body assemble process.



### 1.1.4 Drill and Tap

#### ● STEP 1

Place the robot base on the stationary platen as shown in below figure. Use the transfer punch and hammer to make the hole locations. ( If there is not hole pattern on fixed platen )

#### ● STEP 2

Use a Magnetic Base drill to drill 4 Location to a depth of more than 40mm.

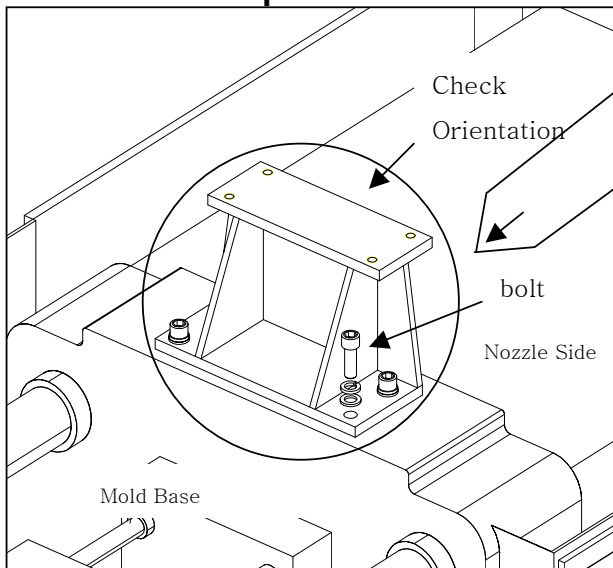
#### ● STEP 3

Tap Standard M12, deburr.

#### **NOTICE**

●Some of the old generation molding machine doesn't have any hole pattern or if hole pattern is not matches with robot follow Step 1, 2, 3

### 1.1.5 Adaptor Plate Installation.



#### ● STEP 1

Adapter Plate need to be installed as left figures, make sure the direction or orientation of Adapter plate as figures.

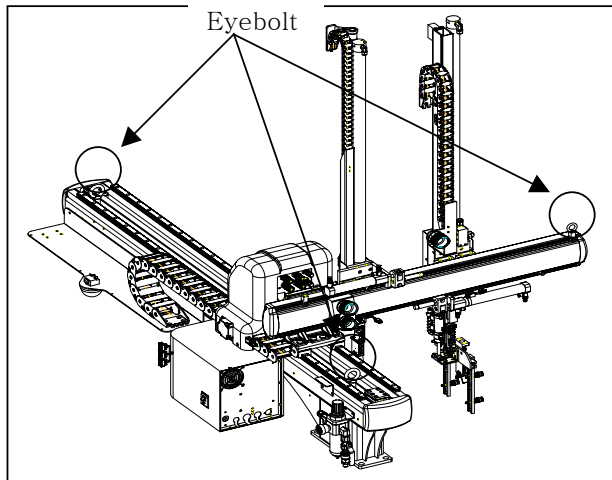
#### ● STEP 2

Lift adaptor plate on the fixed platen and mount with M12 Bolts x 4.

#### **⚠ CAUTION**

- Assign more than three men as a team for one robot installation. Robot weight is about 134 Kg. Use proper equipment for lifting Robot (Crane, Fork lift with wire slings )
- Lifting robot with Crane or forklift must be performed by authorized personnel only.
- Failure to observe this caution may result in injury or damage.

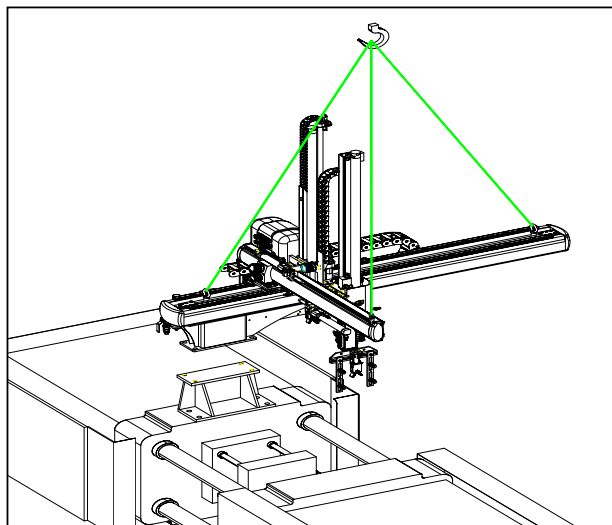
### 1.1.5 Robot Attachment.



#### ● STEP 1

Install the Eyebolts.

Confirm each axis robot body are not moving by manual.



#### ● STEP 2

Install wire slings or chain on the Eyebolt.

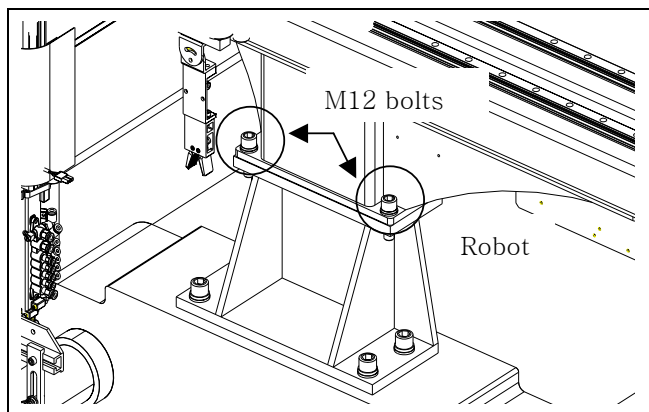
Check Wire sling or chain Weight limitation.

( Robot weight is about 134 Kg )

Slowly lift up and make sure the robot stand vertically straight. If not, lower the robot body and adjust each sling or chain length to straight up the robot body. Put the Robot on the molding machine as figures.

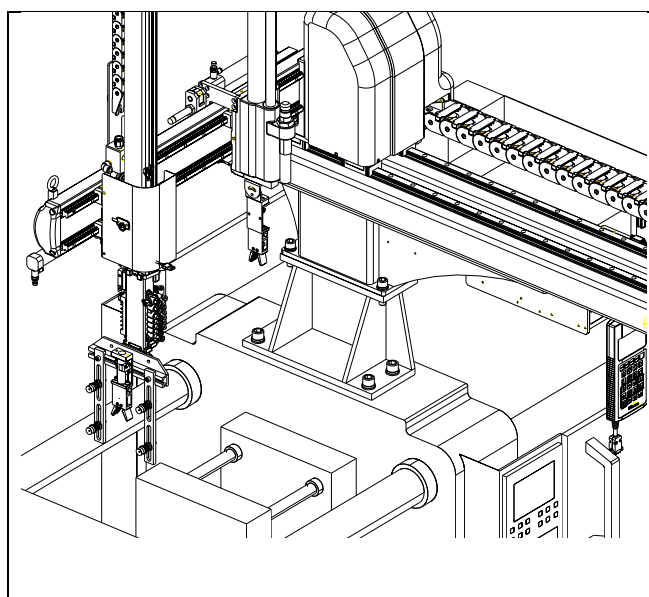
## DANGER

Avoid excessive vibration or shock during transportation. The system consists of precision components, so failure to observe this caution may adversely affect performance.



### ● STEP 3

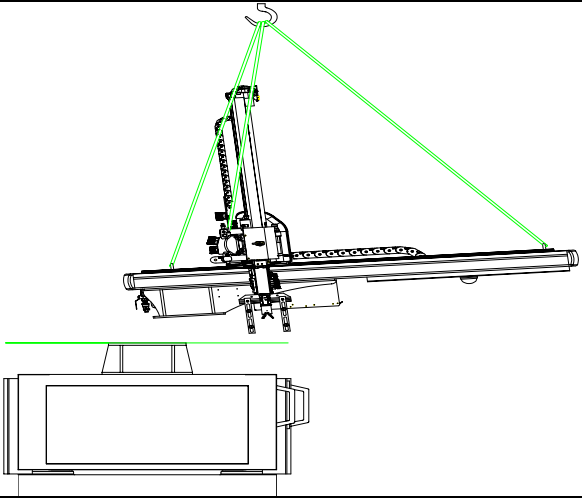
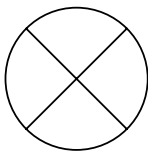
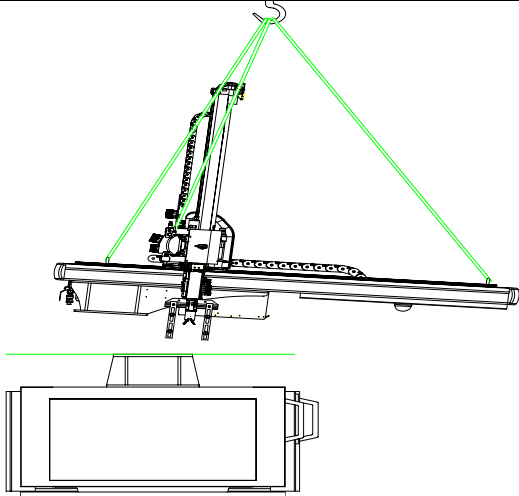
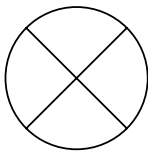
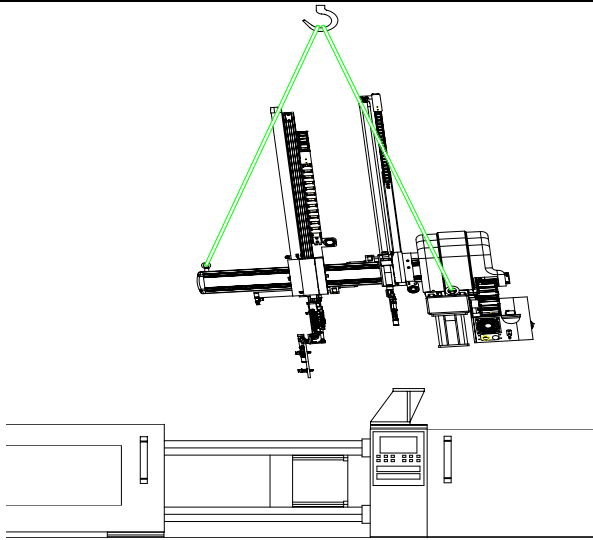
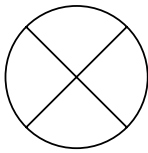
Extremely care for installation on bolts. Make sure the robot is secured with Sling or Chain. Use lock washer, flat washers and M12 bolts, Secure the base of the Robot firmly to the Adaptor Plate in 4 locations. (Lifting robot body up or down might required )



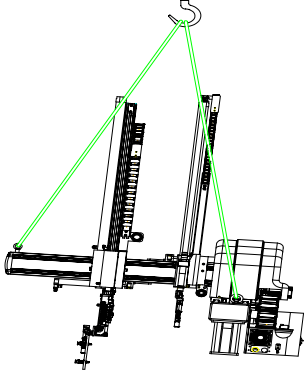
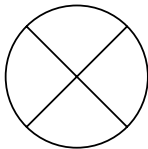
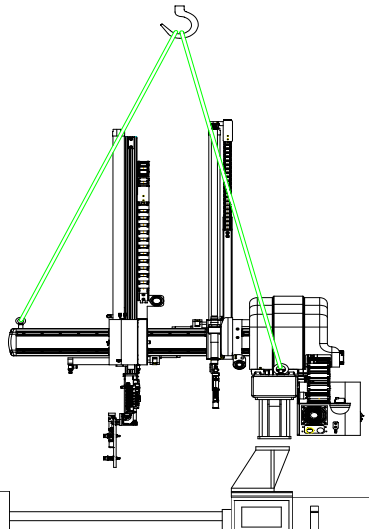
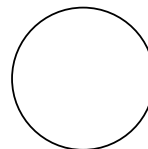
### ● STEP 4

Make sure the Robot installed as shown. Remove sling or chain from Robot body. Remove 3 Eye Bolts

### 1.1.6 How to lifting Robot body.

	<p><b>WRONG.</b></p> 
	<p><b>WRONG.</b></p> 
	<p><b>WRONG.</b></p> 



	<p>WRONG</p> 
	<p>RIGHT !!!!</p> 

## WARNING

Make sure the robot stand straight up while lifting by crane or fork lift.  
If not robot might fall and serious injury or damage occur.

## 1.2 Electric Interface Wiring

**⚠ WARNING** Only qualified personnel should attempt to complete interface wiring.

### Tool and Parts needed

Parts	Cable tie (1 ea), M4 X 12 Round head Screw (2 ea), Terminal Strip
Tool	Hand Drill , 3.3mm Drill Bit, M4 Tap, Punch, Hammer

### Prepare the molding machine for wiring.

1. Injection Molding Machine Interface Circuit Diagram
2. Tool and Parts for Wiring
3. Perform Lock out and Tag-Out for Injection Molding Machine
4. Open the electrical control panel.

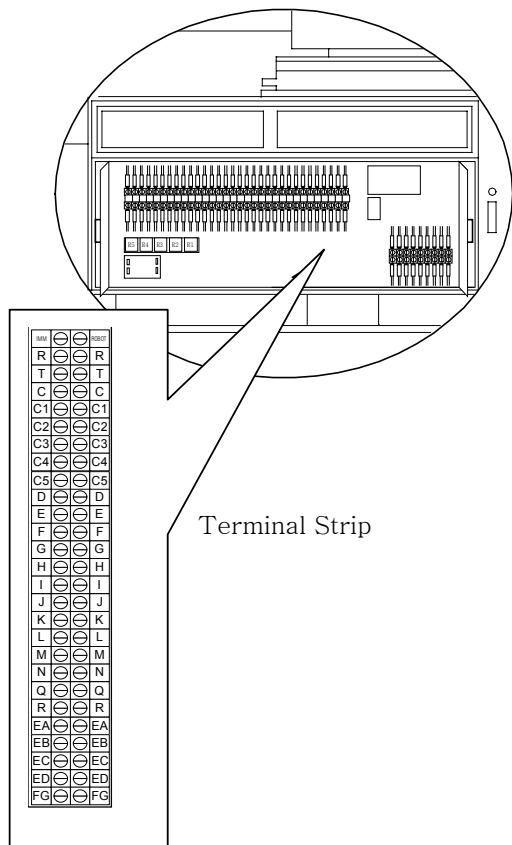
● Read and understand Injection Molding Machine wiring/schematic diagram prior to interface. Confirm molding machine brand and type with actual molding machine

### **NOTICE**

1. Check if input and output signal is + or - DC. Rarely output signal is 110 Volts or 220 Volts.
2. Interlock signal from Robot to Molding machine which is not used need to be connected (For Examples :
3. Do not connect Robot main power to IMM Transformer ( Inside of control box )
4. Separate Robot Main Power cable from Interface Cable to minimize noise.

### 1.2.1 Mount Terminal Strip

IMM Electrical Interface Box



#### ● STEP 1

Evaluate the control panel and choose an appropriate place to connect the interface cable or Terminal Strip

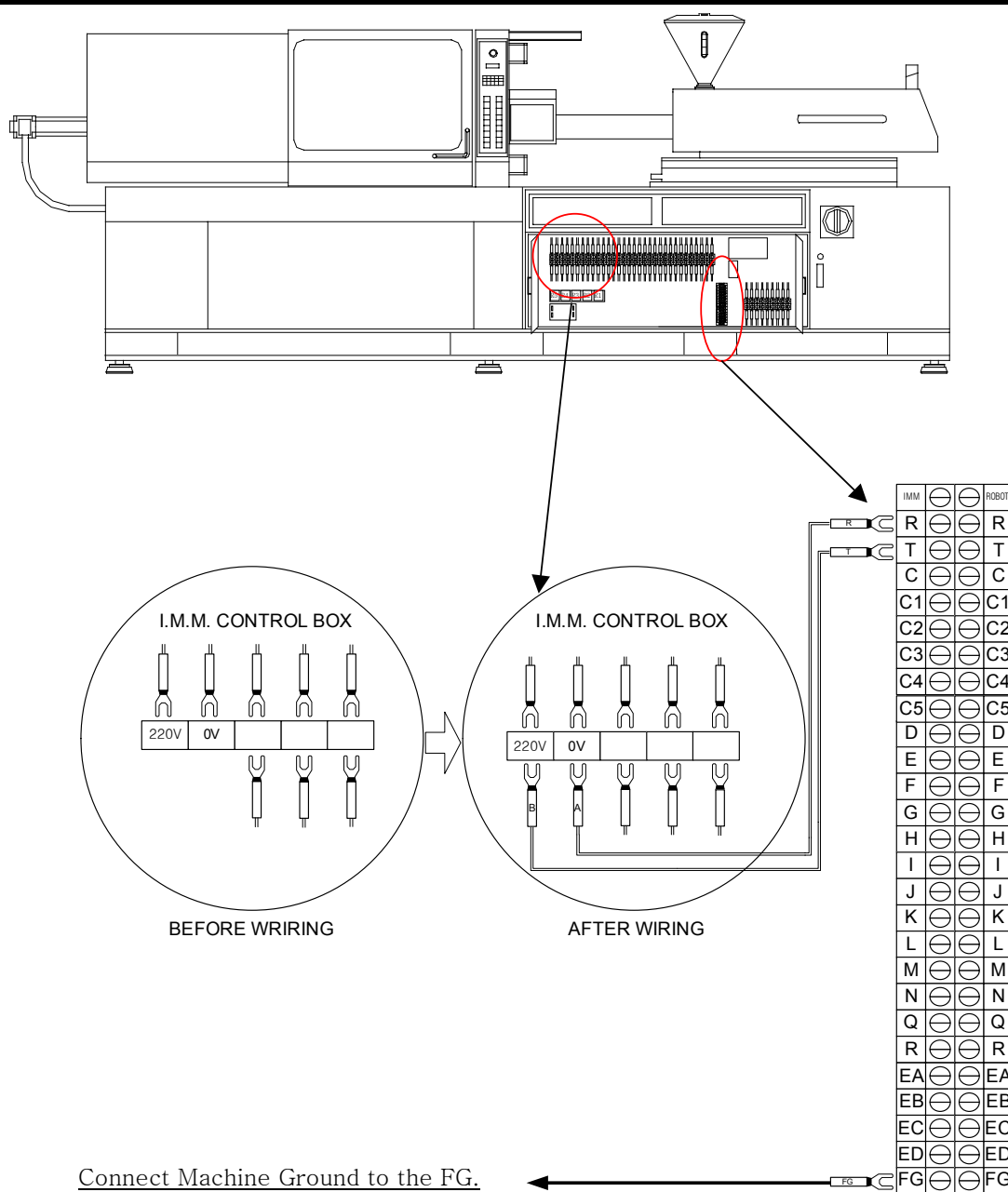
#### ● STEP 2

Secure the wire using cable tie.

## 1.2.2 Wiring Power Source

1. Locate correct voltage power source (220 V or 110 V)
2. Connect Injection Molding Machine R and T to A, B Robot.
3. Connect Machine Ground to the FG.

**NOTICE** Your wiring may look different.



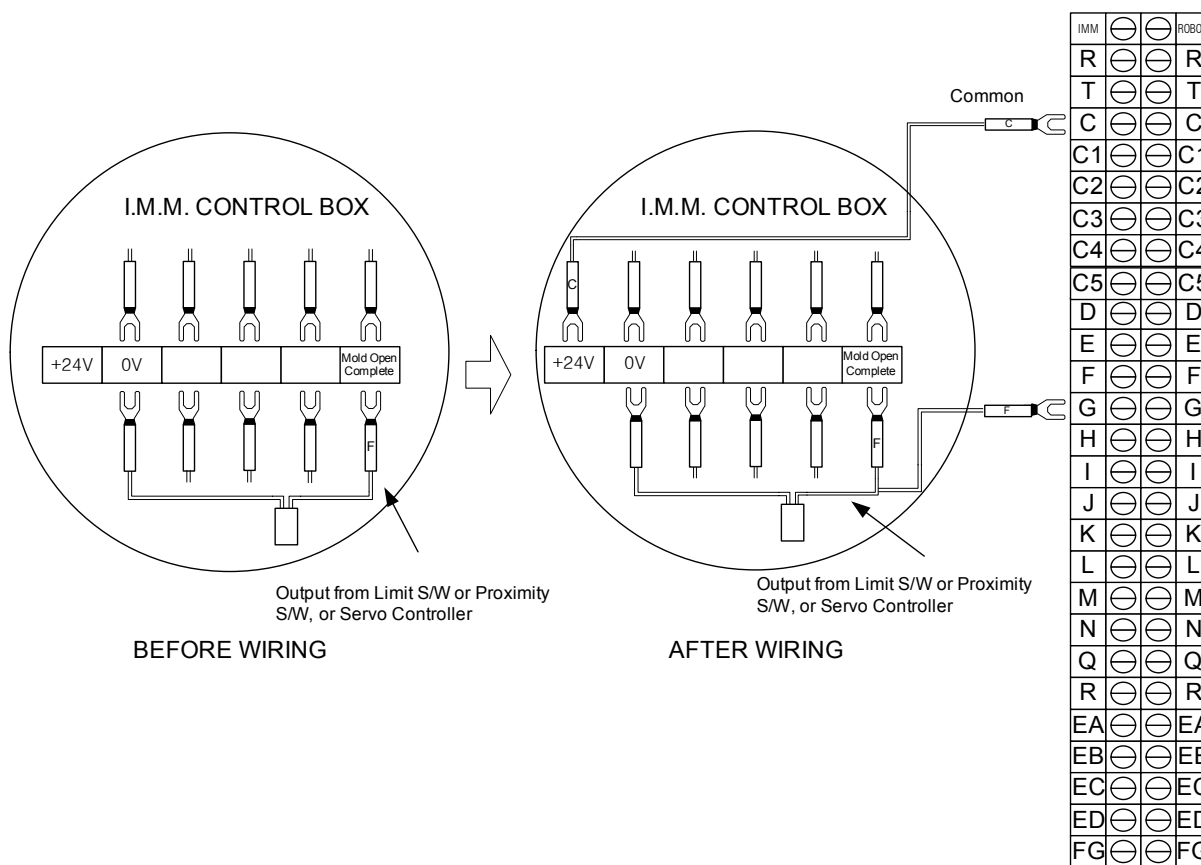
### 1.2.3 Mold Open Complete Signal

1. The Mold open complete signal indicates that the mold is fully open and it is safe for the robot to remove products. This signal must be maintained during product removal.
2. Locate this signal and confirm the signal voltage is DC 24V ( for AC 110V ,220V signal replace relay ),( For SPI version, the signal voltage is open / close contact ) contact factory
3. Connect 0 V on terminal F and Connect + 24V terminal C (Common ).  
\* Terminal+ 24V is using common for Mold Open Complete and Safety Door Open together
4. If Mold Open Complete and Safety Door Open Signal Output is + 24V , contact Factory
5. This signal may be a direct PLC output

#### **NOTICE**

Your wiring may look different.

#### [WIRING EXAMPLE]

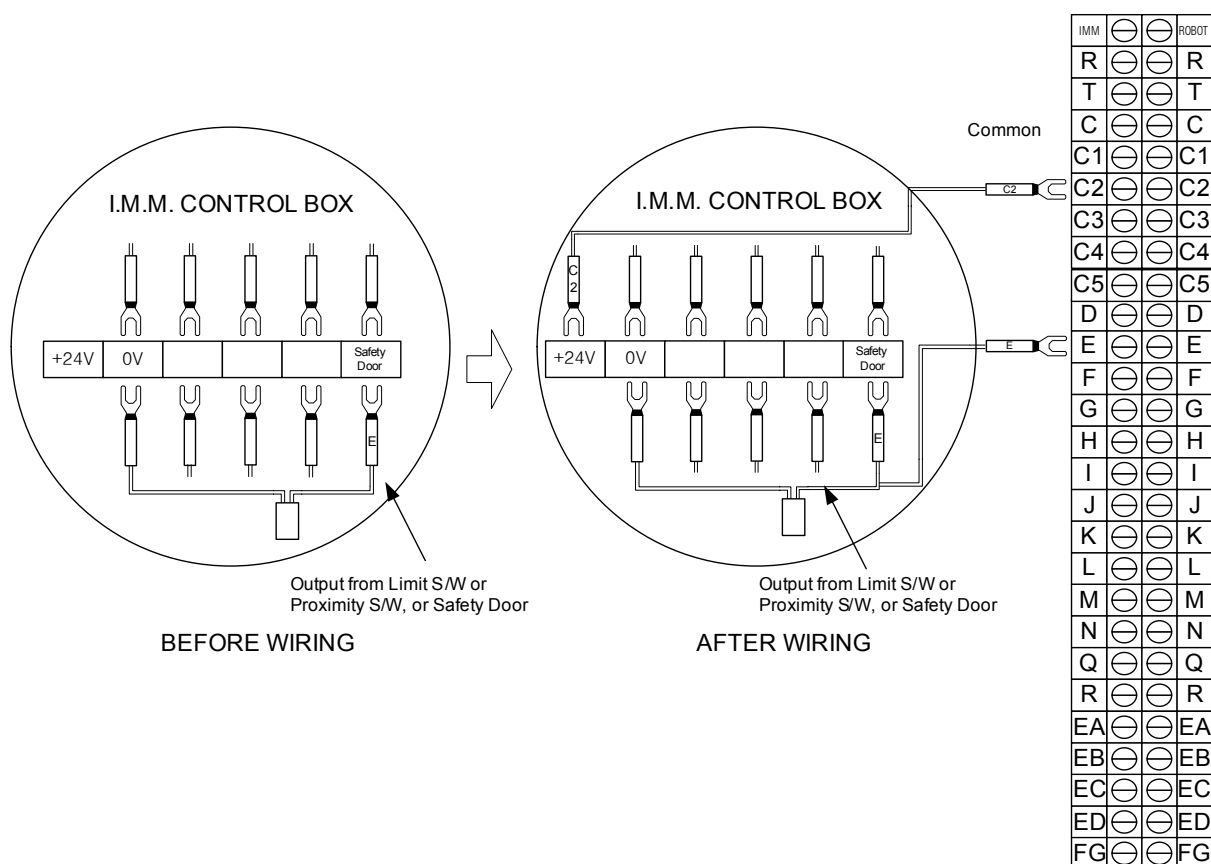


## 1.2.4 Safety Door Signal

1. This signal indicated the safety door is closed. The Robot will not operate automatically without this signal. The relay will be on when safety door is closed
2. Locate Door Safety Signal on the I.M.M and confirm the signal Voltage is 24V DC
3. Safety Door Signal is 0 V. ( The Robot 's + 24V is COMMON C2 )
4. Connect the signal to terminal E ( 0 Volts )
5. If you are unable to locate the signal or signal voltage is not 24 V DC, contact factory.
6. This signal may be a direct PLC output.
7. Other normally closed safety devices may be wired in series on this circuit.

**NOTICE** Your wiring may look different.

### [WIRING EXAMPLE]

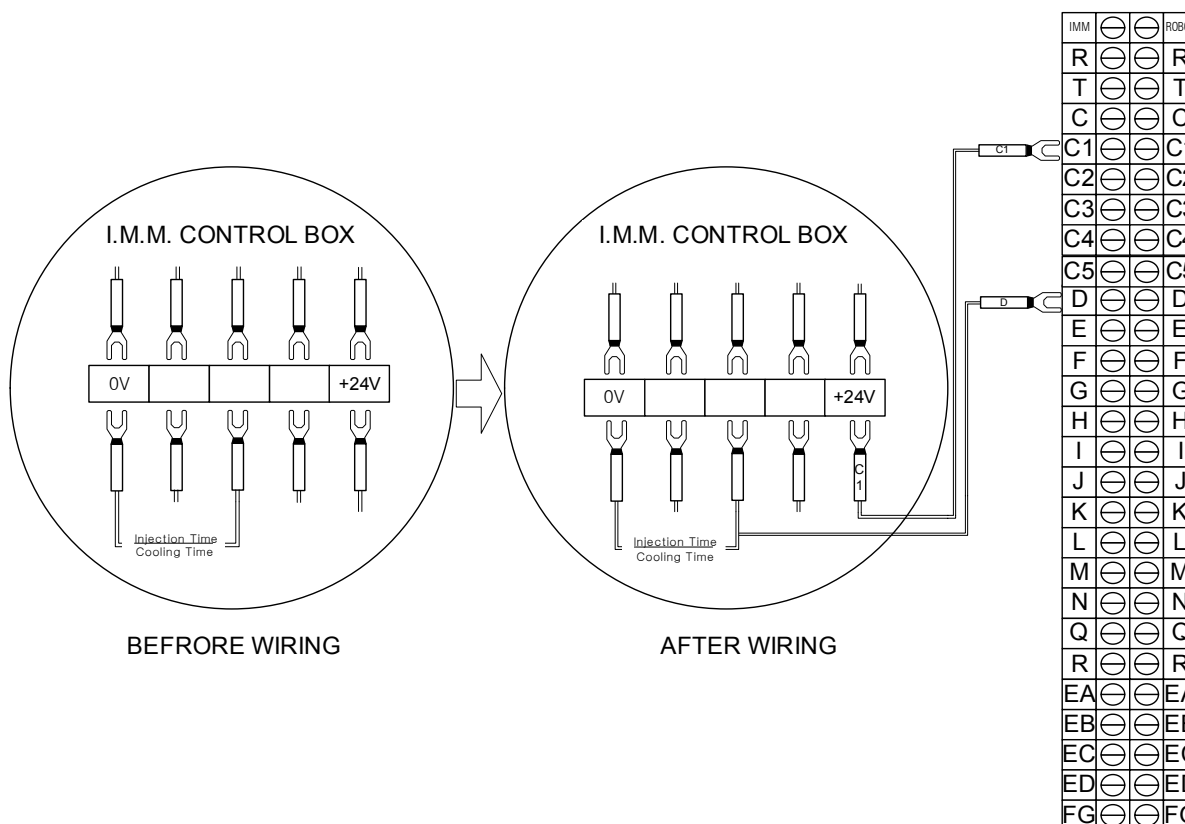


## 1.2.5 Auto Injection Signal

1. This signal confirm the one operation of the I.M.M and ensure the correct sequence during the first product removal. Any 24V signal that is momentarily on during the automatic cycle may be used. Some possible signal are : Injection Signal, Injection Time Complete, Mold Close Complete. When the robot is placed in auto mode, it will begin operation after the first molding cycle. After completing the first automatic molding cycle, the robot will operate.
2. Locate this signal and confirm the signal voltage is 24 V DC.
3. This signal uses a separate common for input.
4. Connect the signal ( + 24V DC ) to terminal C1 and Connect 0V. On terminal D.
5. This signal may be a direct PLC output

**NOTICE** Your wiring may look different.

### [Wiring Example]



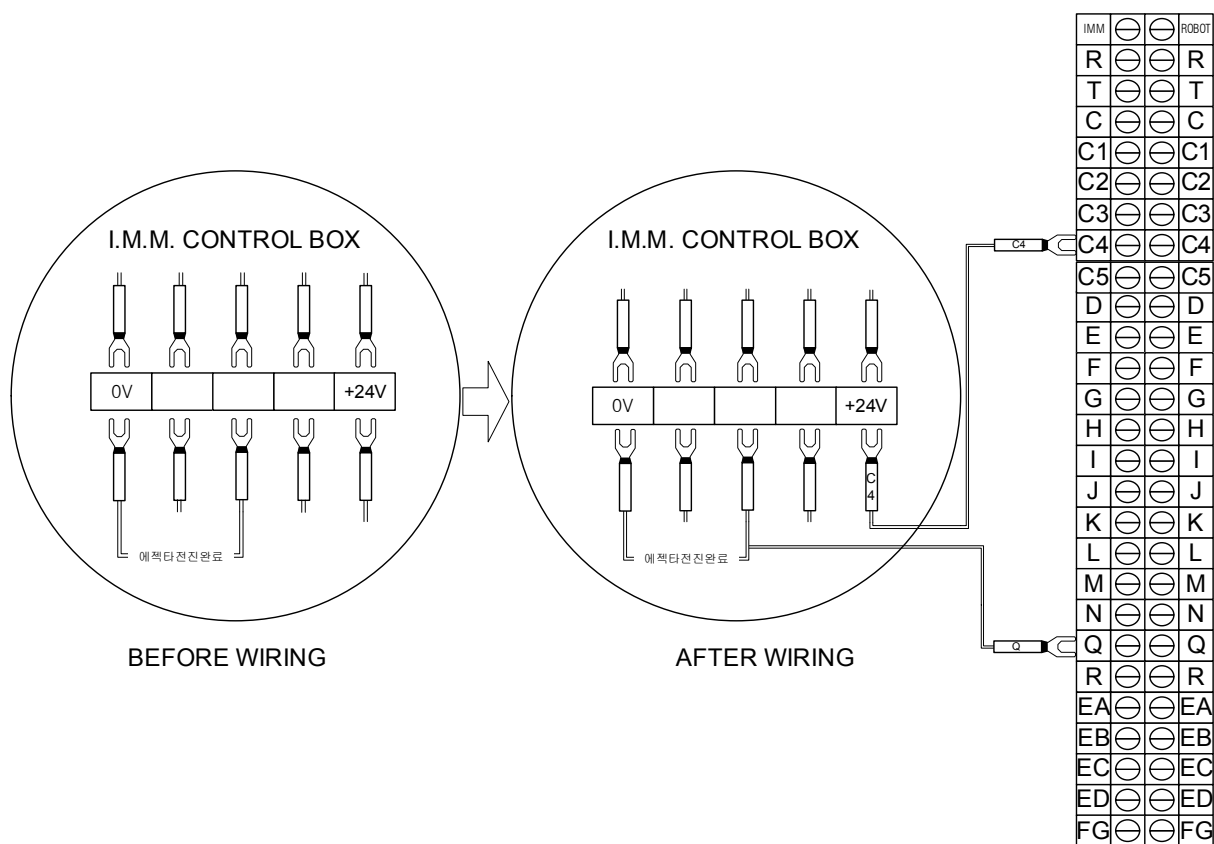
## 1.2.6 Ejector Forward Signal

1. This signal indicated the Injection Molding Machine Ejector is completely forwarded. During Auto Operation, Robot chucking or suction will be followed after Ejector Forward completed.
2. Connect the signal ( + 24V DC ) to terminal C4 and Connect 0V. On terminal Q.
3. If Ejector Forward Complete Signal is + 24V, required to install external relay to change signal. Change the proper relay if signal is AC220V or 110V
4. This signal may be a direct PLC output.

### NOTICE

Your wiring may look different.

### [Wiring Example]





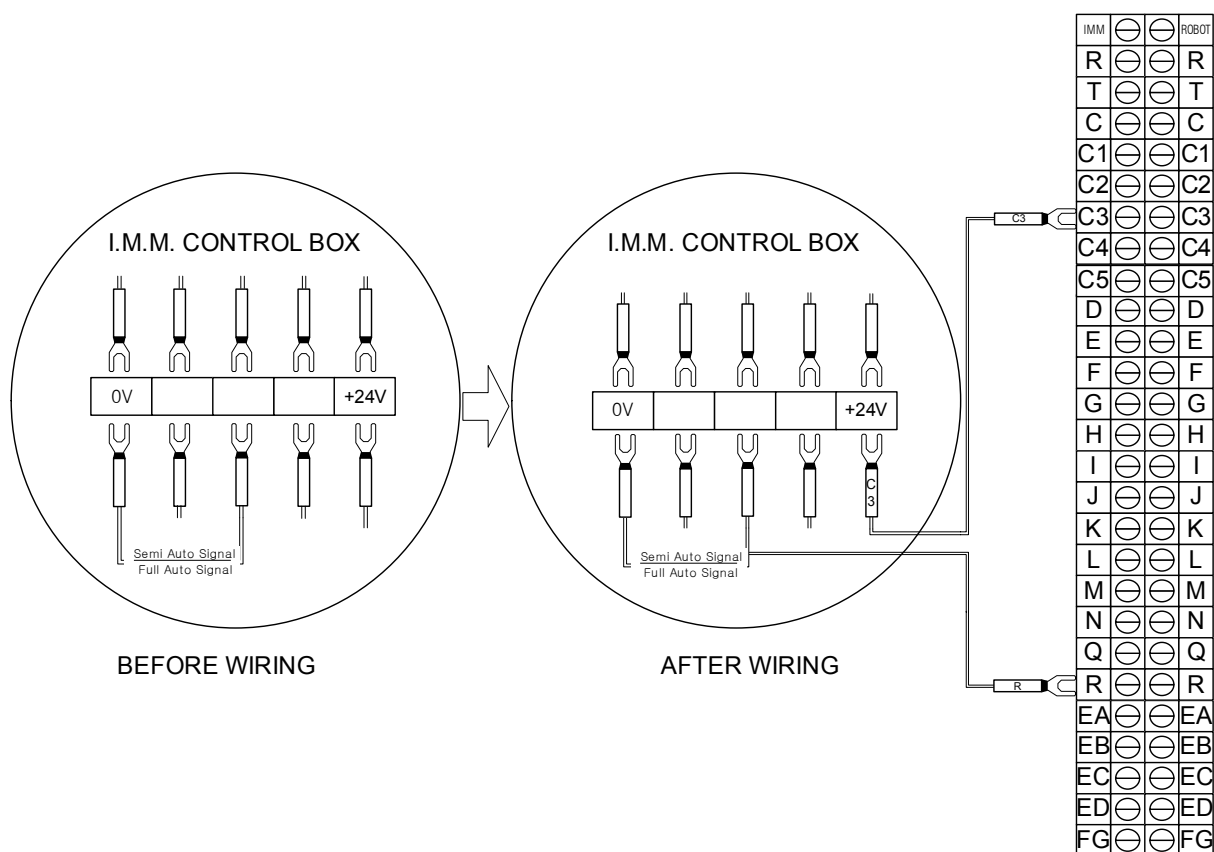
## 1.2.7 Full Auto Signal

1. This signal indicate that Molding Machine is in Fully automatic Model.
2. This signal maintained during Auto Operation
3. Connect DC24V to C3 and OV to R
4. This signal may be a direct PLC output.

### **NOTICE**

Your wiring may look different.

### [WIRING EXAMPLE]



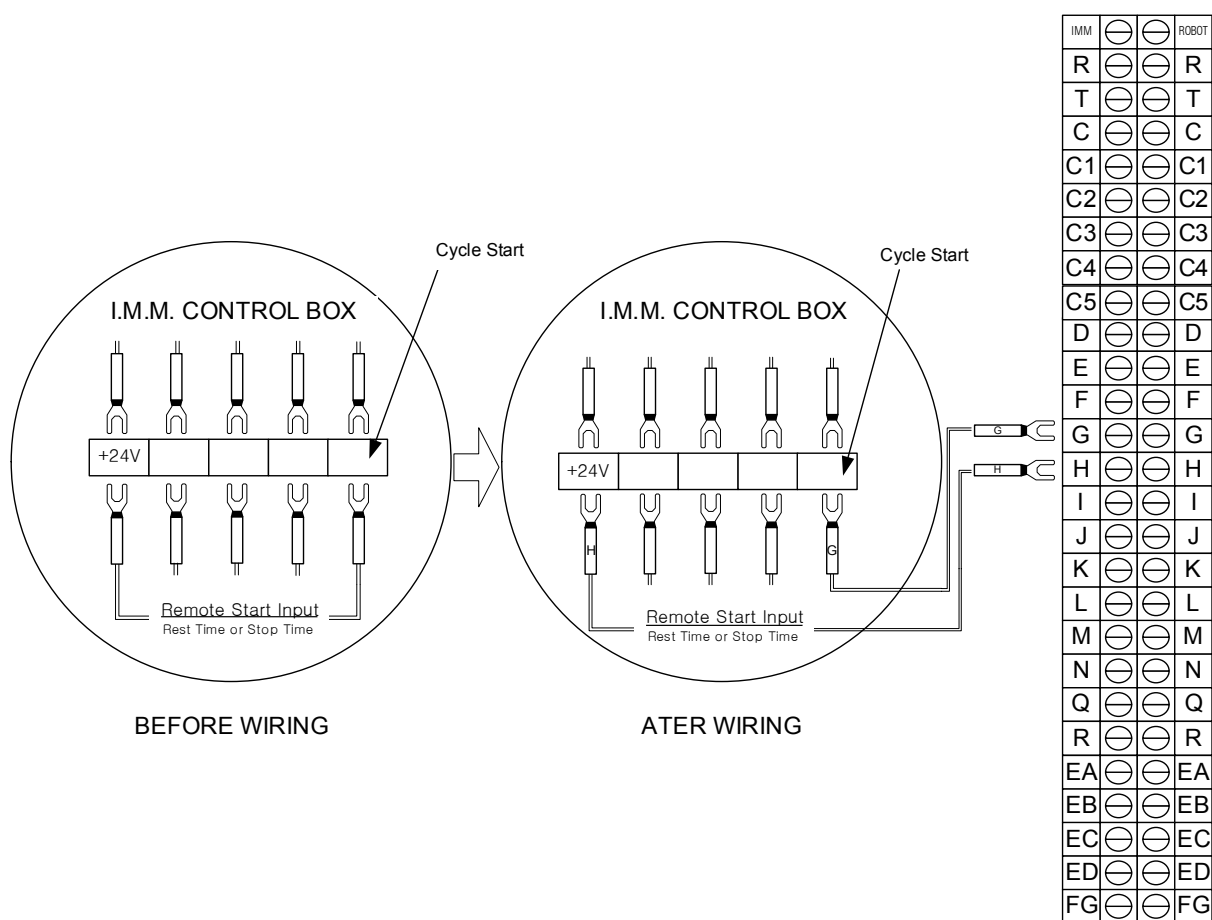
## 1.2.8 Cycle Start ( Take-Out Complete)

1. The Robot initiates the molding cycle by momentarily closing a normally open contact.
2. Using the I.M.M Schematic locate the correct place to wire cycle start contact
3. It may be necessary to contact the machine builder for information
4. Connect terminal G and H for cycle start signal. ( Depending on the injection molding machine, there may be different name for the cycle start. For example: Rest Time, Stop Time )
5. For SPI or Euromap 12 , this signal might not required

### **NOTICE**

Your wiring may look different.

### [WIRING EXAMPLE]



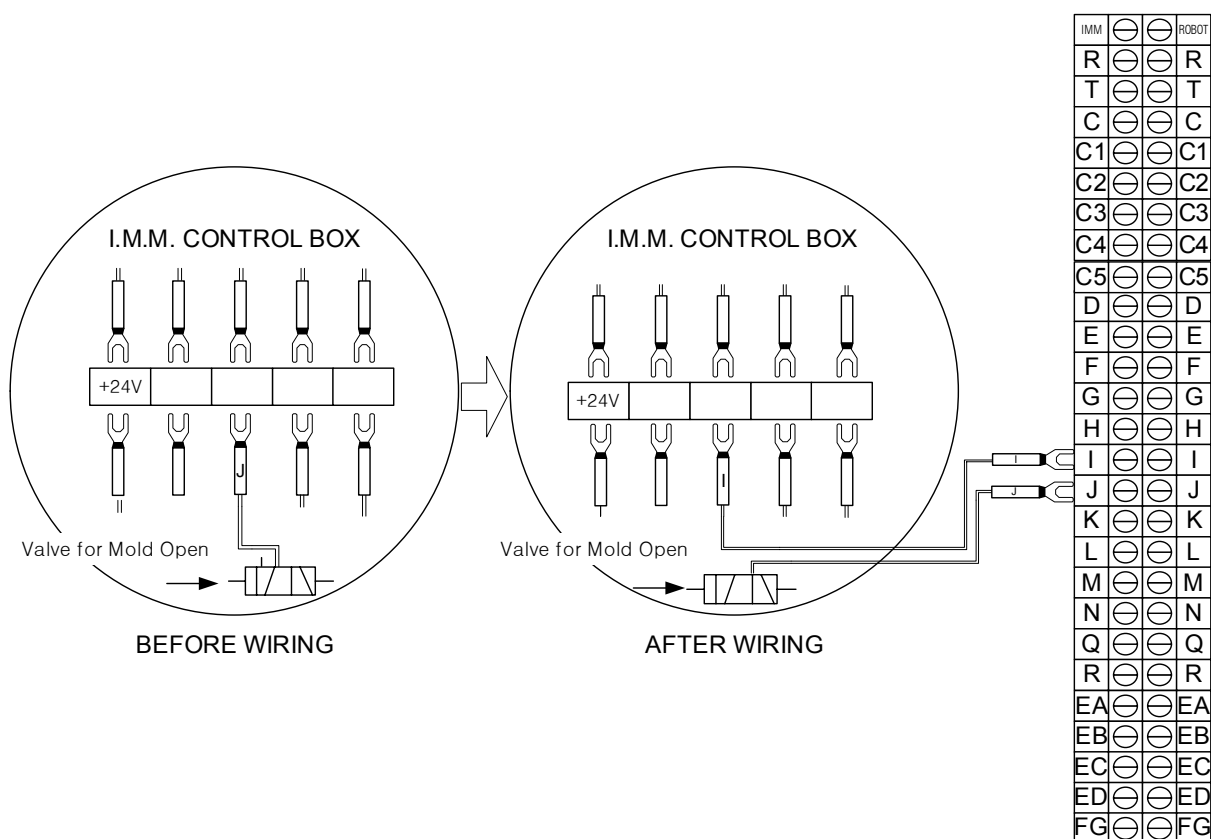
## 1.2.9 Mold Open Interlock

1. This circuit prevents the mold from opening if the robot arm is not fully retracted ( E.g. Loss of air pressure and failure of safety lock pin )
2. A normally open contact when wired correctly prevents mold open valve from being activated
3. Locate the wiring to the mold open valve.
4. Wire in series as shown.

### **NOTICE**

Your wiring may look different.

### [Wiring Example]

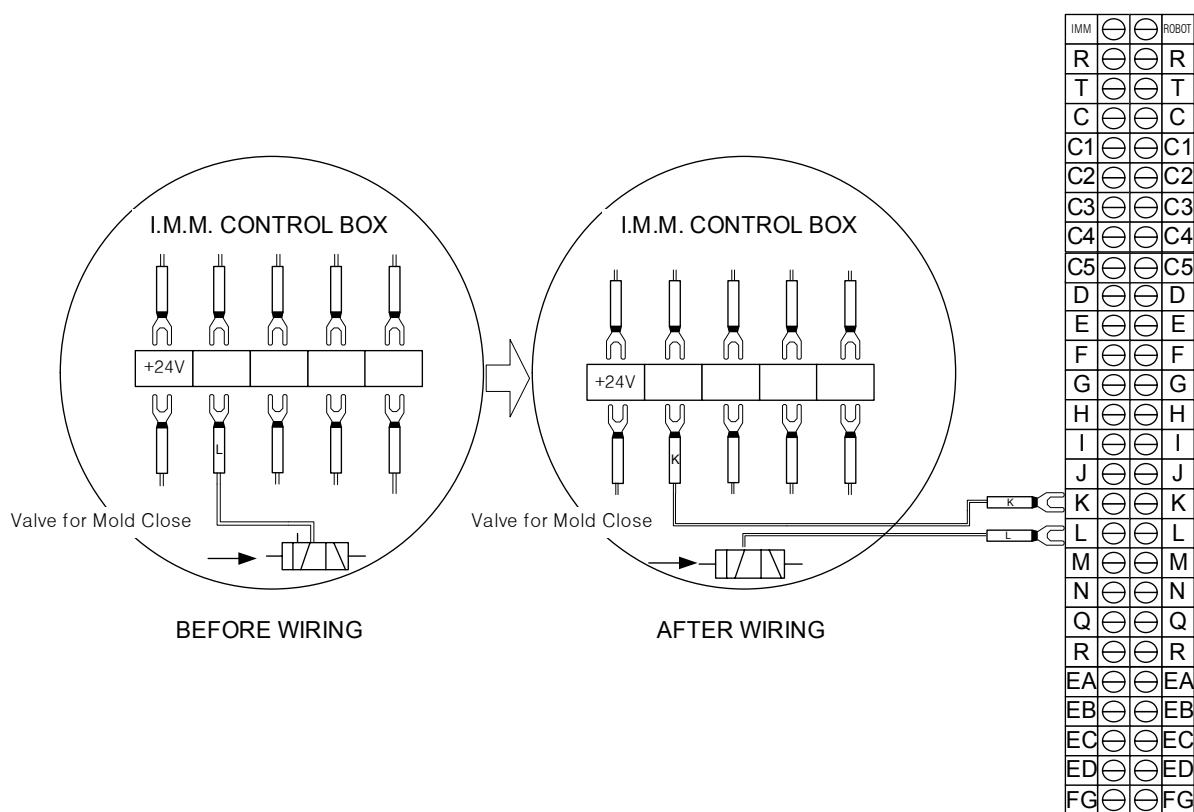


## 1.2.10 Mold Close Interlock

1. This circuit prevents the mold from closing while the picker arm is down.
2. A normally open contact when wired correctly prevents the mold close valve from being activated. Locate the wiring to the mold close valve
3. Wire in series as shown below.

**NOTICE** Your wiring may look different.

### [Wiring Example]



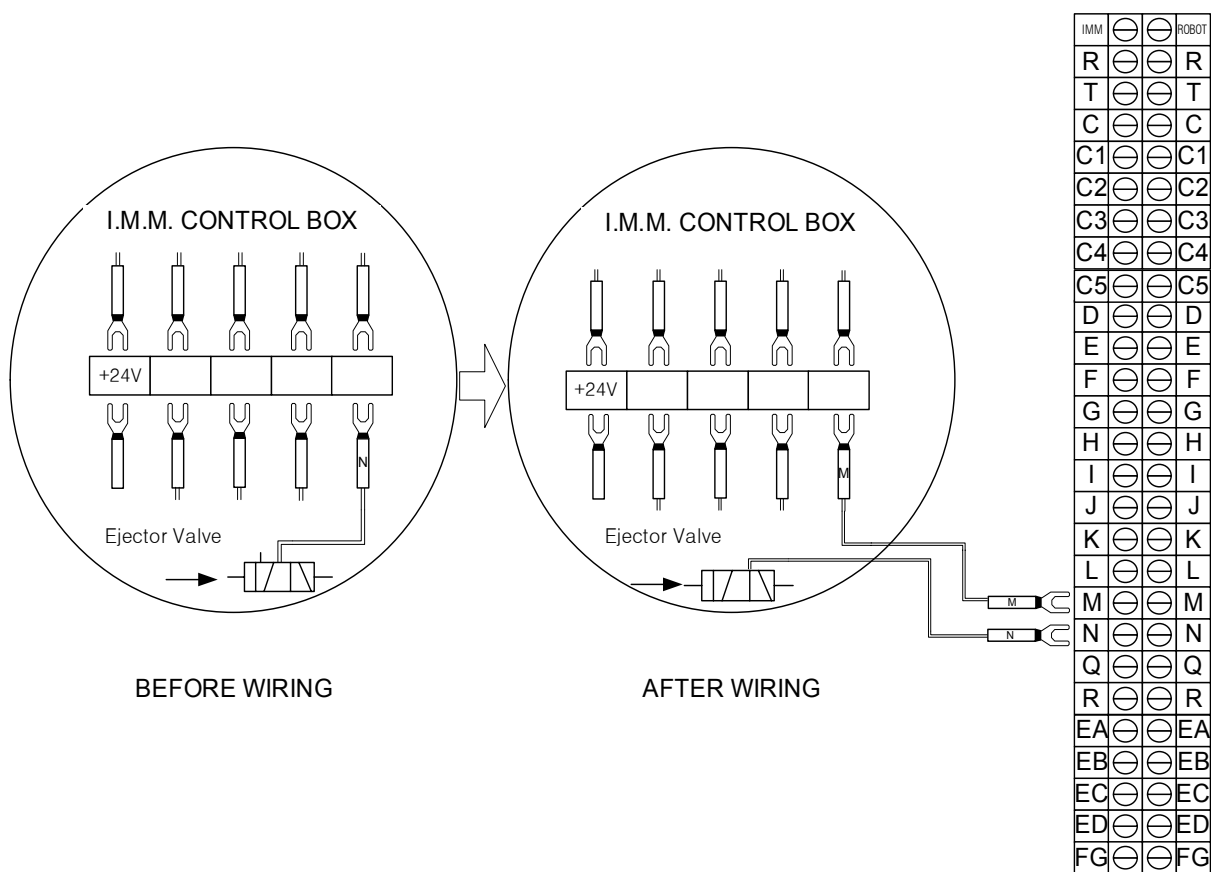
## 1.2.11 Ejector Interlock

1. The robot delays the ejector signal until the gripper or vacuum unit is in place to receive the product.
2. This is accomplished by placing a normally open contact in series with the supply to the ejector calve solenoid.
3. Locate IMM signal to ejector solenoid.
4. Wire and M and N as shown below.

### **NOTICE**

Your wiring may look different.

### [Wiring Example]



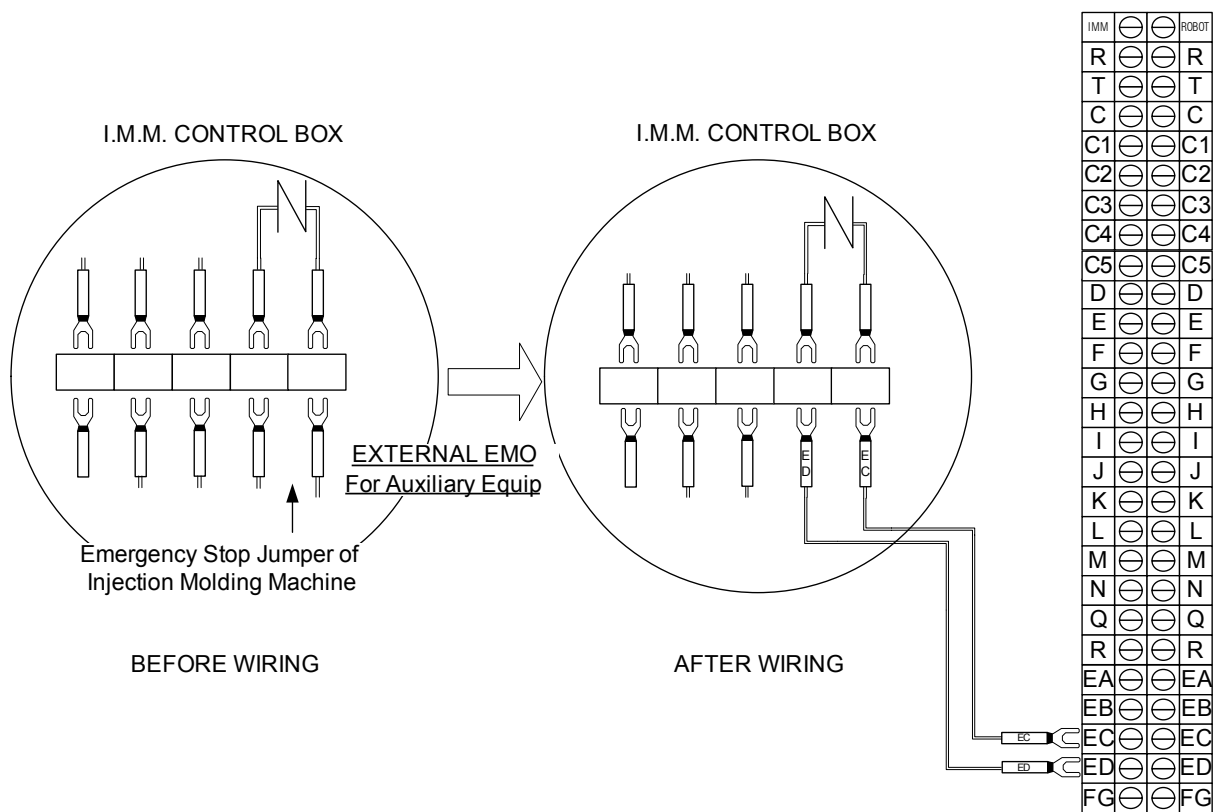
## 1.2.12 IMM to Robot EMO Circuit

1. If the IMM has a contact to activate the EMO auxiliary equipment it should be wired to the Robot
2. The Robot requires a normally closed bare contact
3. When the contact opens from IMM, the Robot EMO will be activated.
4. Wire as shown below.

### **NOTICE**

Your wiring may look different.

### [Wiring Example]



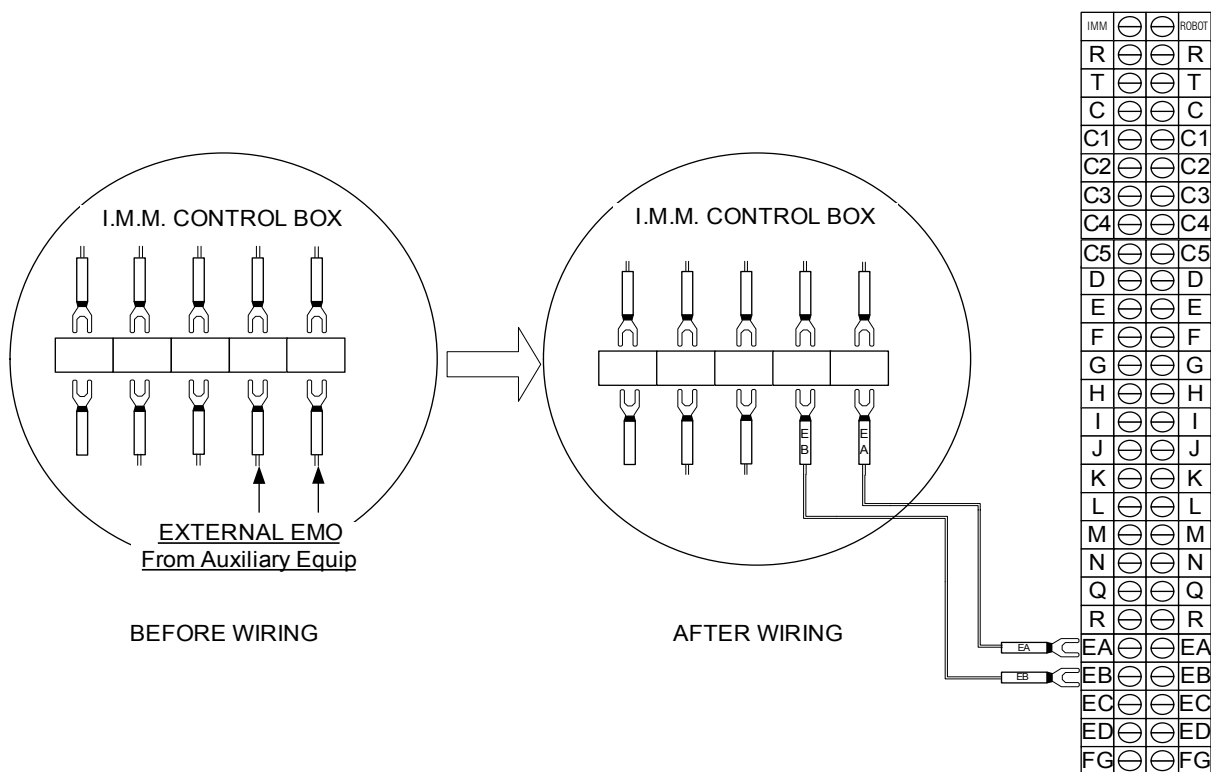
### 1.2.13 Robot to IMM EMO Circuit

1. The Robot has a contact available for use in the IMM's EMO circuit.
2. This contact is normally closed and will open when the EMO on the Robot's handy control is pressed. When wired correctly the picker EMO Stop will trigger the IMM EMO.
3. Locate the external EMO circuit on the I.M.M.
4. Wire as shown and remove jumper as required.

#### **NOTICE**

Your wiring may look different.

#### [Wiring Example]



## **1.2.14 Check Wiring**

1. Confirm all the wiring..
2. Connect robot interlock cable to IMM terminal block.
3. Clean up the wiring, use cable tie to tide up during robot operation



## 1.3 SPI CONNECTION METHOD ( Euromap 12 )

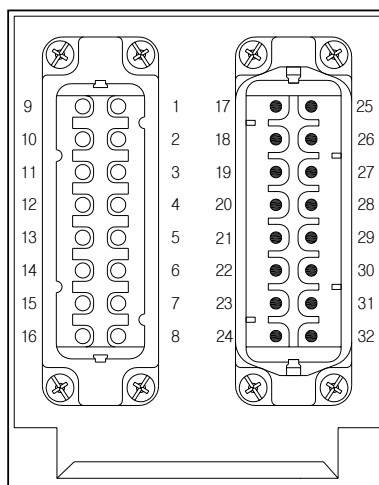
### WARNING

Only qualified personnel should attempt to complete interface wiring..

### NOTICE

● This wiring is for injection molding machine which has SPI Interface or Euromap Version 12.

SPI CONNECTOR



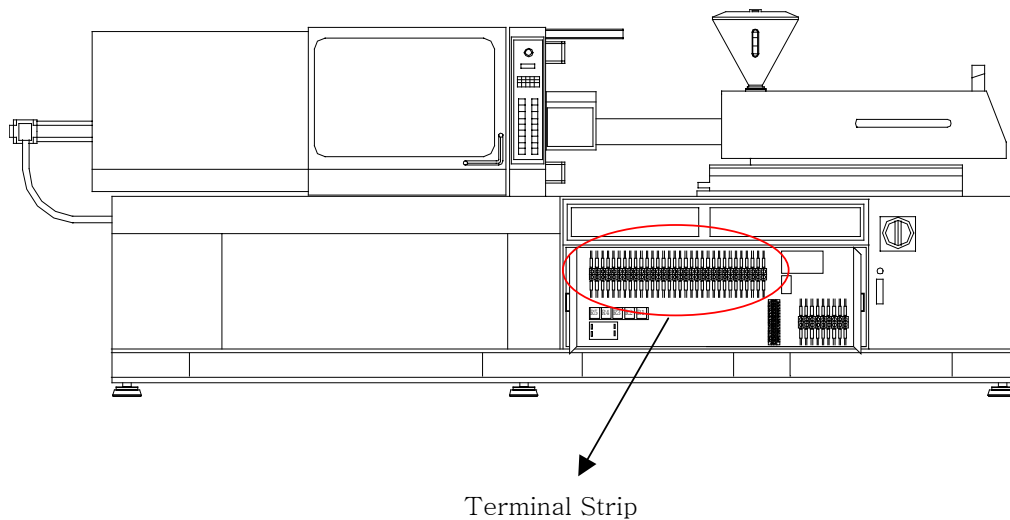
SOCKET FEMALE      PIN MALE

SPI PIN	Robot PIN	SPI PIN	Robot PIN	SIGNAL (FORM IMM TO ROBOT)	SPI PIN	Robot PIN	SPI PIN	Robot PIN	SIGNAL (FORM IMM TO ROBOT)
1	ED	9	EC	IMM EMG	17(1)	K	32(16)	L	PERMIT CLAMP CLOSE
2	F	16	0V	MOLD OPEN COMPLETE	18	I	26	J	PERMIT CLAMP MOTION
3	E	11	0V	SAFETY DOOR	19	EB	27	EA	EMERGENCY STOP
4	S	16	0V	EJECTOR BACKWQRD COMPLETE	20		32		ROBOT NON-OPERATIONAL
5	Q	16	0V	EJECTOR FORWARD COMPLETE	21	●	32	●	PERMIT EJECTOR PETRACT
6		16		CORE FULLY SET	22	N	32	M	PERMIT EJECTOR FORWARD
7		16		CORE FULLY PULLED	23	●	32	●	PERMIT CORE PULL
8	REJ	16	0V	REJECT PART	24	●	32	●	PERMIT CORE SET
10	R	16	0V	FULLY AUTOMATIC					
12	D	16	0V	MOLD FULLY CLOSED					
15		16							

### 1.3.1 Wiring Power Source

Your wiring may look different.

1. Locate correct voltage power source (220 V or 110 V)
2. Connect Injection Molding Machine R and T.
3. Connect Machine Ground to the FG.



#### ***NOTICE***

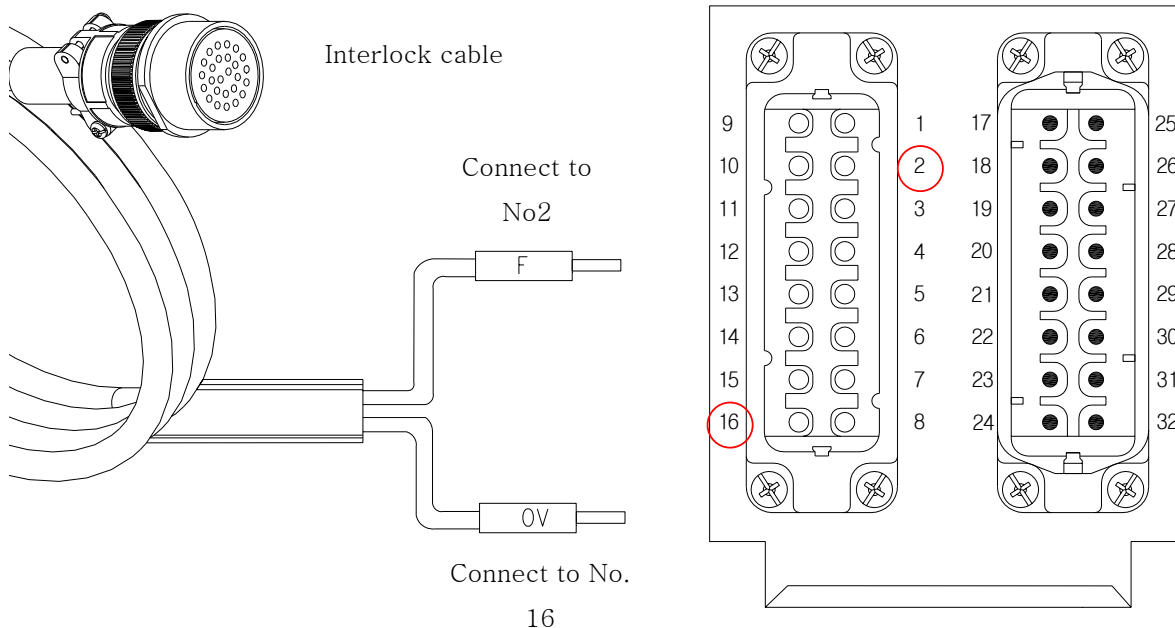
- \* Actual wiring might be different.
- \* Robot Power requirement is Single phase 220 Volts
- \* Require to use down transformer if molding machine power is AC420 or AC 380 Volts
- \*Do not connect robot electric power to transformer for molding machine

**NOTE :** First of all connect C(White), C1(White+ Yellow), C2(White+ Red), C3(White+ Black) C4(White+ Gray), C5(Black+ Yellow) to 24V ( From Robot ) ( For SPI Interlock )

### 1.3.2 Mold Open Complete Signal

1. When mold is completely open, this signal will be ON. Robot arm can go down to the molding area after confirm this signal
  2. Connect Robot wire F to No. 2 of SPI Connector
  3. Connect Robot wire OV to No. 16 of SPI Connector
- This is ON/Off contact from Molding Machine ( Relay output ). No 24 V DC or 110 V AC should not supplied.

- \* C White
- \* F Gray
- \* OV Purple

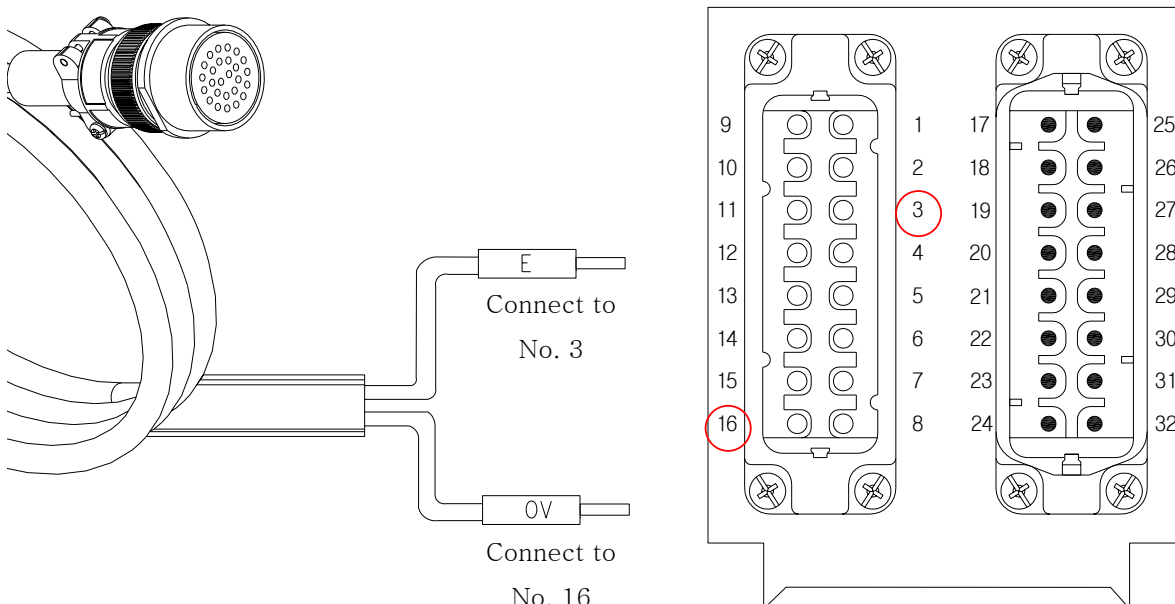


#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.3 Safety Door Signal

1. This signal indicate that the safety door is closed. If safety door is open, the signal will be off and robot can't not move or stop automatic operation.
2. . Connect Robot wire E to No. 3 of SPI Connector
3. Connect Robot wire OV to No. 16 of SPI Connector
  - This is ON/Off contact from Molding Machine ( Relay output ). No 24 V DC or 110 V AC should not supplied
  - \* C2 White+ Red
  - \* E Yellow
  - \*OV Purple



#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.4 Auto Injection Signal

1. This signal confirm the one operation of the I.M.M and ensure the correct sequence during the first product removal. Any 24V signal that is momentarily on during the automatic cycle may be used. Some possible signal are : Injection Signal, Injection Time Complete, Mold Close Complete.
2. Connect Robot wire D to No. 12 of SPI Connector
3. Connect Robot wire OV to No. 16 of SPI Connector.

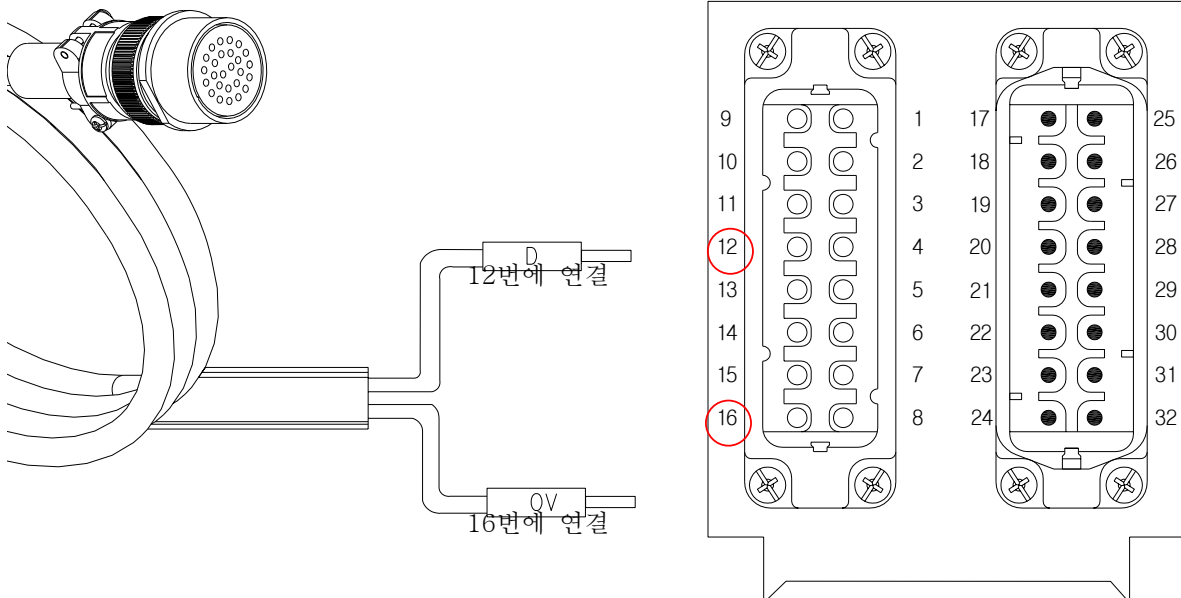
This is ON/Off contact from Molding Machine ( Relay output ).

No 24 V DC or 110 V AC should not supplied.

\* C4 White+ Yellow

\* D Orange

\*OV Purple



#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.5 Full Auto Signal

1. This signal indicate Molding Machine is in Full Auto Mode. This will allow robot operate fully automatic cycle.

2 Connect Robot wire R to No. 10 of SPI Connector

3. Connect Robot wire OV to No. 16 of SPI Connector.

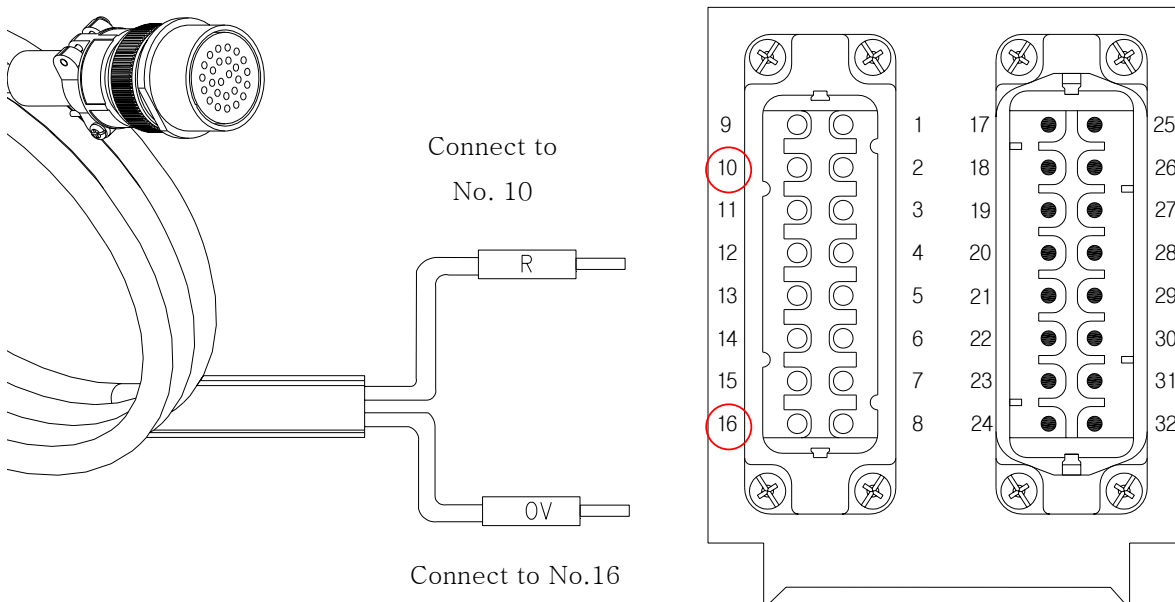
This is ON/Off contact from Molding Machine ( Relay output ).

No 24 V DC or 110 V AC should not supplied.

\* C3 White+ Black

\* R Black+ Red

\*OV Purple

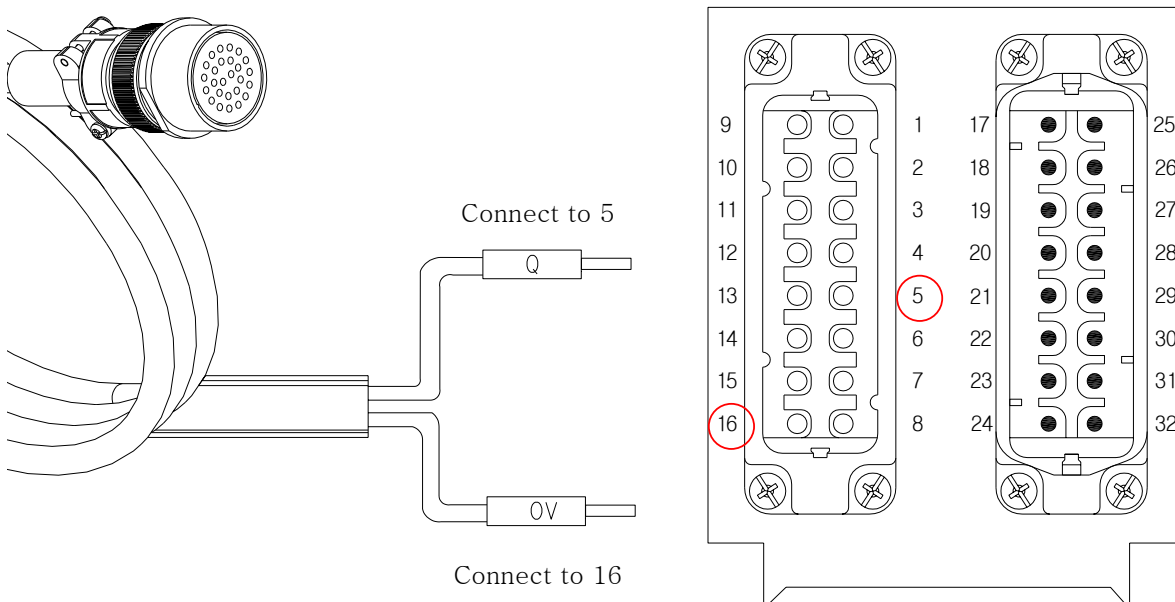


#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.6 Ejector Forward Signal

1. This signal indicate that Ejector forward completed . This signal used for Robot Suction or Chucking after Ejector Forward Completed.
2. Connect Robot wire Q to No. 5 of SPI Connector
3. Connect Robot wire OV to No. 16 of SPI Connector.
  - \* This is ON/Off contact from Molding Machine ( Relay output ).
  - No 24 V DC or 110 V AC should not supplied..
  - \* C4 White + Gray
  - \* Q Pink
  - \* OV Purple



#### **NOTICE**

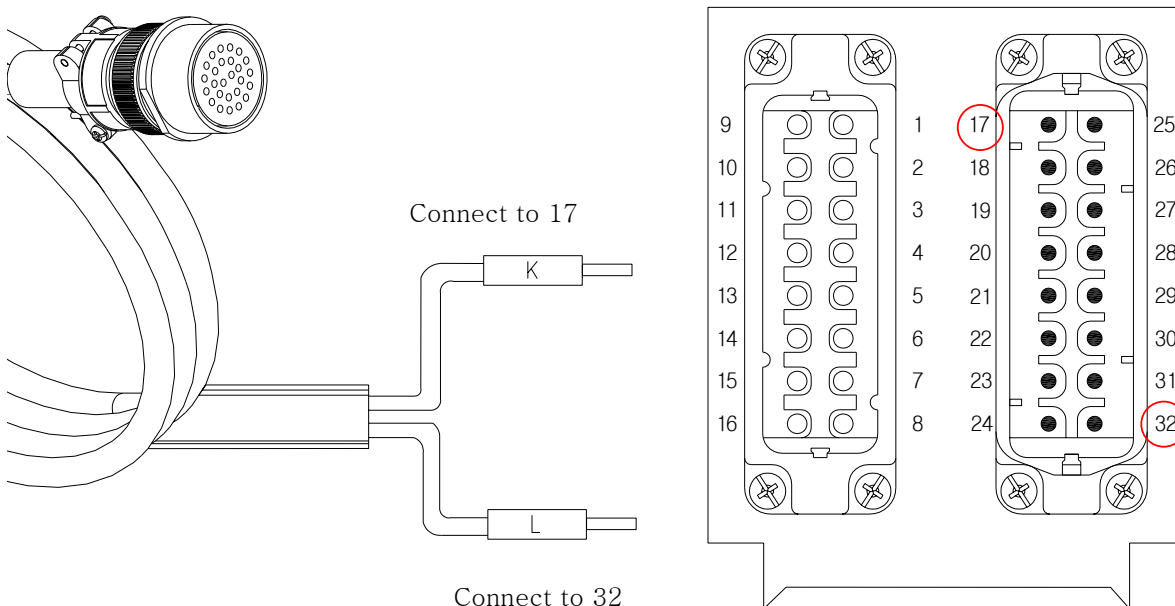
- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.7 Mold Close Interlock ( From Robot to IMM )

1. This signal prevent mold is closed when robot arm is in Mold Area.
  2. Connect Robot wire K to No. 17 of SPI Connector
  3. Connect Robot wire L to No. 32 of SPI Connector.
- \* This is ON/Off contact from Robot ( Relay output ).
- \* No 24 V DC or 110 V AC should not supplied.

\* K Green

\* L Green + White



#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.



### 1.3.8 Mold Open Interlock

1. This signal prevent mold is closed when robot arm is in Mold Area.

2. Connect Robot wire I to No. 18 of SPI Connector

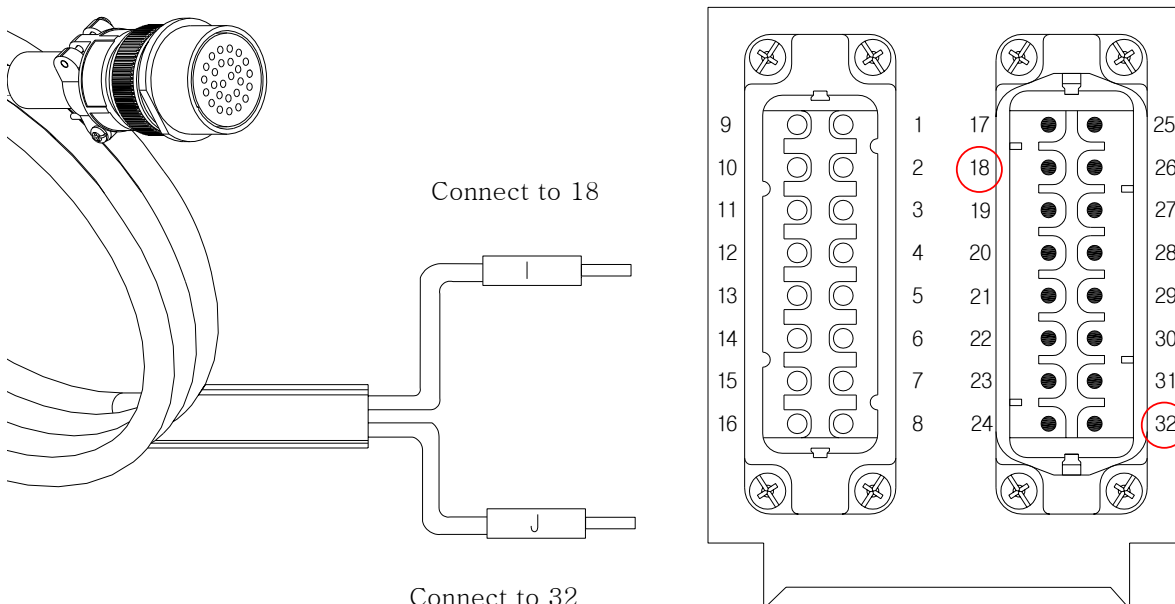
3. Connect Robot wire J to No. 32 of SPI Connector.

\* This is ON/Off contact from Robot ( Relay output ).

\* No 24 V DC or 110 V AC should not supplied..

\* I Brown

\* J Brown + White



#### **NOTICE**

\* Your wiring may look different

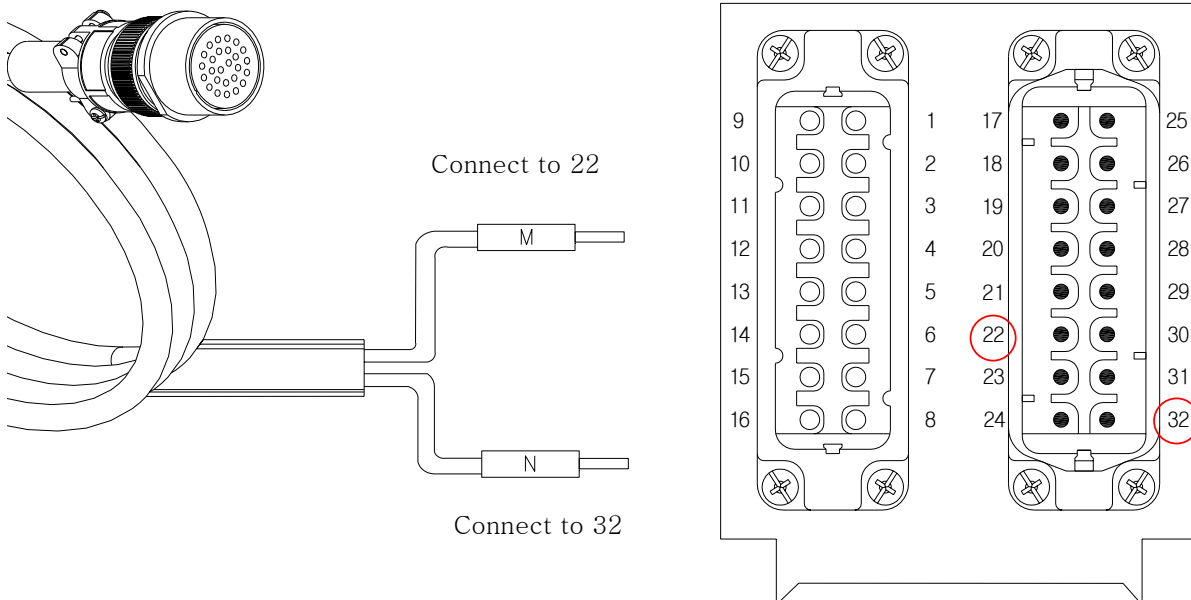
\* Confirm the orientation of SPI Connector.

### 1.3.9 Ejector Interlock

1. This Interlock hold ejector operation until robot arm is in right position for suction or chucking molded parts ( Only In Automatic Mode )
2. Connect Robot wire M to No. 22 of SPI Connector
3. Connect Robot wire N to No. 32 of SPI Connector.
  - \* This is ON/Off contact from Robot ( Relay output ).
  - \* No 24 V DC or 110 V AC should not supplied..

\* M Blue

\* N Blue + White

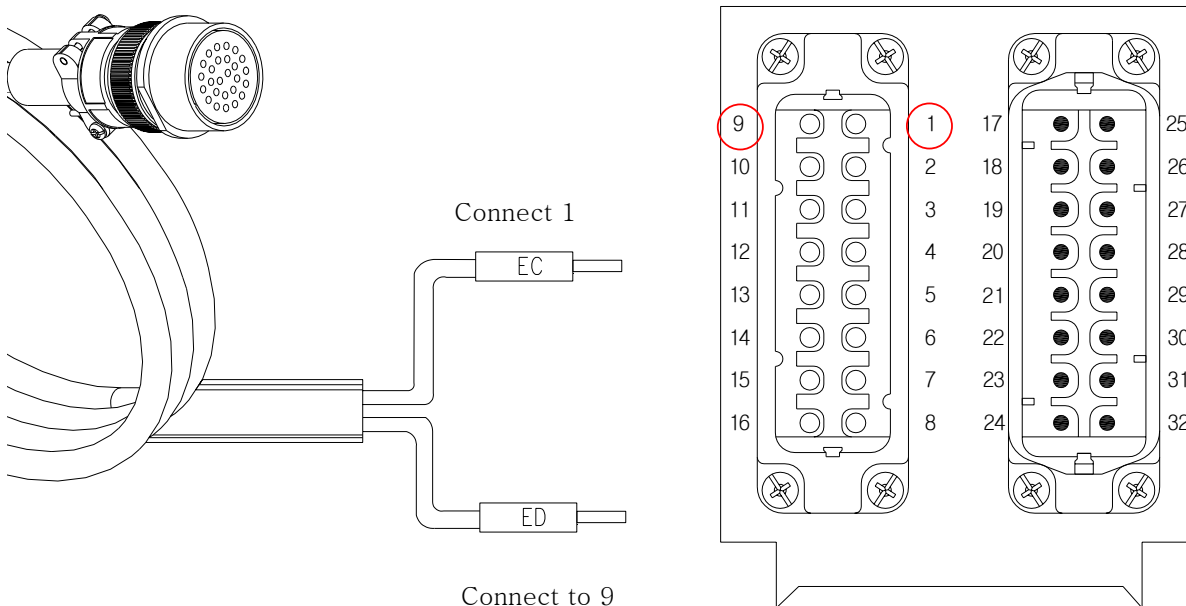


#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.10 IMM to Robot EMO Circuit

1. If the IMM has a contact to activate the EMO auxiliary equipment it should be wired to the Robot. The Robot requires a normally closed bare contact  
When the contact opens from IMM, the Robot EMO will be activated.
2. Connect Robot wire EC to No. 1 of SPI Connector
3. Connect Robot wire ED to No. 9 of SPI Connector.
  - \* This is ON/Off contact from IMM ( Relay output ).
  - \* No 24 V DC or 110 V AC should not supplied..
  - \* EC Sky
  - \* ED Pink + Black

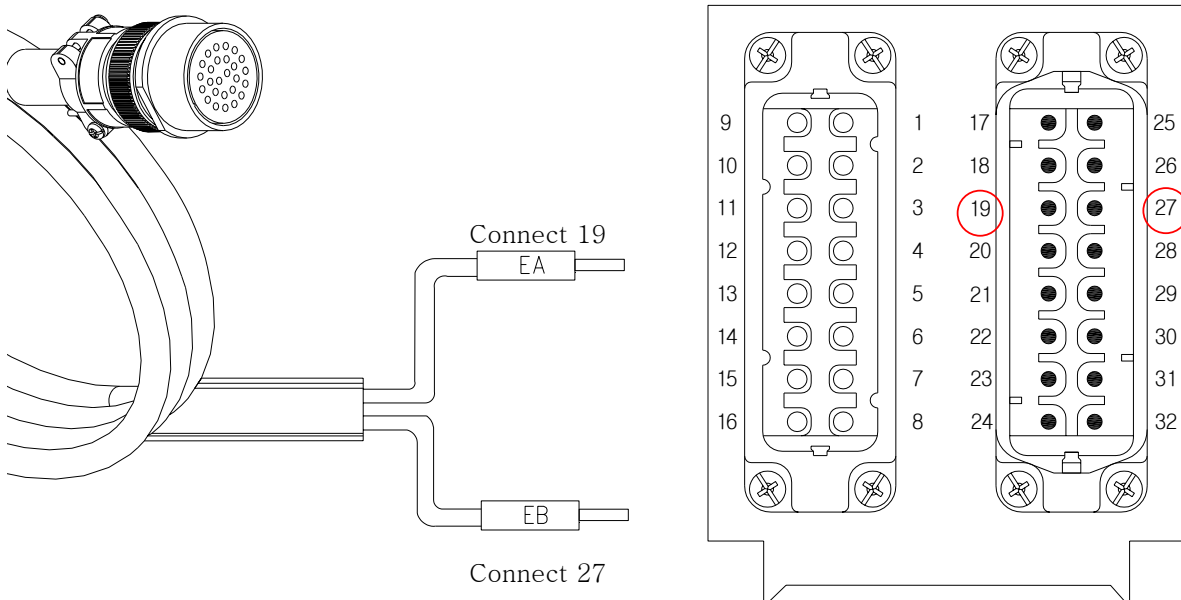


#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector.

### 1.3.11 Robot IMM EMO Circuit

1. Robot E-stop will activate IMM E-Stop Circuit.
2. Connect Robot wire EA to No. 19 of SPI Connector
3. Connect Robot wire EB to No. 27 of SPI Connector.
  - \* This is ON/Off contact from Robot ( Relay output ).
  - \* No 24 V DC or 110 V AC should not supplied..
  - \* EA    Black + Blue
  - \* EB    Purple + White



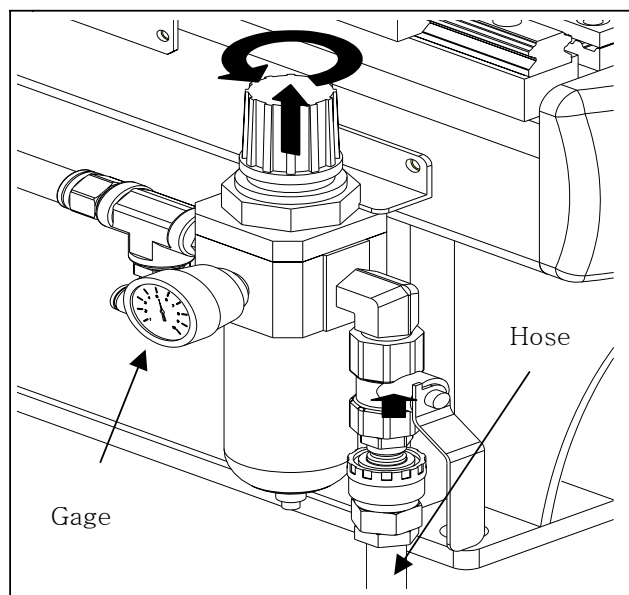
#### **NOTICE**

- \* Your wiring may look different
- \* Confirm the orientation of SPI Connector..

---

### 1.3.12 Air Connect

1. Make sure the Robot arm is retracted and in the vertical position.
2. Beware that the Robot may move suddenly as the system is pressurized.
3. Connect the air line to the Robot.
4. Connect the electric line for Air Shutdown Solenoid Valve
5. Secure the air line to avoid damage.
6. Pull up the adjusting knob and adjust the pressure to 70 psi .
7. Air supply should be clean and dry.





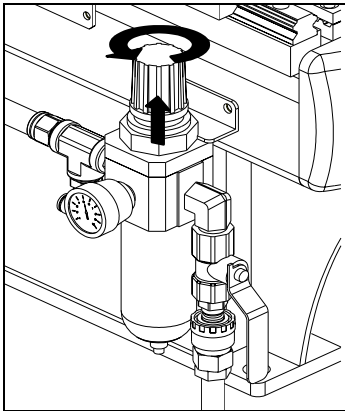
## **2 Maintenance**





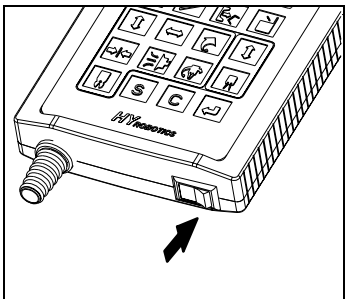
## 2.1 Check

### 2.1.1 Power ON



#### ● STEP 1

Set air pressure as 0.5Mpa (Gauge)



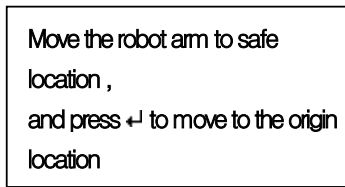
#### ● STEP 2

Power on




#### ● STEP 3

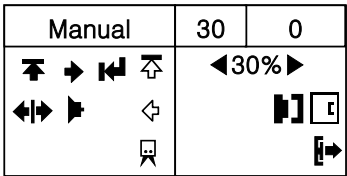
It will display System Version. And move to origin screen.



#### ● STEP4

Press  will move each axis arm to servo origin point.

And then screen will display manual operation screen.

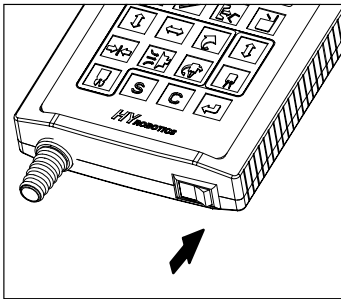


### 2.1.2 Turning System OFF



#### **WARNING**

Do not turn on and off too fast. Wait more than 1 minute to turn on or turn off the system



#### ● **STEP 1**

Turn Off

#### ● **STEP 2**

Screen will be off

### 2.1.3 Manual Operation

#### (1) Manual Operation Description

Selecting Outside Waiting Option will initiate Robot with Swing Operation



**DANGER**

CLEARING ROBOT MOTION AREA : It is the responsible of the operator to verify that the robot motion area is clear before any robot operation

Manual	30	0

INPUT / OUT PUT					
NO	NO	NO	NO	NO	NO
1	↓	Main Arm Down	12	▶	Vacuum Off
2	↑	Main Arm Up	13	↔	Chuck
3	⬆	Main Arm Up Complete	14	↔	Chuck Open
4	⬅	Main Arm Kick	15	⬇	Sub Arm Down
5	⬅	Main Arm Kick Complete	16	⬆	Sub Arm Up
6	➡	Main Arm Kick Return	17	⬆	Sub Arm Up Complete
7	⬅	Rotation	18	↔	Sub Arm Kick
8	⬅	Rotation Complete	19	⬆	Sub Arm Kick Return
9	⬆	Rotation Return	20	🖐	Sub Arm Gripper
10	⬆	Rotation Return Complete	21	🖐	Sub Arm Gripper Open
11	➡	Vacuum On			
Interlock Signal					
Input			Output		
NO	Icon	NO	Icon	NO	Icon
1	🔄	Full Auto	6	🚫	Mold Open/Close Interlock
2	👁	Auto Injection signal	7	🚫	Ejector Interlock
3	🔲	Mold Open Complete signal			
4	🔲	Door Safety signal			
5	🚪	Ejector Forward Complete			

## 2. Before Operation

### (2) Button Function









**CLEARING ROBOT MOTION AREA :** It is the responsible of the operator to verify that the robot motion area is clear before any robot operation

### NOTICE

Robot arm will not descent if mold is not open

NO	Button	Description
1		Press the Timer button, LCD displays timer mode for delay time settings.
2	+	Press the Timer button with Shift button, ( Counter ) LCD displays Counter screen , Counter screens display Total Q'ty, Reject Q'ty, Detection Fail.
3		Press Mode button, LCD displays Mode screen ( Motion Mode ).
4	+	Press Mode Button with Shift Button, ( Mold ) LCD displays Mold Maintenace Screen. ( Search Mold Number, Open and Creat, Delete Mold File )
5		Press Step Button LCD displays Step Motion Mode Screen ( Robot can operate Step by Step Operation. )
6	+	Press Step Button with Shift Button, ( I/O ) LCD display Input / Output Signal.
7		Press Auto Button LCD displays Auto Mode Screen.
8	+	Press Auto Button with Shift Button ( Cycle ) LCD displays One Cycle Operation Screen.
9	+	Press Up Arrow with Shift Button. LCD displays Error History Screen
10	+	Press Down Arrow with Shift Button. LCD displays Rom version Information
11	+	Press Right Arrow with Shift Button. LCD displays the commend in the screen with selected Language.
12		Press Descent Button Move Main Arm Down, Press again, Move Main Arm up
13		Press Kick Button Move Main Arm Kick, Press again, Move Main arm Kick Return
14		Press Rotate. Rotate Chuck, Press again, Chuck rotate return.
15		Press Chuck Chuck , Press again, Chuck Off

NO	Button	Description
16		Press Suction Suction, Press again, Suction Off
17		Press Descent Button for Sub Arm Move Sub Arm Down, Press again, Move Sub Arm up
18		Press Kick Button Move Sub Arm Kick, Press again, Move Sub Arm Kick Return
19		Press Gripper Grip and Grip Off
20		Press WAITPOS LCD displays waiting position setting screen ( Option ).
21		Press 1 Forward Robot arm will move traverse ( X+ )

### 2.1.4 Interlock Confirmation

Confirming Robot and Injection Molding Machine interlock is for safety operation between two machines

#### (1) Interlock Signal

##### ① From Injection Molding Machine to IMM

Mold Open Complete Signal	This signal is present when the contacts are closed ( Relay is On ) and indicates that the mold is in a predetermined fully open position. The signal is maintained whenever the mold is the predetermined fully open position. (This signal allow robot arm to enter mold area if interlock is working properly )
Auto Injection Signal	This signal is present when the contacts are closed ( Relay is ON ) and indicates that the mode of operation of the injection molding machine is auto. This signal can be on when the injection molding machine is in automatic processing. The Robot will memorize this signal until receiving the Mold Open Complete signal and robot will start auto operation.
Door Safety Signal	This signal is present when the contacts are closed ( Relay is ON ) and indicates that the movable gates and guard that prevent access to robot motions are closed. The signal maintained as long as the movable gates and guard are closed. When Robot in Auto Mode, if this signal is not present , robot will not operate and move to manual mode.
Full Auto	This signal is present when the contacts are closed ( Relay is ON ) and indicates that the mode of operation of the injections molding machine is fully automatic. This signal is maintained as long as the injection molding machine is in fully automatic
Reject Part	This signal is present when the contacts closed ( Relay is ON ) and indicates that the molded part is not acceptable. If the Robot receives this signal, robot will separate the parts in this cycle as a rejected parts and locate the predetermined position.
IMM EMO	While the injection molding machine emergency stop is activated, the circuit will open and will activate the emergency stop circuit of the robot. The injection molding machine emergency stop circuit will be hard wired in series with the robot emergency stop circuit. The current of this signal must not exceed 6 amps

## ② From Robot to Injection Molding Machine

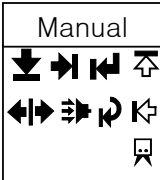
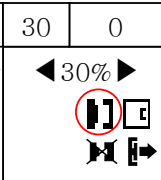
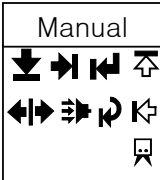
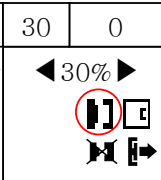
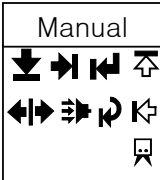
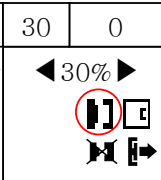
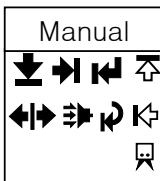
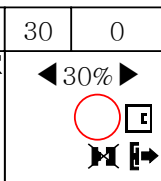
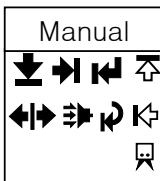
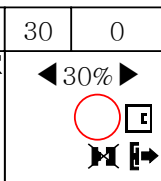
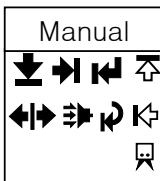
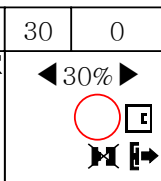
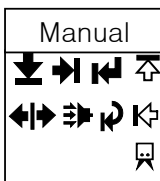
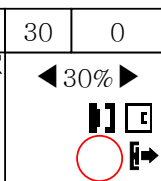
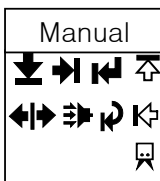
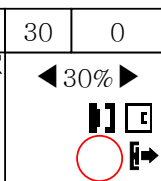
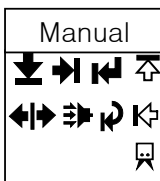
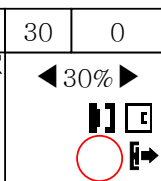
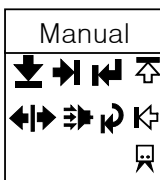
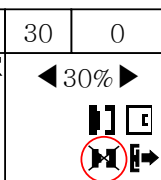
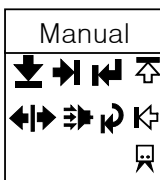
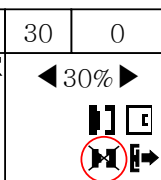
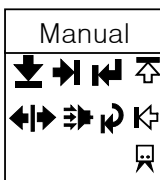
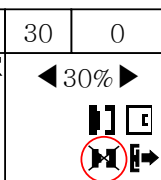
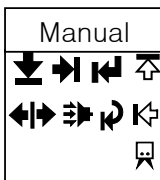
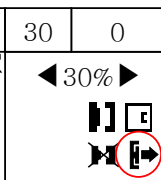
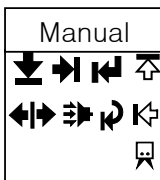
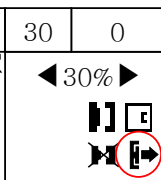
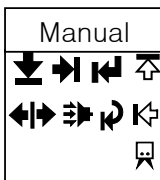
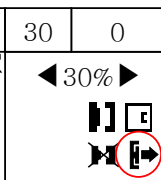
Mold Closed Interlock	The closing of this contact ( Relay is ON ) indicates that the robot is in a predetermined safe position and allows the IMM clamp to close. Clamp closing motion must be interrupted whenever this signal is not present. This signal is no longer required once the mold is fully closed.
Mold Open Interlock	The closing of this contact indicates ( Relay is ON ) that the robot is in a predetermined safe position and allows IMM clamp Open. Both clamp closing and clamp opening motion must be interrupted whenever this signal is not present. The current of this signal must not exceed 6 amps
Ejector Interlock	The closing of this contact ( Relay is ON ) permits the ejectors can go forward. Only operate in Auto mode and when Robot is in Kick Position ( Ready to Receive the parts ) will send signal to Injection Molding Machine
Take-Out Complete / Cycle Start	The closing of this contact ( Relay is ON ) indicates that the robot is in a predetermined safe position and allows the IMM clamp to close. Clamp closing motion must be interrupted whenever this signal is not present.
Robot EMO	While the robot emergency stop is activated, the circuit will open and activate the emergency stop circuit of the injection molding machine. The robot emergency stop circuit will be hardwired in series with the injection molding machine emergency stop circuit. The current of this signal must not exceed 6 amps.

## ③ Output Signal to Conveyor or Stocker or Gate cutter

Conveyor	After release ( Open ) the parts , robot will generate signal momentarily to auxiliary machine for next operation.
----------	--

## (2) Interlock Signal Confirmation

### ① While in Manual Mode

Signal	Description							
Mold Open Complete Signal	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td colspan="2"></td></tr></table>	Manual	30	0				<ul style="list-style-type: none"><li>◆ When Mold Open,</li><li>◆ Robot arm can be Descent(Down)</li></ul>
	Manual	30	0					
								
<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td colspan="2"></td></tr></table>	Manual	30	0				<ul style="list-style-type: none"><li>◆ When Mold is not Open</li><li>◆ Robot arm can not be Descent</li></ul>	
Manual	30	0						
								
Mold Open and Close Interlock	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td colspan="2"></td></tr></table>	Manual	30	0				<ul style="list-style-type: none"><li>◆ When mold open is permitted</li><li>◆ Mold can be opened and closed</li></ul>
	Manual	30	0					
								
<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td colspan="2"></td></tr></table>	Manual	30	0				<ul style="list-style-type: none"><li>◆ When Robot arm ascent complete is not on,</li><li>◆ Mold can not be closed ( with Safety Door Closed )</li></ul>	
Manual	30	0						
								
Ejector Interlock	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td colspan="2"></td></tr></table>	Manual	30	0				<ul style="list-style-type: none"><li>◆ When Ejector can be operated in manual mode</li><li>◆ Ejector interlock will working only the Robot in Auto Mode.</li></ul>
Manual	30	0						
								



Safety Door Signal	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td>◀30%▶</td><td></td></tr></table>	Manual	30	0		◀30%▶		◆ When Safety Door is closed.
	Manual	30	0					
	◀30%▶							
	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td>◀30%▶</td><td></td></tr></table>	Manual	30	0		◀30%▶		◆ When Safety Door is opened
Manual	30	0						
	◀30%▶							
Auto Injection	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td></td><td></td></tr></table>	Manual	30	0				◆ When IMM in manual and Semi-Manual Mode
Manual	30	0						
Full Auto	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td></td><td></td></tr></table>	Manual	30	0				1. When Injection Molding Machine is not in auto mode.
	Manual	30	0					
	<table><tr><td>Manual</td><td>30</td><td>0</td></tr><tr><td></td><td></td><td></td></tr></table>	Manual	30	0				2. When Injection Molding Machine is in fully auto mode.
Manual	30	0						
Robot EMO		3. Press Robot EMO button, make sure IMM EMO is operated.						

## 2. Before Operation

### ② Interlock Confirmation in Step Operation

Signal	Description									
Ejector Interlock	<table><tr><td>StepRun</td><td>30</td></tr><tr><td colspan="2">Down</td></tr><tr><td colspan="2">Kick</td></tr><tr><td colspan="2">&gt; Ejector</td></tr></table>	StepRun	30	Down		Kick		> Ejector		<p>◆ When robot is down, kick and ready to receive parts, Ejector should be operated.</p>
StepRun	30									
Down										
Kick										
> Ejector										

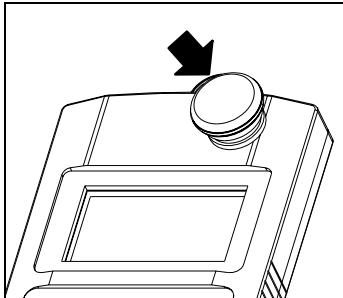
### ③ Interlock confirmation in Auto Mode

Signal	Description									
Cycle Start	<table><tr><td>Error</td><td>30</td></tr><tr><td colspan="2">160 Vacuum Error Open safety door and check.</td></tr></table>	Error	30	160 Vacuum Error Open safety door and check.		<ul style="list-style-type: none"><li>◆ When the Robot has Vacuum error in Auto Mode, next cycle should not be operated with safety door closed</li></ul>				
Error	30									
160 Vacuum Error Open safety door and check.										
Full Auto	<table><tr><td>Input (Out ► )</td><td>30</td></tr><tr><td>X303 FullAuto</td><td>●</td></tr><tr><td>X304 EjectorOk</td><td>○</td></tr><tr><td>X305 ImmEmg</td><td>●</td></tr></table>	Input (Out ► )	30	X303 FullAuto	●	X304 EjectorOk	○	X305 ImmEmg	●	<ul style="list-style-type: none"><li>◆ When IMM is in auto injection with full Auto mode, make sure the signal is on. ( Mold Close complete may be substituted Auto Injection Signal )</li></ul>
Input (Out ► )	30									
X303 FullAuto	●									
X304 EjectorOk	○									
X305 ImmEmg	●									
Conveyor	<table><tr><td>Output (In ◀ )</td><td>30</td></tr><tr><td>Y300 EjectorSig</td><td>●</td></tr><tr><td>Y301 TakeoutOk</td><td>○</td></tr></table>	Output (In ◀ )	30	Y300 EjectorSig	●	Y301 TakeoutOk	○	<ul style="list-style-type: none"><li>◆ Confirm the Conveyor output is on, after ascent complete with release parts</li></ul>		
Output (In ◀ )	30									
Y300 EjectorSig	●									
Y301 TakeoutOk	○									
Reject	<table><tr><td>Input (Out ► )</td><td>30</td></tr><tr><td>X303 FullAuto</td><td>●</td></tr><tr><td>X304 EjectorOk</td><td>○</td></tr><tr><td>X305 ImmEmg</td><td>●</td></tr></table>	Input (Out ► )	30	X303 FullAuto	●	X304 EjectorOk	○	X305 ImmEmg	●	<ul style="list-style-type: none"><li>◆ If the mold parts is accepted, reject signal will be off after mold open complete.</li></ul>
Input (Out ► )	30									
X303 FullAuto	●									
X304 EjectorOk	○									
X305 ImmEmg	●									

Reject	<table><tr><td>Input ( Out ► )</td><td>30</td></tr><tr><td>X000 Ready Cut</td><td><input type="radio"/></td></tr><tr><td>X101 Rdy Stack</td><td><input type="radio"/></td></tr><tr><td>X102 Reject</td><td><input checked="" type="radio"/></td></tr></table>	Input ( Out ► )	30	X000 Ready Cut	<input type="radio"/>	X101 Rdy Stack	<input type="radio"/>	X102 Reject	<input checked="" type="radio"/>	◆ If the mold parts is rejected by IMM , reject signal will be on after mold open complete.
Input ( Out ► )	30									
X000 Ready Cut	<input type="radio"/>									
X101 Rdy Stack	<input type="radio"/>									
X102 Reject	<input checked="" type="radio"/>									
IMM EMO Stop	<table><tr><td>Input ( Out ► )</td><td>30</td></tr><tr><td>X305 Imm Emg</td><td><input checked="" type="radio"/></td></tr></table>	Input ( Out ► )	30	X305 Imm Emg	<input checked="" type="radio"/>	◆ Pressing IMM EMO Stop will operate Robot EMO stop				
Input ( Out ► )	30									
X305 Imm Emg	<input checked="" type="radio"/>									

### 2.1.5 Emergency Off

Press ROBOT EMO button in any dangerous situation ( Protect People, Robot, Mold Etc )



#### ● STEP 1

Press ROOBT EMO button.

Robot will stop Operation immediately.

Error
096 ROBOT EMO Restore ROBOT EMO button.

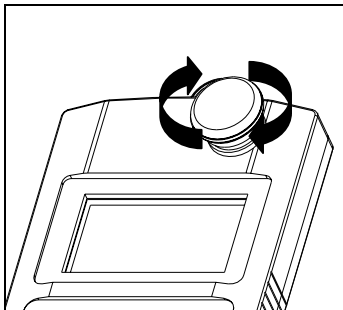
Buzzer will be on and Error message will appear in the handy controller.

### 2.1.6 Restoring Emergency Off



#### **WARNING**

Eliminate Emergency Off Environment before restoring ROBOT EMO button.



#### ● STEP 1

Eliminate Emergency Off Situation.

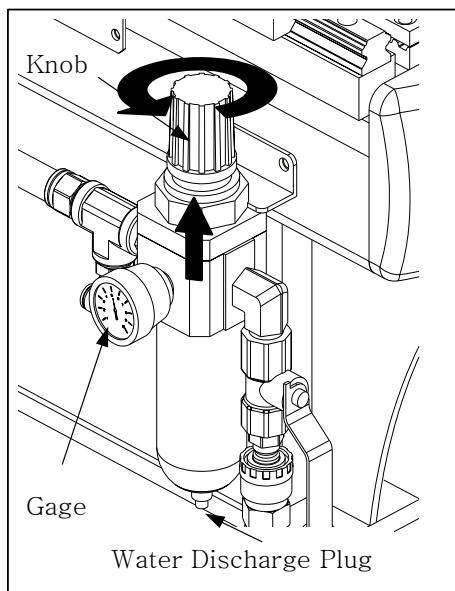
Rotate ROBOT EMO button to Clock Wise and stop Buzzer.

#### ● STEP 2

Press  and moves to Manual Mode

## 2.2 Adjustment after mold change

### 2.2.1 Air regulator



Make sure the robot arm is retracted and in the vertical position.

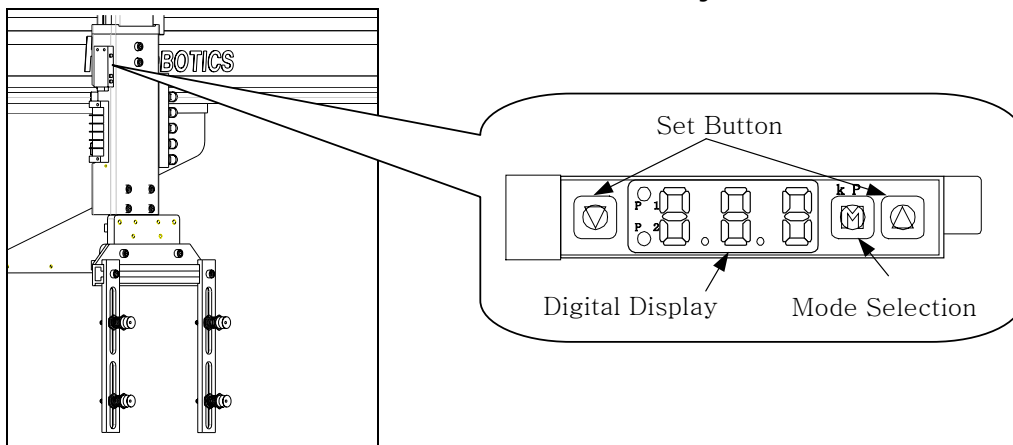
Beware that the robot may move suddenly as the system is pressurized.

Pull Up the adjusting knob and adjust the pressure to [ $5.9 \times 10^5$  Pa(Gauge) or 6 kg/cm<sup>2</sup>] and Push down to set.

Air supply should be clean and dry

\* Remove water from air regulator regularly if required.

## 2.2.2 Vacuum Verification Sensor Adjustment




[Main Arm Up/Down]

### Vacuum Sensitivity Adjustment ( Normally not required )



#### ● STEP 1



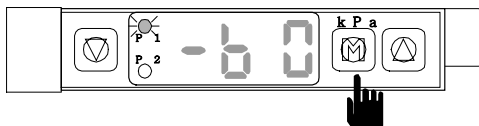
Press  and  at the same time  
P1 will blink.


#### ● STEP 2

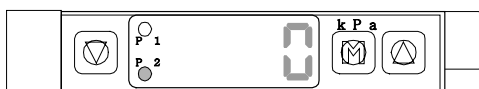


Press  or  , set pressure -60(kpa) .

#### ● STEP 3



Press  more than 1 seconds.  
Set up finished, and LED will display current Vacuum pressure.

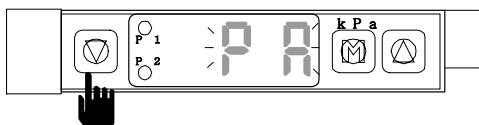



### Lock and Unlock for Vacuum Sensor value

Locking Vacuum Sensor Value will prevent setup value from changing by any mistake



Press  more than 3 seconds. "PL" will blink twice and Sensor will lock.



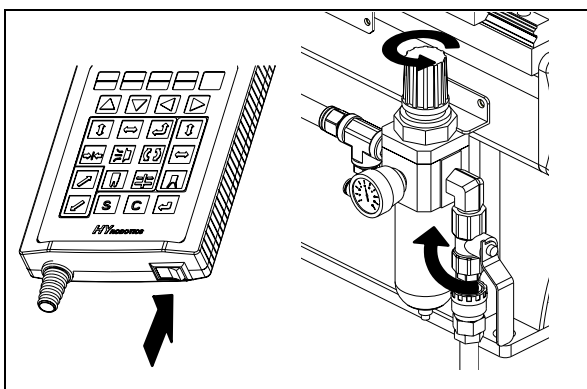
Press  more than 3 seconds "PA" will blink twice and sensor will unlock.

### 2.2.3 Adjust Kick/Return Cylinder

Adjust the location of Kick Cylinder with Kick shock absorber block and bolts

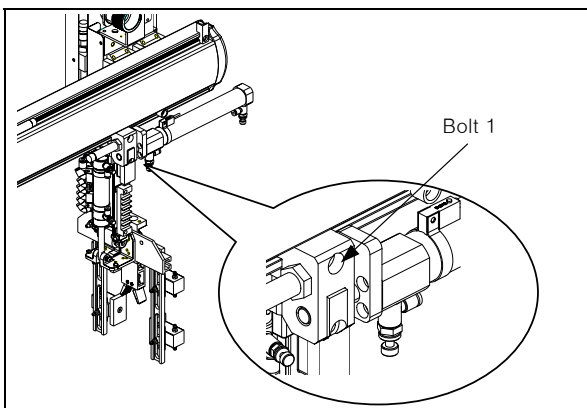
#### **NOTICE**

This information is designed for main arm. Follow same step for sub arm as described below.



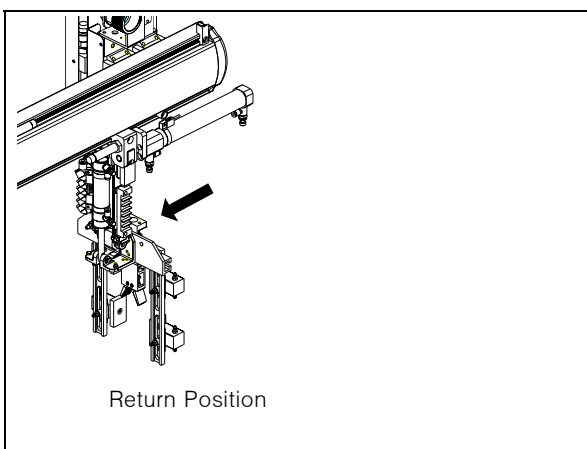
#### ● **STEP 1**

Turn off Power and depressurized system with air regulator or disconnect air.



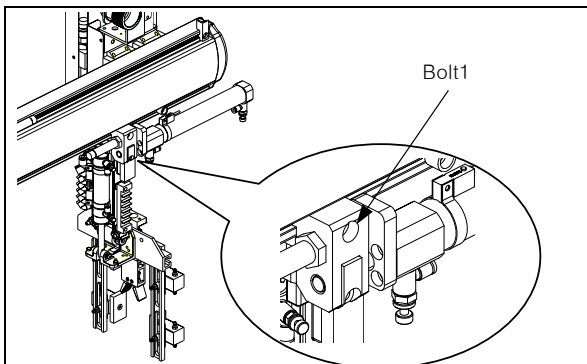
#### ● **STEP 2**

Loosen the bolt1



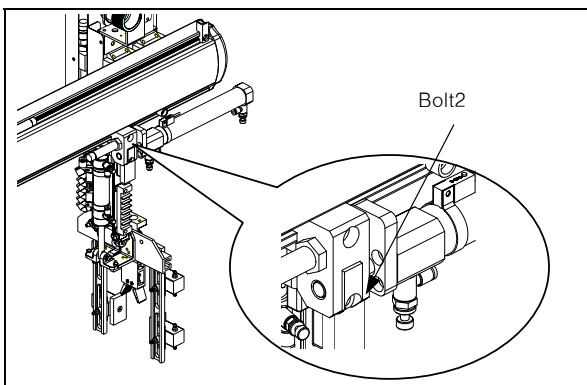
#### ● **STEP 3**

Adjust main arm location and find return position for application.



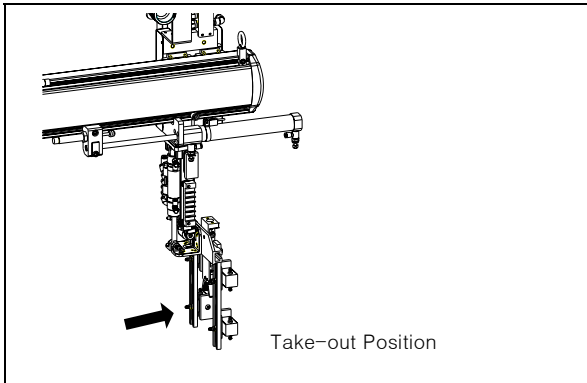
### ● STEP 4

Push Block to the kick cylinder guide ( Till the end of Shock Absorber Stroke ). Tighten the bolt1 .



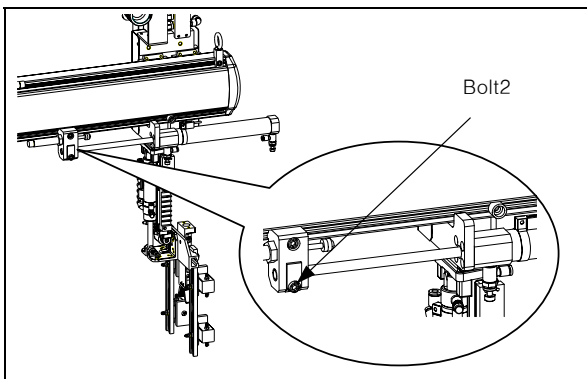
### ● STEP 5

Loosen the bolt2.



### ● STEP 6

Adjust main arm location and find return position for application.



### ● STEP 7

Tighten bolt2

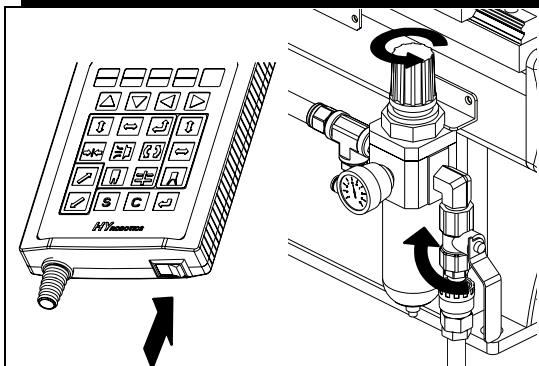


### 2.2.4 Down Stroke Adjustment

Adjust the stroke for Descent Position with Stopper

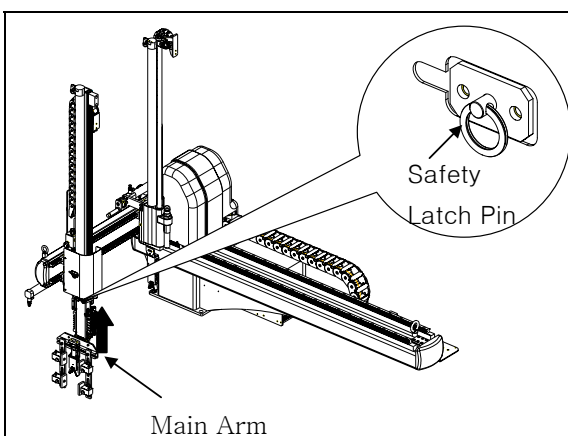
#### **NOTICE**

This information is designed for main arm. Follow same step for sub arm as described below.



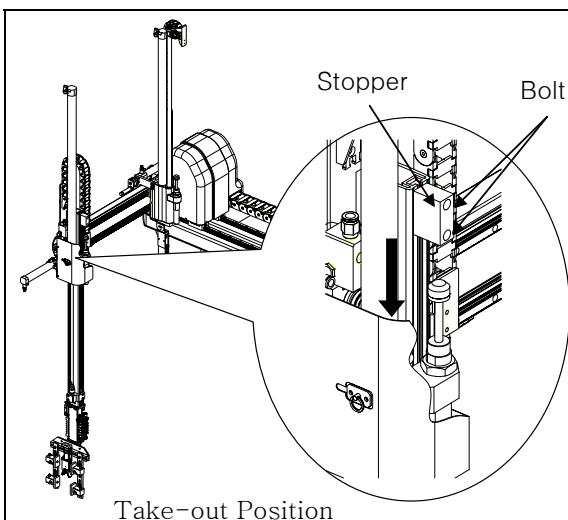
#### ● **STEP 1**

Turn off Power and depressurized system with air regulator or disconnect air.



#### ● **STEP 2**

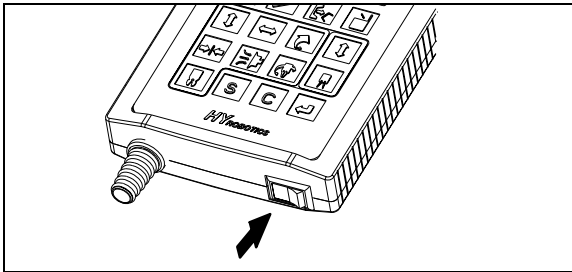
Slowly lift Arm up and Pull Safety Latch Pin. Release Arm will allow it Down by gravity



#### ● **STEP 3**

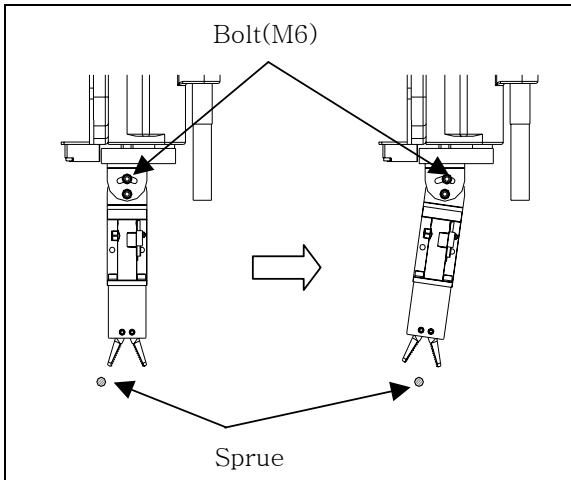
Loosen the bolt and find proper location of EOAT for parts with pushing Shock absorber with Stopper. And Tighten the bolt  
Precision positioning for finding suction cups position is required in EOAT location adjustment.

### 2.2.5 Gripper Angle Adjustment



#### ● STEP 1

Power on.

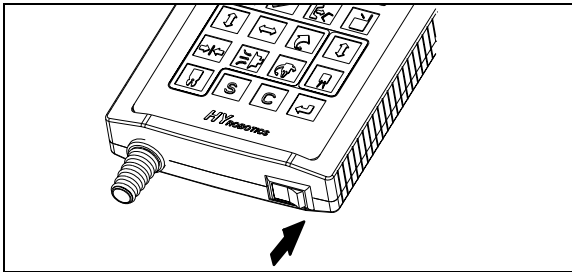


#### ● STEP 2

Descent Robot Arm, Loosen the bolt

#### ● STEP 3

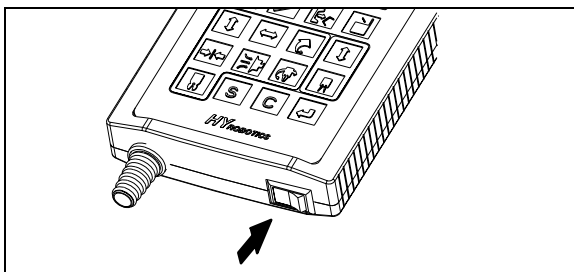
Rotate angle of gripper to grip the sprue and  
Tighten bolt



#### ● STEP 4

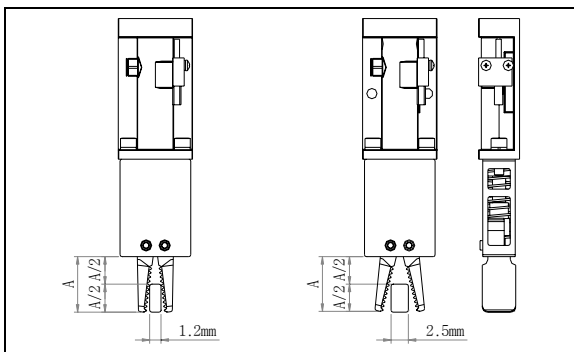
Ascent Robot arm

## 2.2.6 Adjustment Gripper Sensor Location



### ● STEP 1

Turn ON

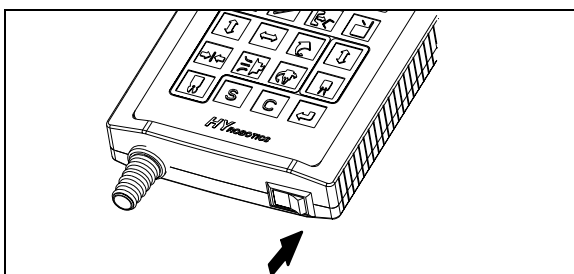


### ● STEP 2

Descent Robot arm in manual Mode, Operated Gripper with Sprue in location.

### ● STEP 3

LED should be on, when Gripper chuck the sprue  
LED should be off, when Gripper upchuck or Chuck without the sprue.



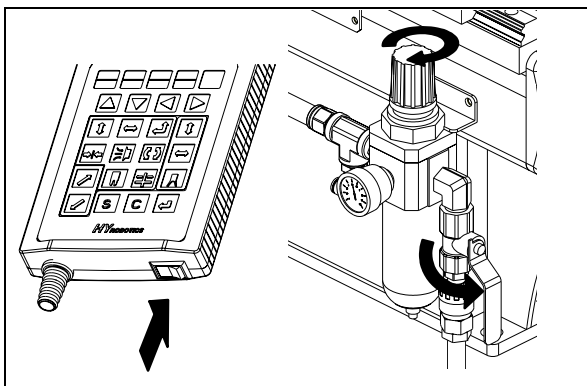
### ● STEP 4

Sensor is a sensitivity product, handle with care.

## 2.2.7 Speed Control for Down, Kick, Rotation

### NOTICE

This information is designed for main arm. Follow same step for sub arm as described below.



#### ● STEP 1

Normally it is not necessary to adjust speeds because they are factory set.

Power On and pressurized system with air regulator or connect air..

#### ● STEP 2

HY Logo will displays and move to Servo Origin scree

### ⚠ DANGER

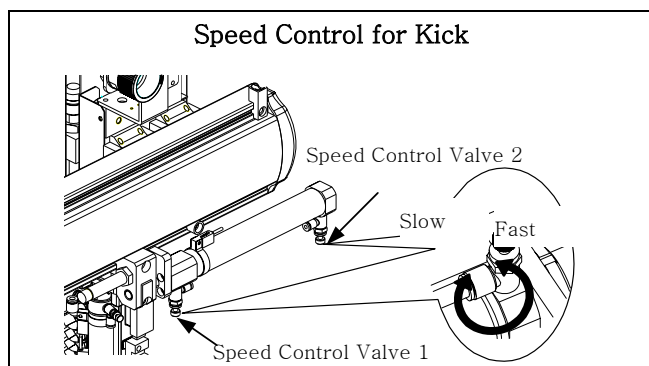
Before operate Servo Origin, make sure the robot arm is in safe location.  
If robot arm is not if safe location, move robot arm manually to safe location with manual button.

Move the robot arm to safe location ,  
and press to move to the origin location

Manual	30	0
	30%	

#### ● STEP 3

Press will move each axis arm to servo origin point. And then screen will display manual operation screen.




#### ● STEP 4

To adjust the Kick Cylinder speed, use speed control Valve 1.

To adjust the Kick Return Cylinder speed, use speed control Valve 2.

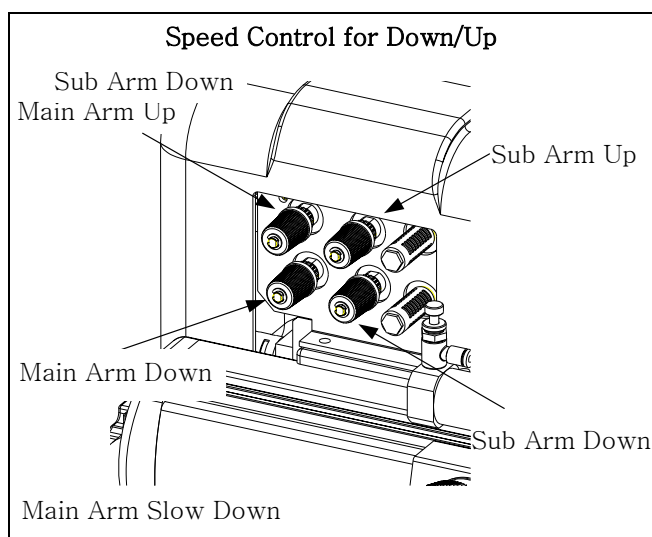
Turn the speed controller clockwise to reduce the speed and counterclockwise to increase the speed.

#### ● STEP 5

Press  will activate kick and kick return.

Make sure the operation speed is proper. If not perform step 4


\*Follow same step to adjust speed sub arm kick speed control.




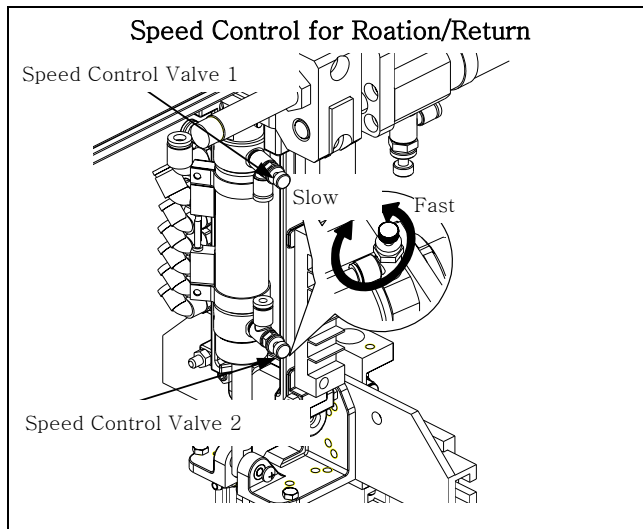
#### ● STEP 6

Turn the speed controller clockwise to reduce the speed and counterclockwise to increase the speed.

#### ● STEP 7

Press  for main arm descent(down),

press  for sub arm, check the speed.




### ● **STEP 8**

To adjust the Rotation Cylinder speed, use speed control Valve 1.

To adjust the Rotation Return Cylinder speed, use speed control Valve 2.

Turn the speed controller clockwise to reduce the speed and counterclockwise to increase the speed..

### ● **STEP 9**

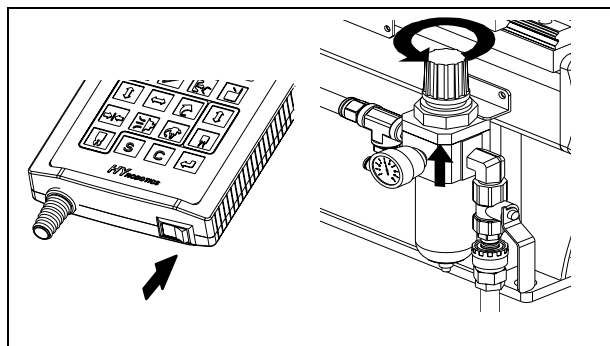
Press  will activate Rotation and Rotation return. Make sure the operation speed is proper. If not perform step 4

### 2.2.8 Cushion Control for Up, Kick, Swing

The cushions are adjusted to optimum condition at the factory. You should not need to adjust them. If required, follow below step.

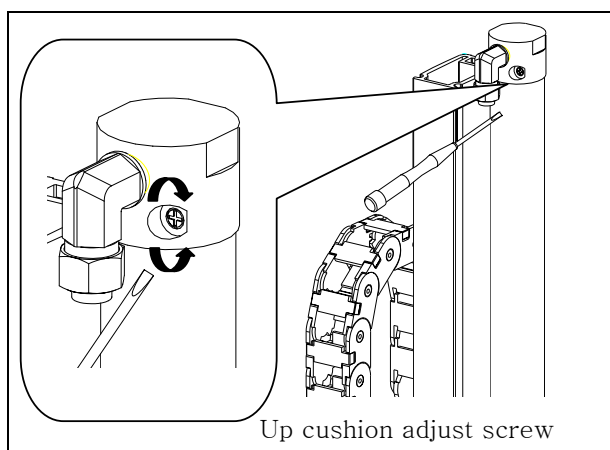
#### **⚠ WARNING**

Adjusting Cushion should be done after adjust the speed control



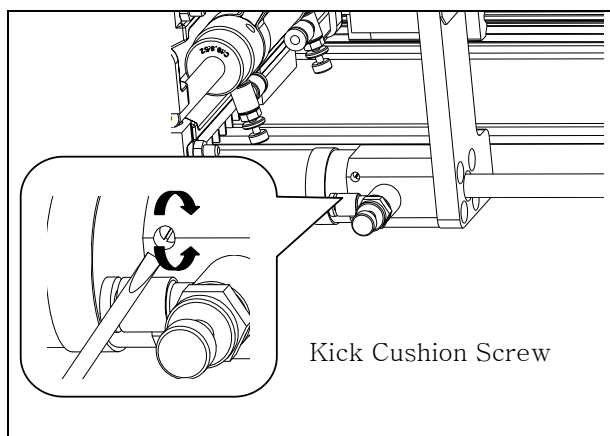
#### ● STEP 1

Turn off Power. Supply the air pressure to the system. Adjust the pressure to  $[5.9 \times 10^5 \text{ Pa(Gauge) or } 6 \text{ kg/cm}^2]$



#### ● STEP 2

Up cushion adjust screw will control the shock absorbing ability for Up motion of cylinder  
Adjust screw CW for increasing cushion, CCW for decreasing cushion.

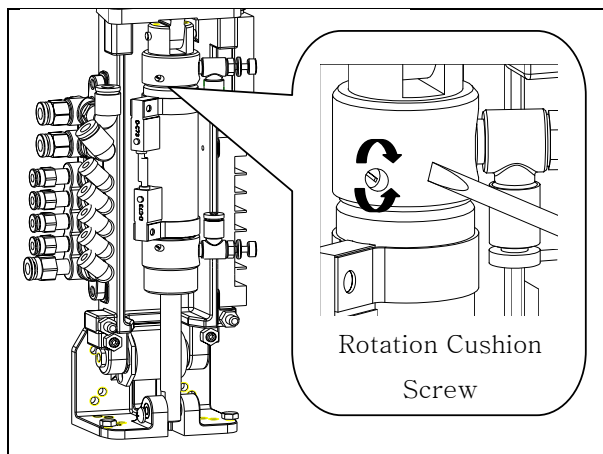


#### ● STEP 3

Adjust Kick cushion with kick Cushion adjust screw.

Adjust screw CW for increasing cushion, CCW for decreasing cushion

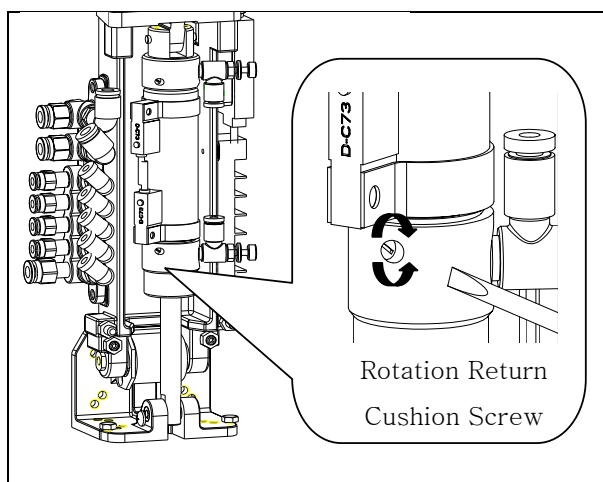
Kick return operation use shock absorber to minimize shock.



### ● STEP 4

Adjust swing cushion with swing cushion adjust screw.

Adjust screw CW for increasing cushion, CCW for decreasing cushion.



### ● STEP 5

Adjust swing cushion with swing return cushion adjust screw.

Adjust screw CW for increasing cushion, CCW for decreasing cushion.

### **NOTICE**

This information is designed for main arm. Follow same step for sub arm as described below.

### **⚠ DANGER**

Do not enter robot motion area. If anyone enter the robot motion area during Auto operation or Manual Operation, serious accident could results.



### **3. Regular Maintenance**



## 3.1 Preventative Maintenance Schedule

Before you start daily operation of the robot, perform preventive maintenance. .

### – Daily

- Check air Pressure is  $4 \sim 5 \text{ kg/cm}^2$  or  $4 \sim 5 \times 10^5 \text{ Pa(Gauge)}$
- Inspecting filter regulator unit : Check the bowl for water and contamination and for correct pressure.
- Check Hoses and Cables : Check for kinks, cuts and tears. Replace as needed.
- Inspecting Shock absorbers and cushions. : Make sure the are operating smoothly
- Checking Gripper return spring : Check that the gripper return spring is operating properly
- Checking residue buildup: Inspect the shafts and gripper for buildup of plastic residue. Clean as necessary.
- Checking Interlock functions. : Make sure the interlock functions are working properly.
- Checking part verification: Check that the parts verification is working properly.
- Check Suction cups

### – Weekly or as often as needed.

- Check EOAT mounting screw including gripper : Check EOAT screw for tightness . Tighten as required.
- Inspecting fittings and mounting hardware : Check all fittings, screws, and component mounting hardware for tightness. Tighten as needed.
- Check the safety latch cylinder for descent. : Make sure the safety latch cylinder is working properly
- Testing the Emergency Stop Button. : Verify that the emergency stop works properly.
- Check angle of rotation and bolts tightness : Check for correct angle of rotation of the arm. Adjust as necessary. Tighten as required.

### – Monthly

- Inspecting the filter regulator : Check that the filter regulator is set at the correct pressure. Check the filter and clean or replace it as needed.
- Checking the solenoid valves : Check that the solenoid Valves are working properly. Replace as needed.
- Checking all electrical cables : Inspect all electrical cables for cuts, burns and replace as required

### 3. Regular Maintenance

---

- Checking the exhaust filter.
- Inspecting electrical terminal : Check all electrical terminals for tightness, adjust as required.
- Inspect each axis cylinder, make sure operation and the cushion is working properly
- Inspect body for any damage during mold set up or other operation.

## 3.2 Cleaning the Robot

Recommend to clean each parts once a every month for maintenance. Use clean and dried paper towel or cotton towel.



### **WARNING**

Never try to clean up the robot with Water. It might damage the robot or electric shock may occur

■ Lock out/ Tag out before maintenance



## **4. Appendix**



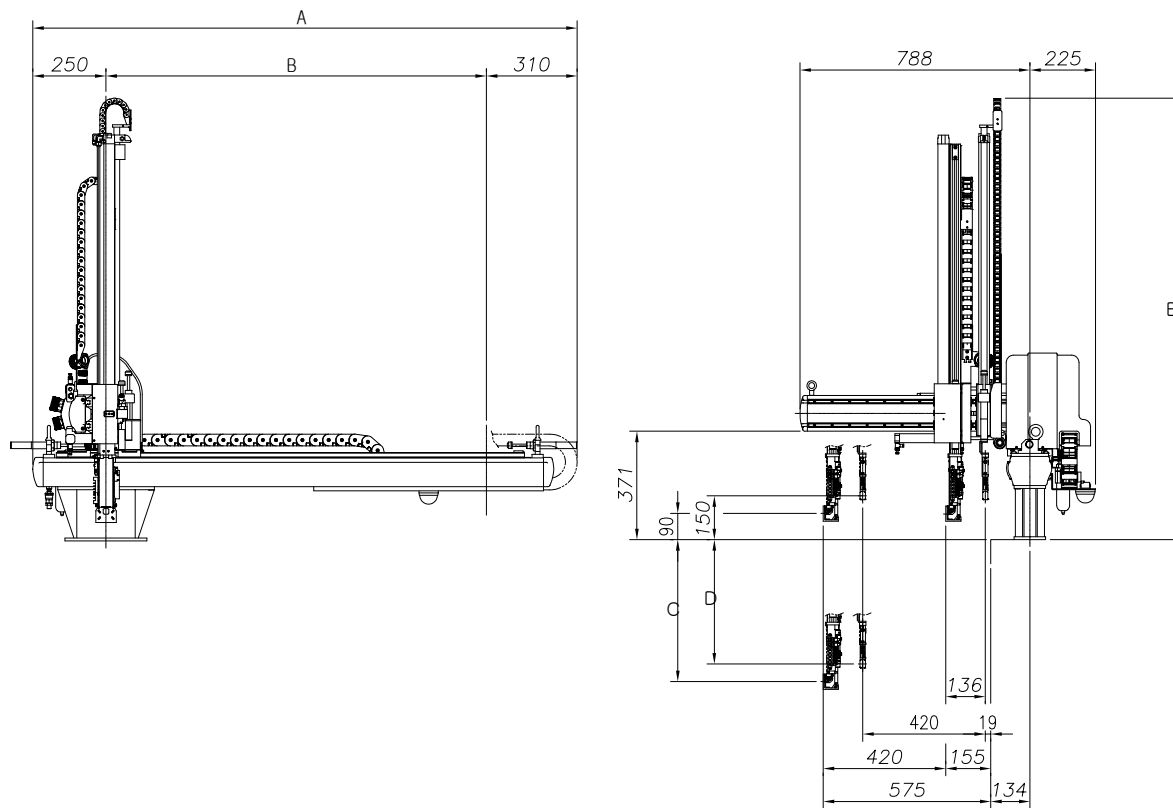


## A. Specsapcation

Power	Driven Method	Control Method	Pneumatic Pressure
100Vac-240Vac 50/60Hz	Servo Motor(Traverse)	Sequence Program	0.5 to 0.6 Mpa

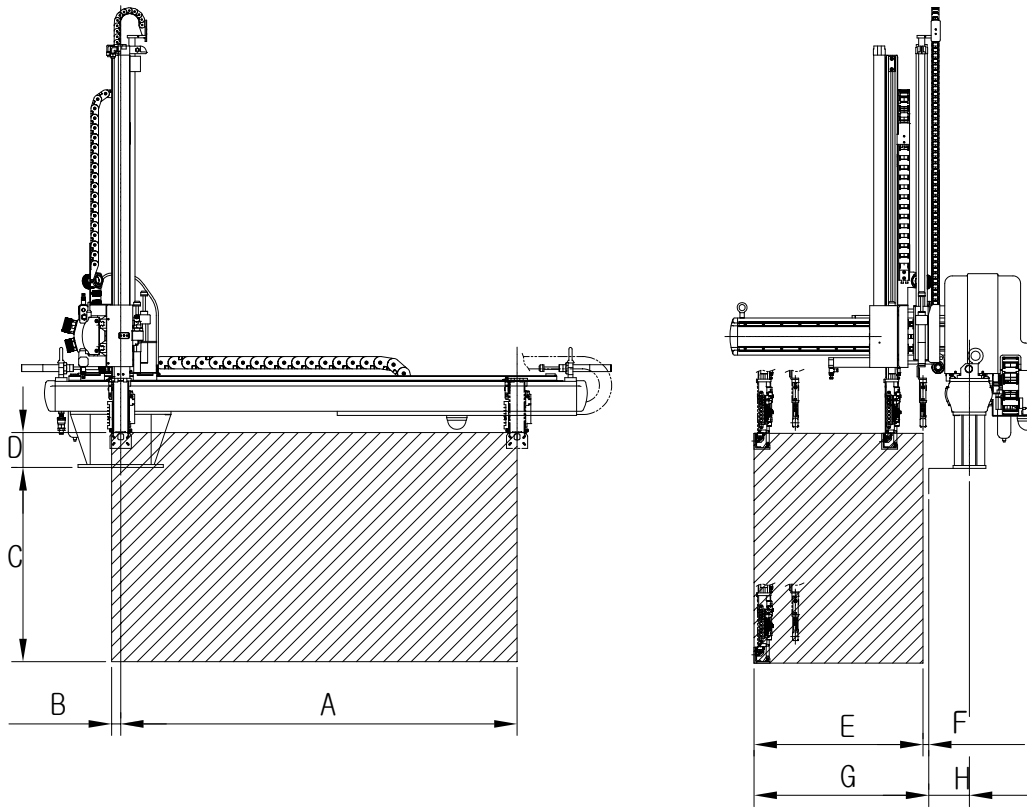
MODEL	Applicable injection molding machine	Traverse stroke (mm)	Kick stroke (mm)		Descent stroke (mm)		Pneumatic consumption (Nl/cycle)	Robot body weight (kg)	Maximum weight capacity (kg)	Take-out dry cycle (sec)	Entire dry cycle (sec0)	Noise level (dB)
		standard	Main Arm	Sub Arm	Main Arm	Sub Arm						
HIT-100S	Down to 250 ton	1100	150	-	700	-	22		3			
HIT-100D			150	90	700	750	30					
HIT-200S	Down to 250 ton	1300	150	-	800	-	25					
HIT-200D			150	90	800	850	35					

## B. External Dimension

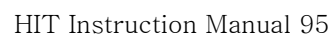


Type	A	B	C	D	E
HIT-100(S/D)	1660	1100	610	600	1410
HIT-200(S/D)	1860	1300	710	700	1510

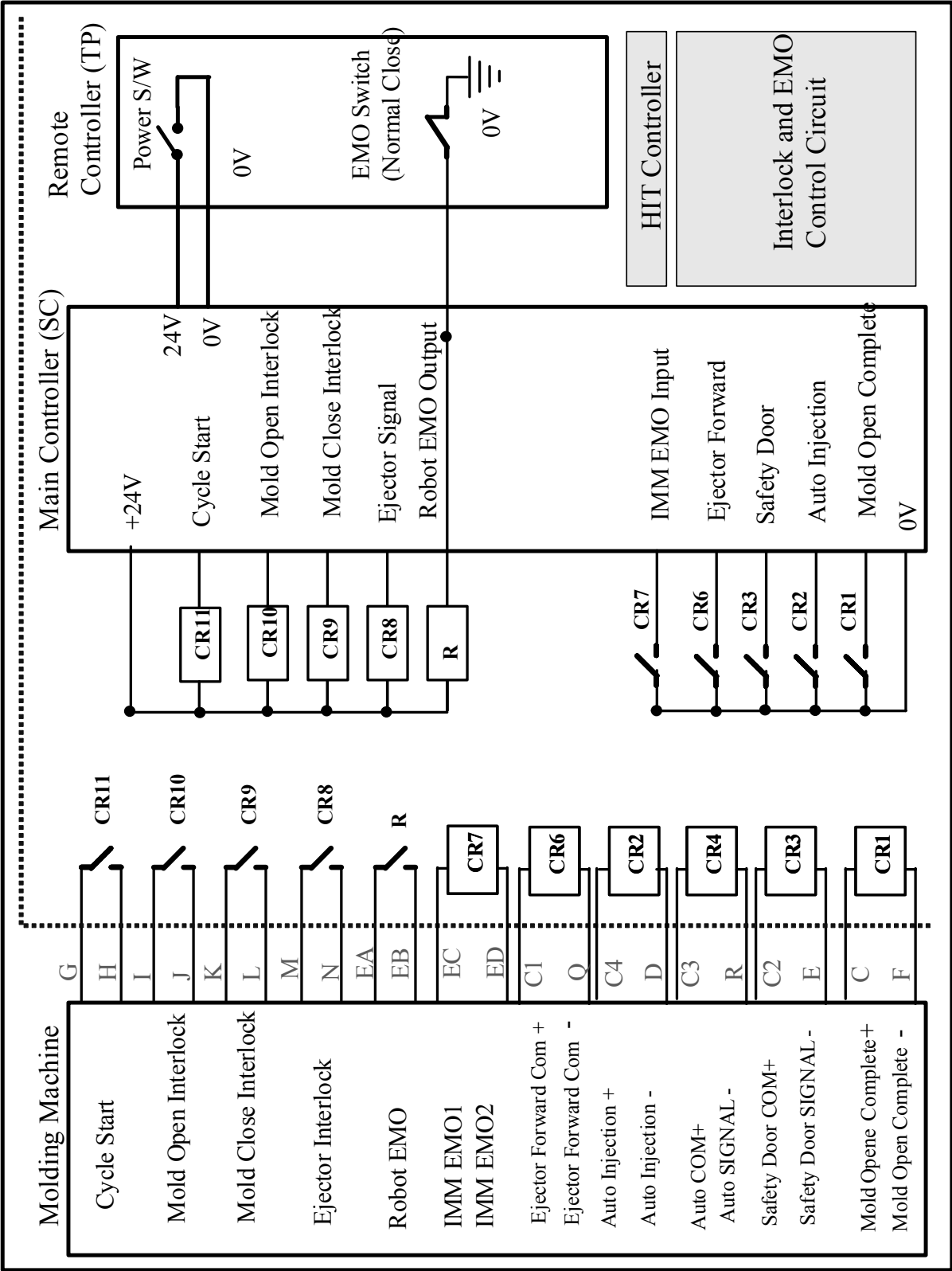
## C. Safe guarded space



Type	A	B	C	D	E	F	G	H
HIT-100(S/D)	1100	30	585	115	555	20	575	134
HIT-200S(S/D)	1300	30	685	115	555	20	575	134



E. Interlock



Robot Signal	Board connector	Color	MS	NO.	Interlock Signal Name
Y305	16-8	Black/blue	A	EA	Robot EMO In
Y304	16-7	Blue	B	M	Ejector Interlock In
Y303	16-6	Green	C	K	Mold Close Interlock In
Y302	16-5	brown	D	I	Mold Open Interlock In
Y301	16-4	Black	E	G	Cycle Start In
GND	16-3	Violet	F	0V	GND
	14-7	Violet/white	G	ER	Robot EMO Out
Y300	14-5	Orange/black	H	CY	Conveyor IN
	14-6	Red/black	J	CV	Conveyor Out
Internal signal	14-8	Skyblue/black	L	RU	Robot Use
GND	14-3	Skyblue	N	EC	I.M.M. EMO Out
	16-15	Blue/white	P	N	Ejector Interlock Out
	16-14	Green/white	R	L	Mold Close Interlock out
	16-13	Gray/white	S	J	Mold Open Interlock out
	16-12	Black/white	T	H	Cycle Start Out
P24V	16-11	Red	U	24V	24V
X300	14-14	Orange	V	D	Auto Injection -Coil (-)
	16-1	White/yellow		C1	Auto Injection -Coil (+)
X301	14-13	Gray	W	F	Mold Open Complete -Coil (-)
	16-2	White		C	Mold Open Complete -Coil (+)
X302	14-12		X	E	Safety Door -Coil (-)
	16-9	White/red		C2	Safety Door -Coil (+)
X303	14-11	Black/red	Y	R	Full Auto Signal -Coil (-)
	14-2	White/black		C3	Full Auto Signal -Coil (+)
X304	14-10	Yellow/black	Z	S	Ejector Backward Complete -Coil (-)
	16-10	Black/yellow		C5	Ejector Backward Complete -Coil (+)
X305	14-9	Pink	a	Q	Ejector Forward Complete -Coil (-)
	14-4	Black/white		C4	Ejector Forward Complete -Coil (+)
내부입력	14-1	Pink/black	b	ED	I.M.M. EMO In

## F. Input/ Output

Input			Output		
X000	VacuumOk	Vacuum Confirm	Y000	Vacuum	Vacuum & Multi Release1
X002	ChuckOk	Chuck Confirm	Y001	Flee	Traverse (Flee) in Mold
X004	SArmGripOk	Sub Arm Grip Confirm	Y002	Chuck	Chuck
X005	AddGripOK	Add Gripper Comfirm	Y004	Nipper	Nipper (Internal. External)
X011	M-KickOk	Main Arm Kick Complete	Y005	MArmGrip	Main Arm Grip
X014	RotateOk	Rotation Complete	Y006	SArmGrip	Sub Arm Grip
X016	TrvRtOk	Traverse Return Complete	Y007	AddGripper	Add Gripper
X017	SafetyDown	Safety Down	Y008	PitchChg	Pitch Change
X019	MArmUpOk	Main Arm Up Complete	Y009	NipFwd	Nipper Forward
X021	SArmUpOk	Sub Arm Up Confirm	Y010	ExNipCls	External Nipper Close
X022	RotRetOk	Rotation Return Complete	Y011	SArmDown	Sub Arm Up/Down
X023	SvlReOk	Swivel Return Complete	Y012	SArmKickRt	Sub Arm Kick/Return
X024	Obstacle	Obstacle Detection	Y013	ChkRotate	Chuck Rotation
			Y014	RotReturn	Chuck Rotation Return
			Y015	ChkSwivel	Chuck Swivel
			Y016	SvlReturn	Chuck Swivel Return
			Y021	MulOff2	Multi Release(Off)2
			Y022	MulOff3	Multi Release(Off)3
			Y023	MulOff4	Multi Release(Off)4
			Y024	MArmDown	Main Arm Down
			Y027	MArmKick	Main Arm Kick
X100	ReadyCut	Ready to Cutting	Y100	CutStart	Cutting Start
X101	RdyStack	Ready to Stacking	Y101	StackingOK	Stacking Complete
X102	Reject	Part Reject			
Interlock Input			Interlock Output		
X300	AutoInject	Auto Injection	Y300	ConveyOn	Conveyor On
X301	MoldOpen	Mold Open Complete	Y301	TakeoutOk	Take Out Complete
X302	SafeDoor	Safety Door Open	Y302	MoldOpen	Mold Open Interlock
X303	FullAuto	Fully Automatic	Y303	MoldClose	Mold Close Interlock
X304	EjtFwdOk	Ejector Forward Complete	Y304	EjectorSig	Ejector Signal
X305	ImmEmg	IMM Emergency			





HYROBOTICS Co., Ltd.  
173-228 GAJWA-DONG SEO-GU INCHON KOREA  
TEL:+ 82-32-582-5040  
FAX:+ 82-32-584-7040

HYROBOTICS Corp.  
5988 Mid Rivers Mall Dr. St.Louis MO 63303  
TEL:+ 1-636-578-6059  
FAX:+ 1-866-232-5594