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USERGUIDE

MNL-00069

PICK & PLACE MECHANISM

HE-300SW(GW) - ICC
HE-400SW(GW) - ICC

⚠ **WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!**

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

CONTENTS

A. GENERAL

1. Concept

The HE-ICC robots will take the product(s) and/or sprue runner system molded by the injection molding machine, and load them out from the machine with the traverse motion. These models are mounted on the fixed platen of the injection machine ranging from 250 to 400 tons.

Using these robots helps to save man power and also ensure high quality products because of constant cycle time (condition).

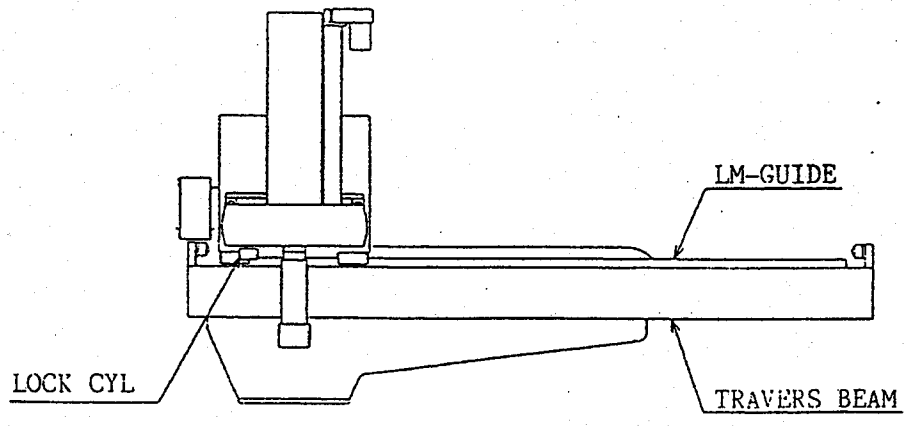
The HE-ICC series robot is equipped with the remote adjustment for arm stroke and strip forward and backward end position. So, no tool is required for stroke adjustment.

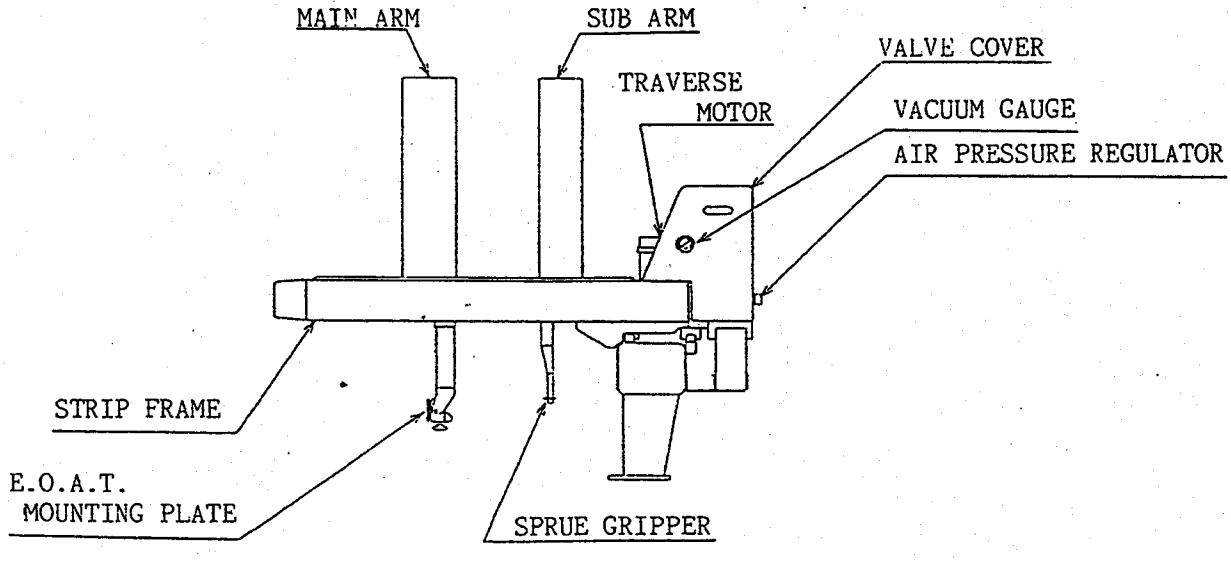
The stop positions for take-out, sprue release and part release etc. on the traverse beam are NC controlled by KG-203 controller. And multi-row placing on the conveyor is available as standard.

The handy console of the KG-203 controller is convenient for mode/timer/position setting, manual operation and each stroke adjustment.

2. Names of parts

MODELs HE-SW(GW)-ICC





3. Application

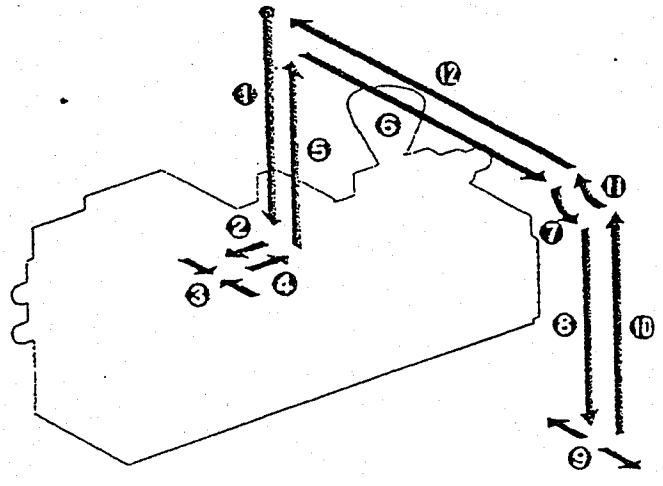
The HE - 300 , 400 SW and GW robots are used to automatically remove molded parts and sprue/runner system at the same time from an injection molding machine ranging from 250 to 400 tons .

Standard sequence

Standard sequence of robot is as follows ;

1. Injection molding machine mold open complete
   Main (and sub) arm descent
2. Main (and sub) arm strip forward
3. Parts grip (and sprue/runner system)
4. Main (and sub) arm strip backward
5. Main (and sub) arm ascent
6. Traverse outward, stop on the way and release the sprue
   Injection machine mold close
7. E.O.A.T. (End of arm tooling) wrist flip horizontal
8. Main arm descent
9. Parts release
10. Main arm ascent
11. Wrist return vertical
12. Traverse inward to Home position

Some other movements are available by mode setting on handy console.



4. Optional Items

The following optional items are available when ordering.

1. Wrist rotation system (90°)
2. Nipper circuit on E.O.A.T.
3. Nipper circuit on E.O.A.T. with primary and secondary pressure
4. Fixed type external degating unit mounted on the traverse beam end
5. Sliding type external degating unit
6. Signal output for synchronous motion of conveyor
7. Alarm light
8. Special color to order

If the some optional functions are needed on robot, consult with our sales representatives.

B. SPECIFICATIONS

1. Standard specifications

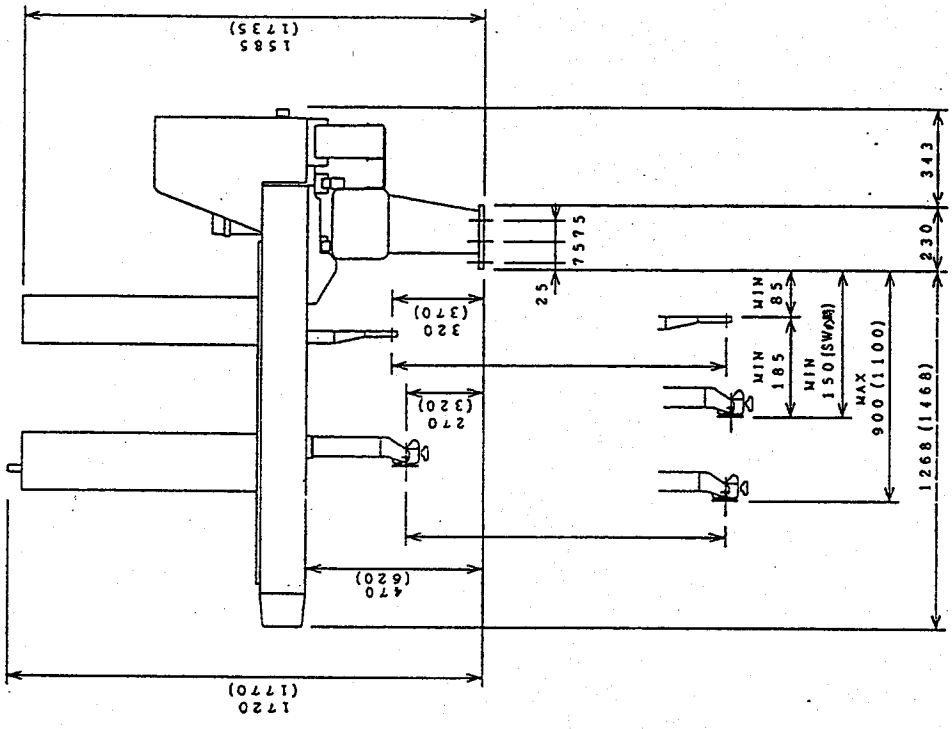
Model	HE-300		HE-400	
	SW	GW	SW	GW
Injection machine size range (ton)	250 - 350		260 - 400	
Max. main arm stroke (mm)	1000		1200	
Wrist axis to top platen (mm)	270		320	
Main strip stroke (mm)	300		300	
Max. sub arm stroke (mm)	-	1050	-	1250
Gripper center to top platen (mm)	-	320	-	370
Sub strip stroke (mm)	-	150	-	150
Traverse stroke (mm)	1800		2000	
Wrist flip angle (°)	90		90	
Min. take out time (sec.)	3.0	3.2	3.5	3.7
Min. cycle time (sec.)	15.0		18.0	
Max. payload (kgs)*	12.0		12.0	
Working air pressure (kg/cm^2)	6.0 - 6.5 (0.6-6.5)MPa		6.0 - 6.5 (0.6-6.5)MPa	
Air consumption (Nℓ/cycle)	52	69	61	80
Drive	Arm up/down, fwd./bwd. --- Pneumatic Traverse -- Inverter controlled motor			
Power supply	AC200V, 50/60Hz, 3 phase			
Power consumption	2.0 KVA FULL LOAD 5.5 AMP			
Control	NC and Stored program control			
Control voltage	DC 24V			
Position sensor	Increment			

* : Including the end of arm tooling

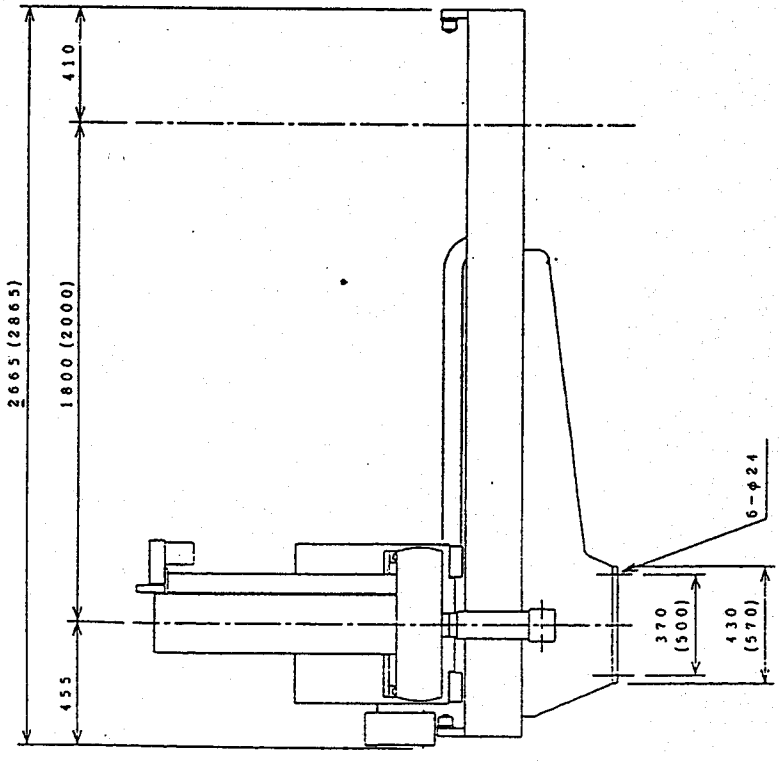
C. DIMENSIONS

Unit : mm

MODEL HE-300SW(GW)-ICC HE-400SW(GW)-ICC



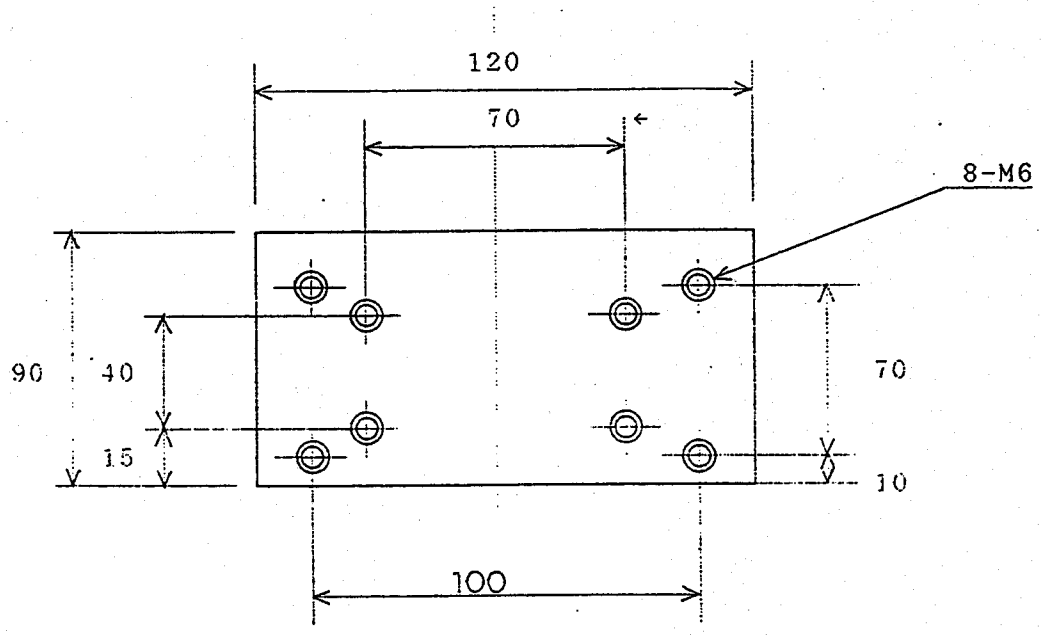
UNIT : mm



( )... 400 TYPE

Dimensions for the End Of Arm Tooling (E.O.A.T.) mounting plate on main arm end.

Refer to the following dimensions when make the E.O.A.T..

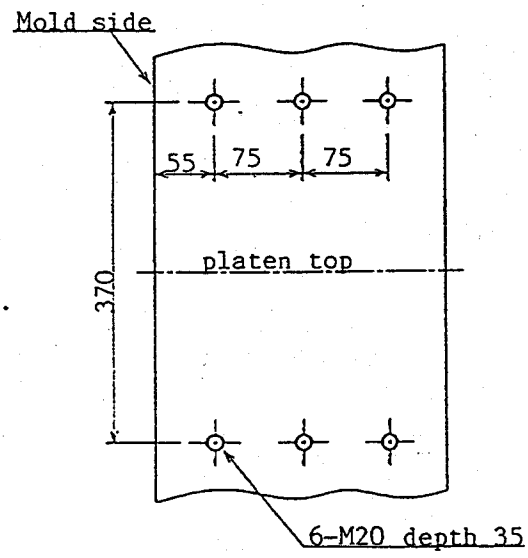


D. ROBOT MOUNTING TAP HOLES

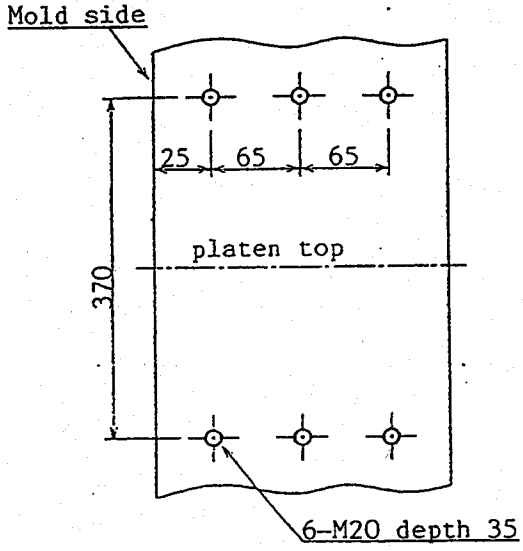
Make tap holes for mounting the robot according to the following dimensions.

1. For Model HE-300

a) Direct mounting

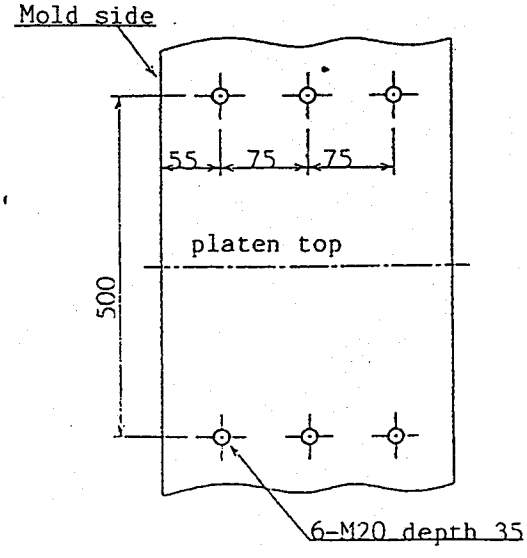


b) Mounting with Harmo standard raising spacer

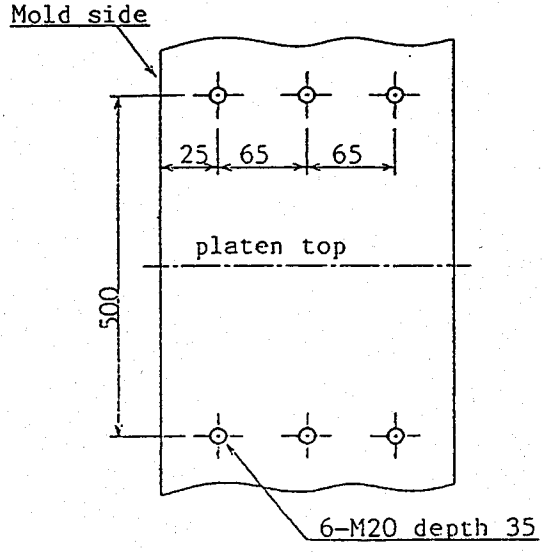


2. For Model HE-400

a) Direct mounting



b) Mounting with Harmo standard raising spacer



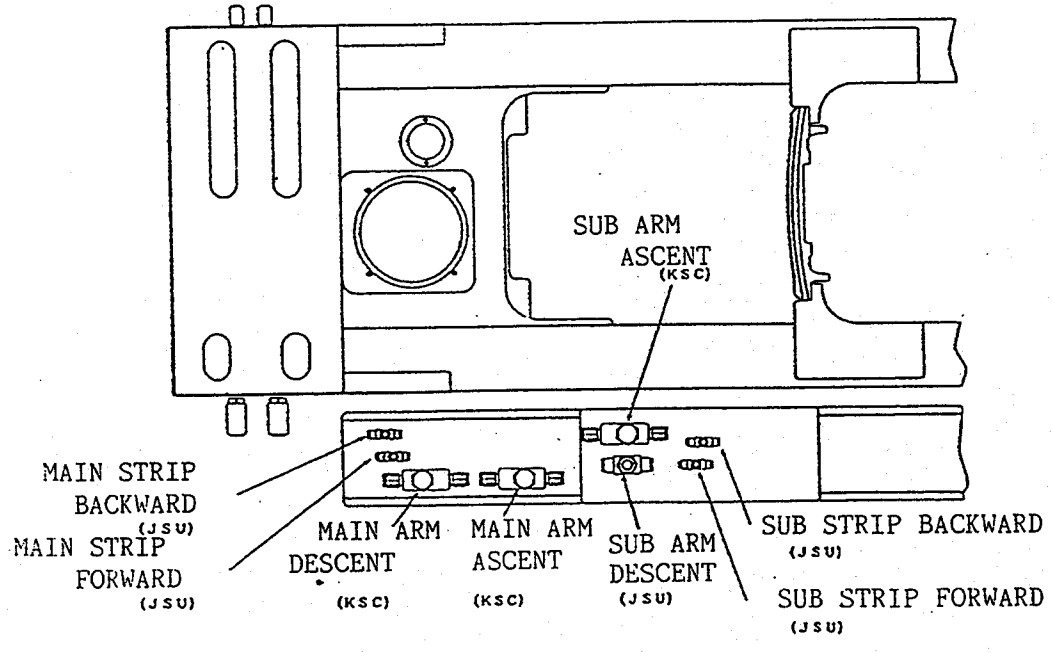
E. ADJUSTMENT OF ARM DESCENT/ASCENT SPEED

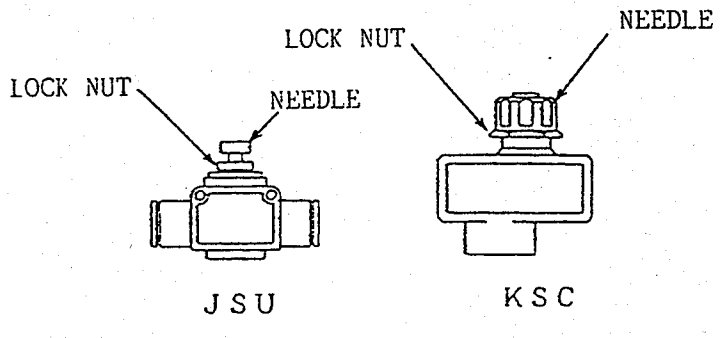
The arm descent/ascent speed can be controlled by the speed controller equipped on the strip frame as shown below.

The speed controller controls the flow rate of air discharged from the cylinder.

As needle is tightened with lock nut loosened, flow rate of air discharged from the cylinder decreases, thereby reducing the cylinder operation speed. On the contrary, as needle is loosened, the flow rate of air discharged from the cylinder increases, thereby increasing the cylinder operation speed.

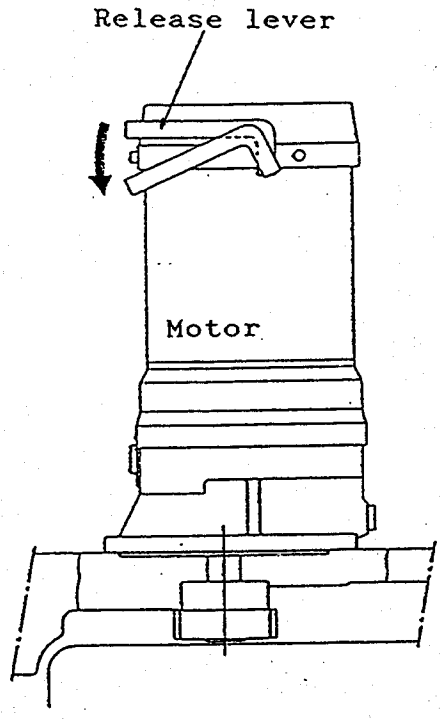
Secure needle by tightening lock nut after adjusting the cylinder operation speed to the desired value.





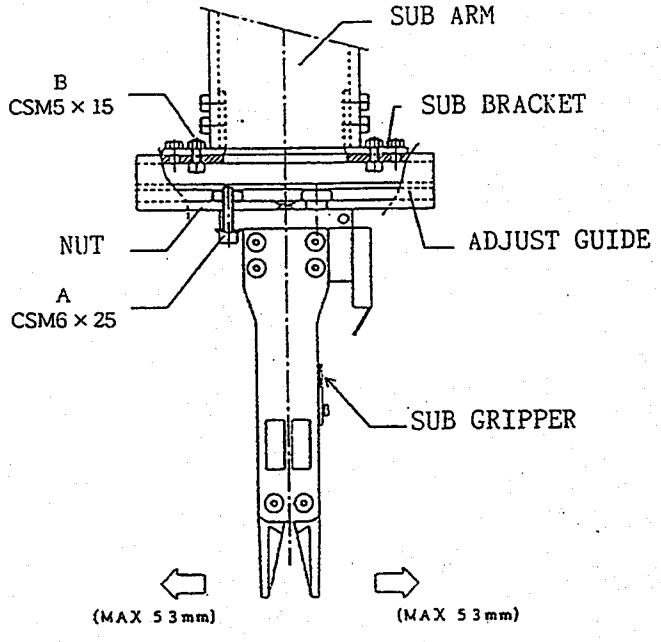
F. RELEASING TRAVERSE MOTOR BRAKE

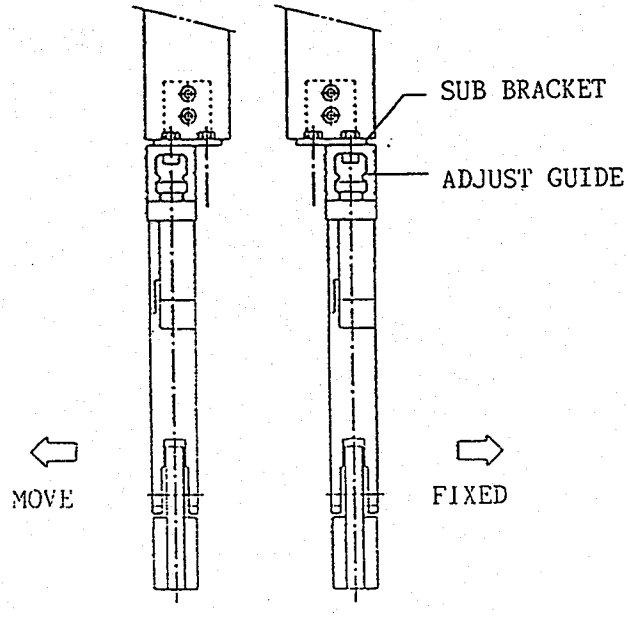
The brake incorporated in the traverse motor is released when the motor is energized, and not released when the motor is not energized.
When needed to release the brake manually, make the release lever down to release it as shown below.
Make it back to the original position before robot auto operation.



G. SLIDING SUB ARM SPRUE GRIPPER

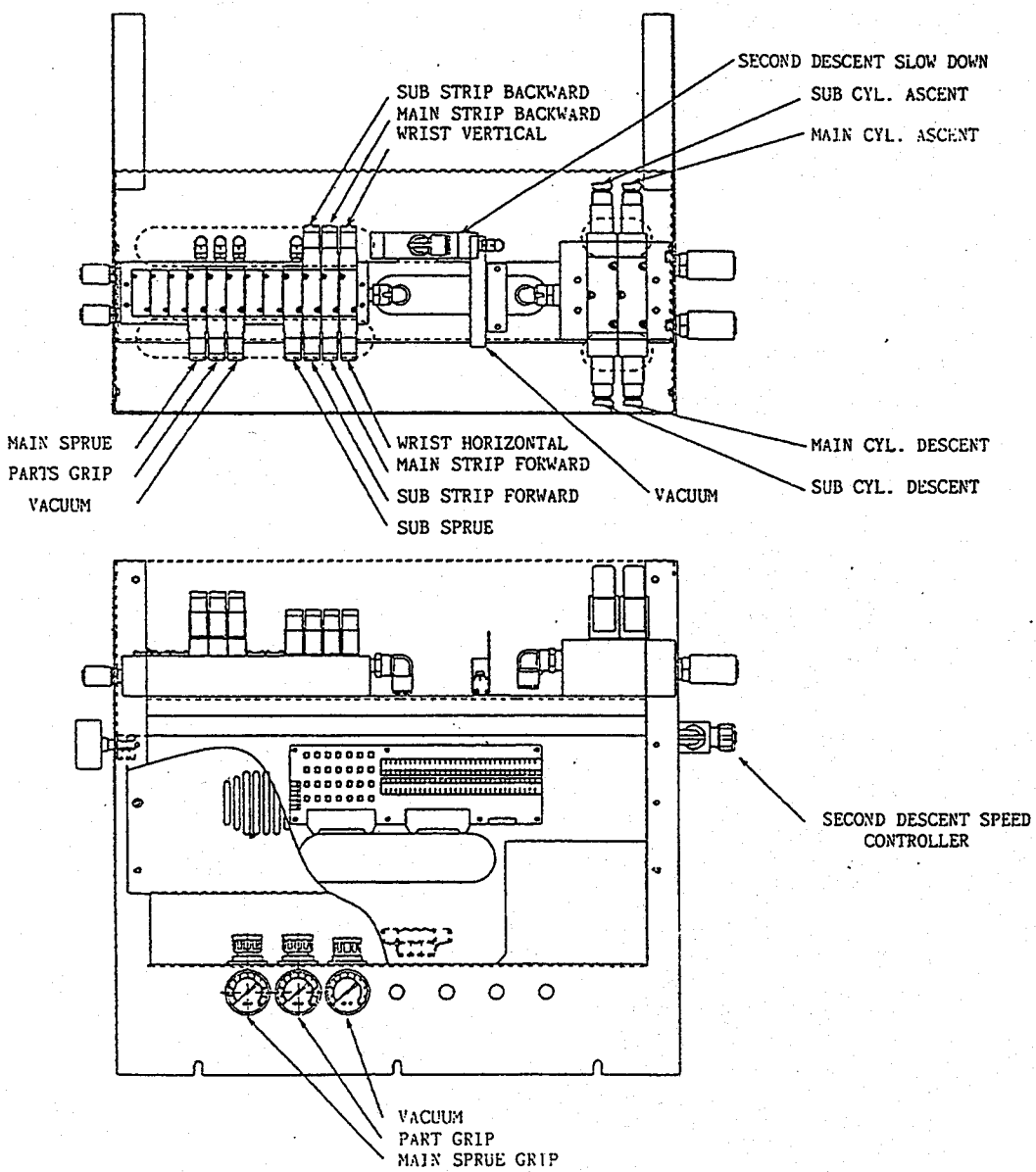
The sub arm sprue gripper can slide to left and right in order to grip the sprue which is located out of center line of the mold.
The adjustable range of it is 41mm for each direction, and it can slide after loosening the screw A as shown below. in case the more sliding is needed, remove the screw B and fix it as shown. By this work, max. 53mm slide is available. Before remove the screw B, disconnect the 4mm O.D. tube for the gripper.
The sub arm sprue gripper can change its position backward and forward.
The forward position is suitable for taking out part/runner from movable mold and the backward position is suitable for taking out from fixed mold.
Take off the gripper by loosening 2pcs of screw B and fix it again to the desired position.





H. AIR SOLENOID VALVES

The solenoid valves which actuate the cylinders, vacuum generator and grippers etc. are mounted on the machine as shown. For the functional details of each solenoid valve, see the label attached on each solenoid valve.



FUNCTION	TYPE OF VALVE	*
MAIN ARM DESCENT/ASCENT	4KB420-10-M1L-DC24 Double solenoid valve	L
SUB ARM DESCENT/ASCENT	4KB420-10-M1L-DC24 Double solenoid valve	L
SECOND DESCENT SLOW DOWN	380-4A Air piloted valve	
WRIST FLIP HORIZ./VERT.	4KB229-00-D2-DC24 Double solenoid valve	N
MAIN ARM STRIP FORWARD/BACKWARD	4KB229-00-D2-DC24 Double solenoid valve	N
SUB ARM STRIP FORWARD/BACKWARD	4KB229-00-D2-DC24 Double solenoid valve	N
SUB ARM SPRUE GRIP	4KB219-00-D2-DC24 Single solenoid valve	N
VACUUM	4KB219-00-M1D2-DC24 Single solenoid valve	L
PART GRIP	4KB219-00-M1D2-DC24 Single solenoid valve	L
MAIN ARM SPRUE GRIP	4KB219-00-M1D2-DC24 Single solenoid valve	L

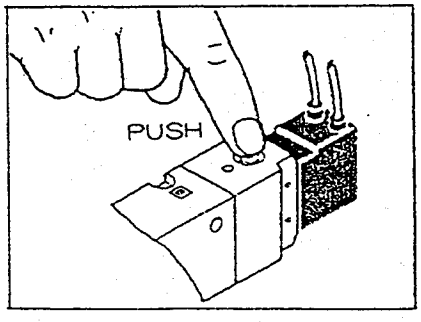
Manufacturer : CKD except
* : N - Non lock type, L - Lock type

When manually operating the robot, select the manual mode and operate the keys on the handy console. When operating the robot using the manual actuator on the solenoid valves, check the robot conditions and full opening of molds, because the solenoid valve ,is actuated and the pneumatic circuit is changed irrespective of the conditions of other solenoid valves and injection molding machine, i.e., **the safety interlocks will be made ineffective.** All the solenoid valves used on robot are 24V DC rating.

Manual actuator on the valve

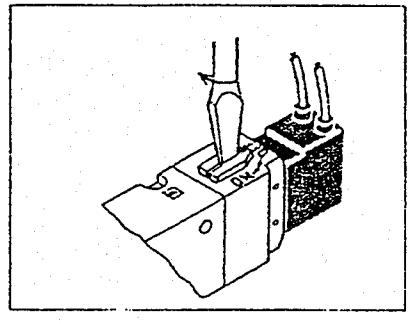
Non lock type

Press the button



Lock type

Turn by screw driver or hand



I. TUBING AND WIRING ON WRIST UNIT

The assignment of the tubing and wiring on the wrist unit is as shown below.
Connect the tubings on the End Of Arm Tooling to the fittings according to the assignment.
The quick fittings for the tubes except for vacuum line is for 4mm outside diameter tube. The 6mm O.D. tube is used for vacuum line.

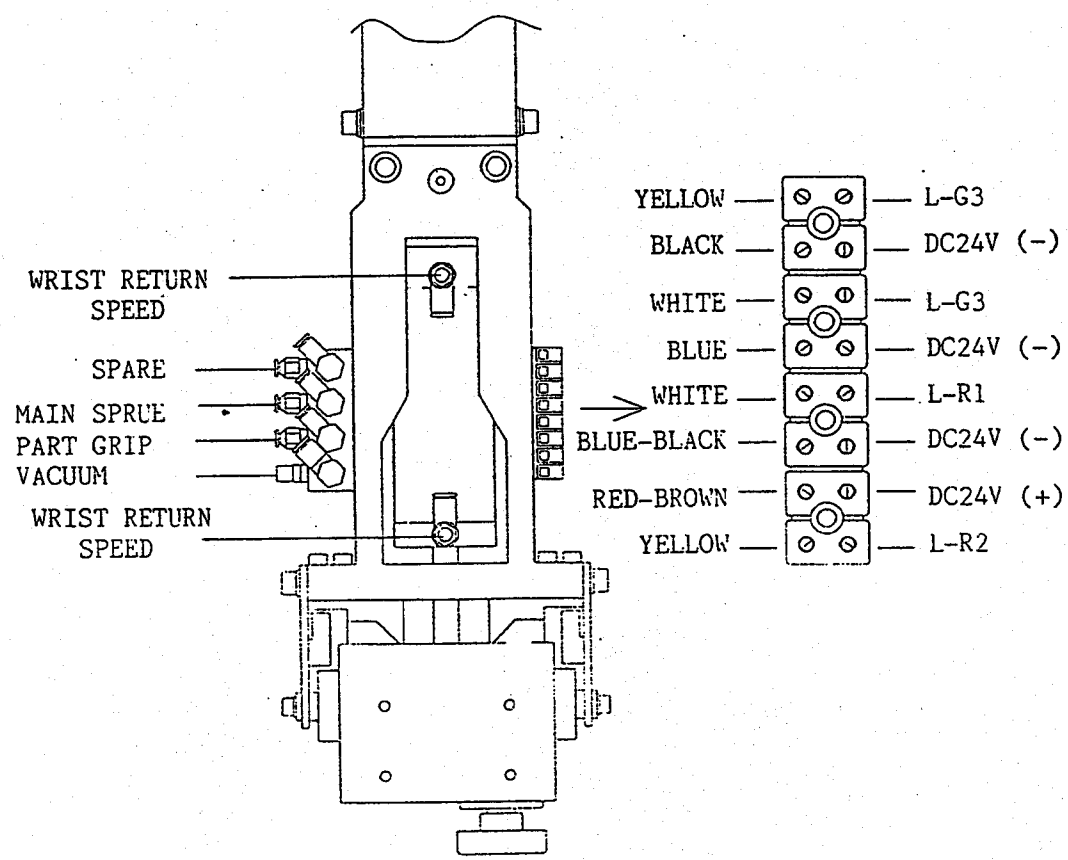
The wiring for the wrist flip horizontal (L-R1) and vertical (L-R2) end proximity switch is done as shown. Connect the switches for part verification (L-G1) and/or sprue verification (L-G3) to the designated terminals.

Example) Using NPN type proximity switch (L-G3)

Black	.... DC24V (-)
Red - Brown	.... DC24V (+)
Yellow	.... INPUT (-)

Using dry contact limit switch

Black	.... (-)
Yellow	.... INPUT



J. PROXIMITY SWITCHES

1. ON THE TRAVERSE BEAM

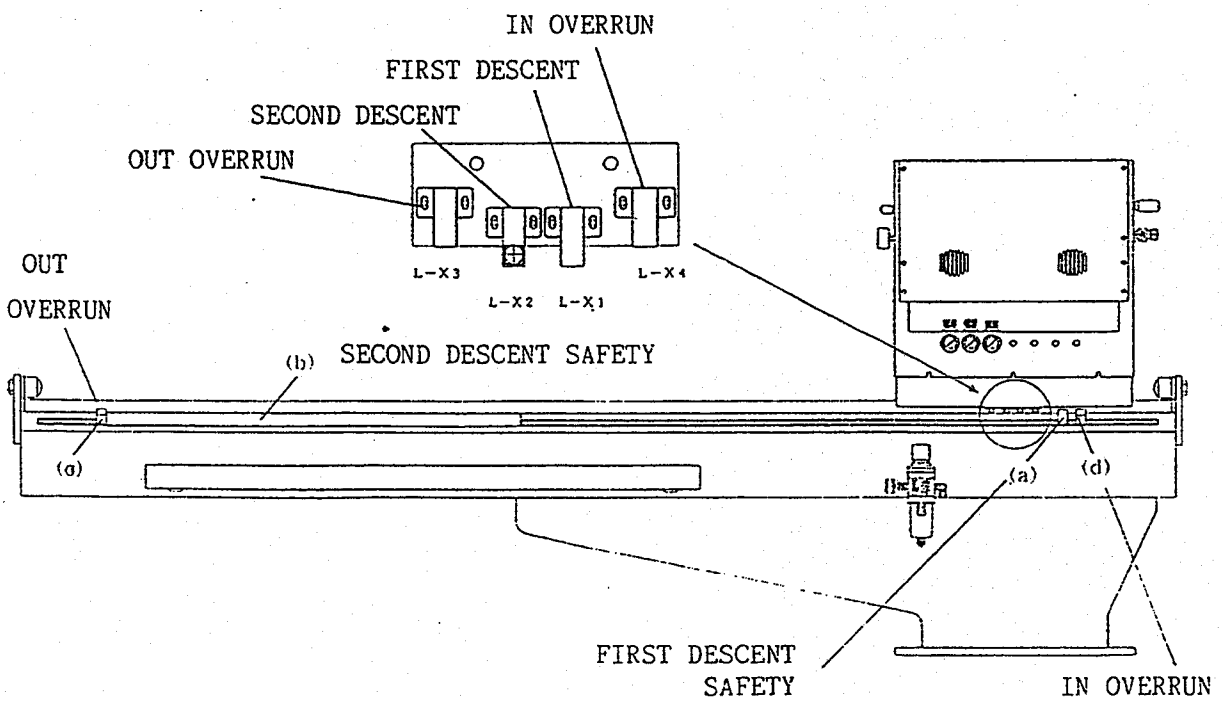
L-X1 : FIRST DESCENT SAFETY (HOME POSITION)
Actuated by the actuator (a) and arms can descend with this switch actuated. It is also for origin for encoder counting.

L-X2 : SECOND DESCENT SAFETY
This prox. switch is actuated by long actuator (b) and the robot can perform the sprue releasing, second descent and place the molding.

L-X3 : OVERRUN STOP FOR TRAVERSE OUT
It is actuated by actuator (c), and if the robot overruns and it is actuated, the robot stops immediately.

L-X4 : OVERRUN STOP FOR TRAVERSE IN
It is actuated by actuator (d), and if the robot overruns and it is actuated, the robot stops immediately.

CAUTION !! DO NOT MOVE THE ACTUATORS FOR OVERRUN (L-X3 AND L-X4).



2. ON THE STRIP FRAME

L-Y1 : MAIN ARM STRIP FORWARD END
It is actuated by actuator (e), and detect that the main arm is at strip forward end position.

L-Y2 : MAIN ARM STRIP BACKWARD END
It is actuated by actuator (f), and detect that the main arm is at strip backward end position. The main arm can descend under this switch is ON.

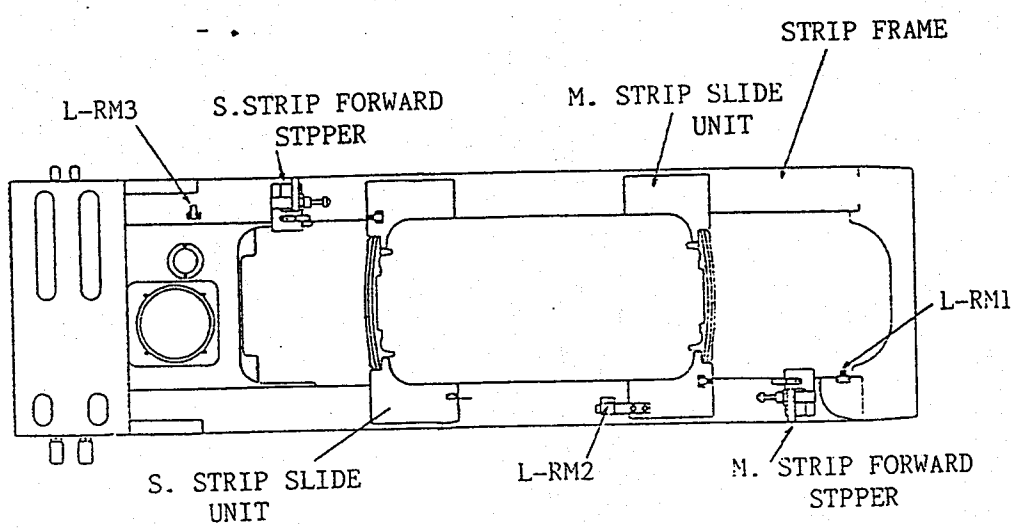
L-W2 : SUB ARM STRIP FORWARD END
It is actuated by actuator (g), and detect that the sub arm is at strip forward end position.

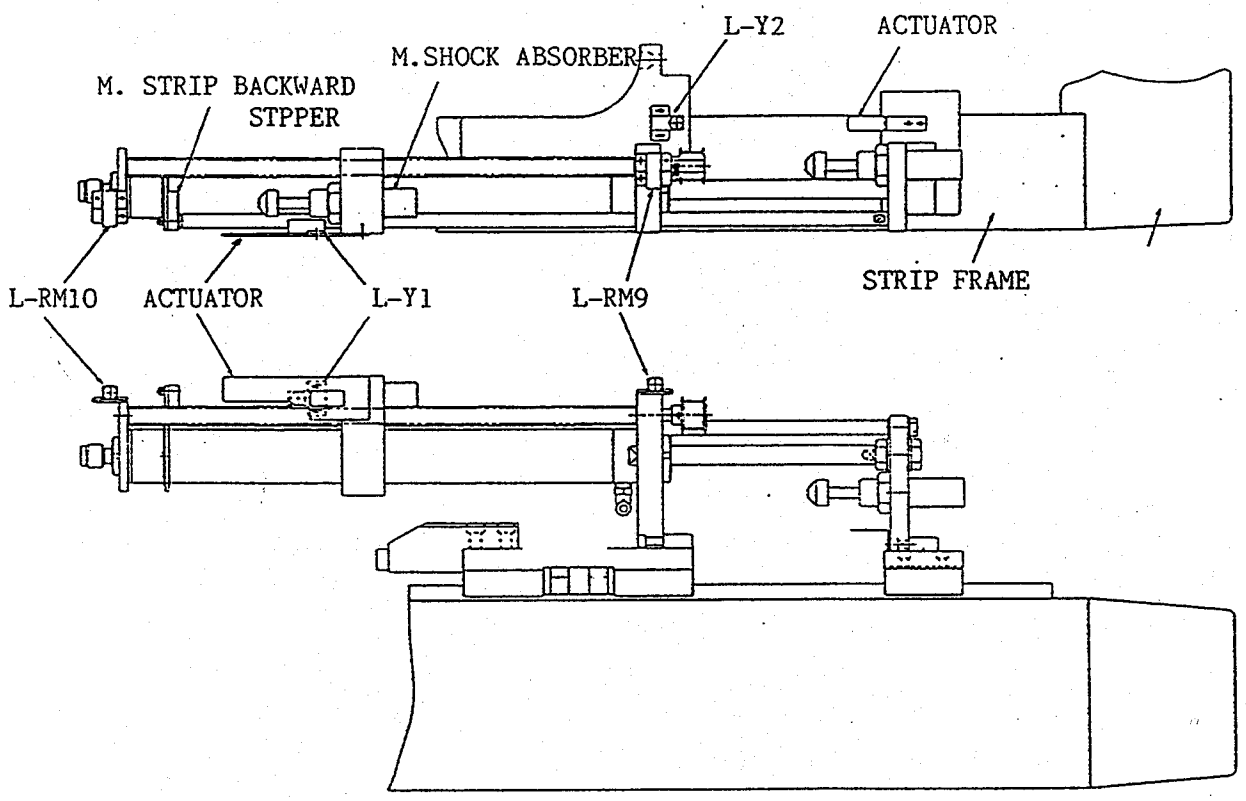
L-W1 : SUB ARM STRIP BACKWARD END
It is actuated by actuator (h), and detect that the sub arm is at strip backward end position. The sub arm can descend under this switch is ON.

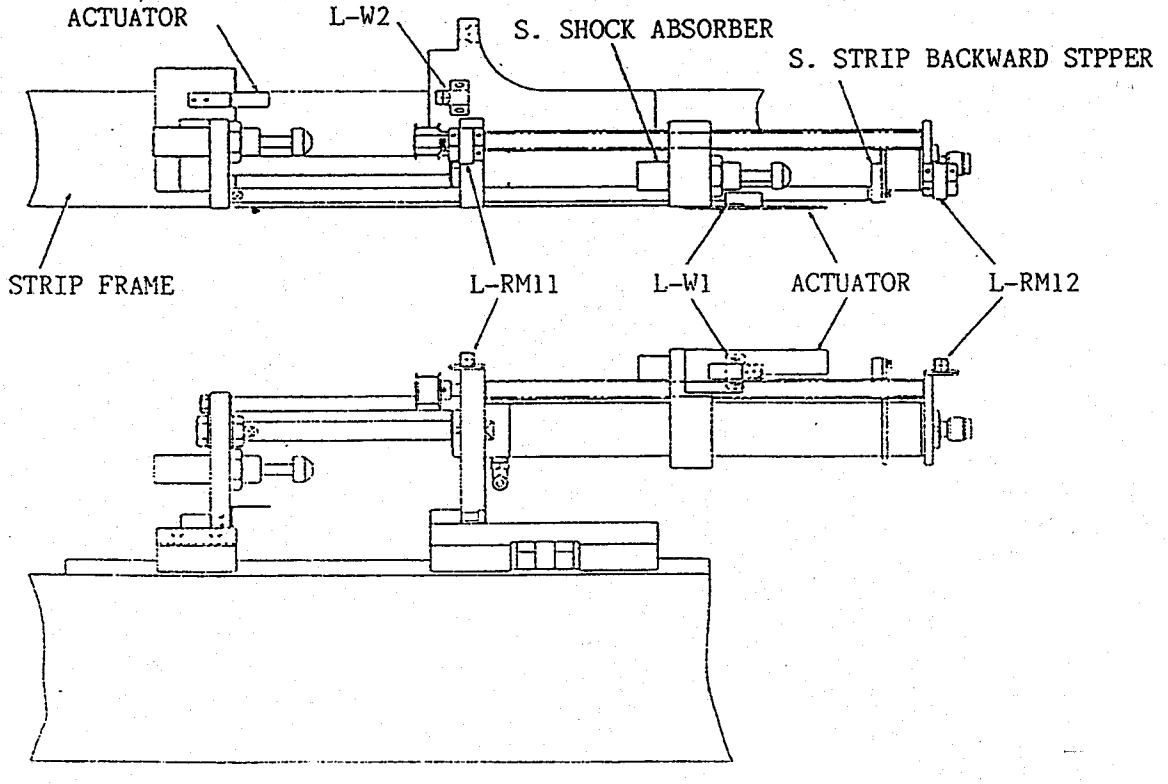
L-RM1: STRIP STOPPER FRONT END POSITION
When the main arm stopper reached its front end position of strip frame by remote adjustment, this switch goes ON. Then, alarm sounds and stop the motor for remote adjustment.

L-RM3: STRIP STOPPER BACK END POSITION
When the main arm stopper on HE-S,SW model or sub arm stopper on HE-G,GW model reached back end position of strip frame by strip remote adjustment, this switch goes ON. The alarm sounds and stop the motor for remote adjustment.

L-RM2: CLEARANCE CHECK FOR MAIN & SUB ARM
This switch is equipped on the main arm slide unit. In the procedure of strip remote adjustment, before the main arm and sub arm touch each other, this switch is actuated. The alarm sounds and also stop the motor for remote adjustment.




L-Y2
ACTUATOR
M.SHOCK ABSORBER
M. STRIP BACKWARD STPPER
L-RM10
ACTUATOR
L-Y1
L-RM9
STRIP FRAME


ACTUATOR
L-W2
S. SHOCK ABSORBER
S. STRIP BACKWARD STPPER
STRIP FRAME
L-RM11
L-W1
ACTUATOR
L-RM12

3. ON MAIN & SUB ARM

L-Z1 : MAIN ARM UPWARD END
It is actuated by actuator (k) and detect that the main arm is at upward end position.

L-Z2 : MAIN ARM DOWNWARD END
It is actuated by actuator (l) and detect that the main arm is at downward end position.

L-RM6: MAIN ARM MINIMUM STROKE LIMIT
It is actuated by actuator (l) and detect that the main arm stopper is at upward end position. When it goes ON, the alarm sounds and remote stroke adjustment motor stops.

L-RM5: MAIN ARM MAXIMUM STOKE LIMIT
It is actuated by actuator (l) and detect that the main arm stopper is at downward end position. When it goes ON, the alarm sounds and remote stroke adjustment motor stops.

L-H1 : SUB ARM UPWARD END
It is actuated by actuator (m) and detect that the sub arm is at upward end position.

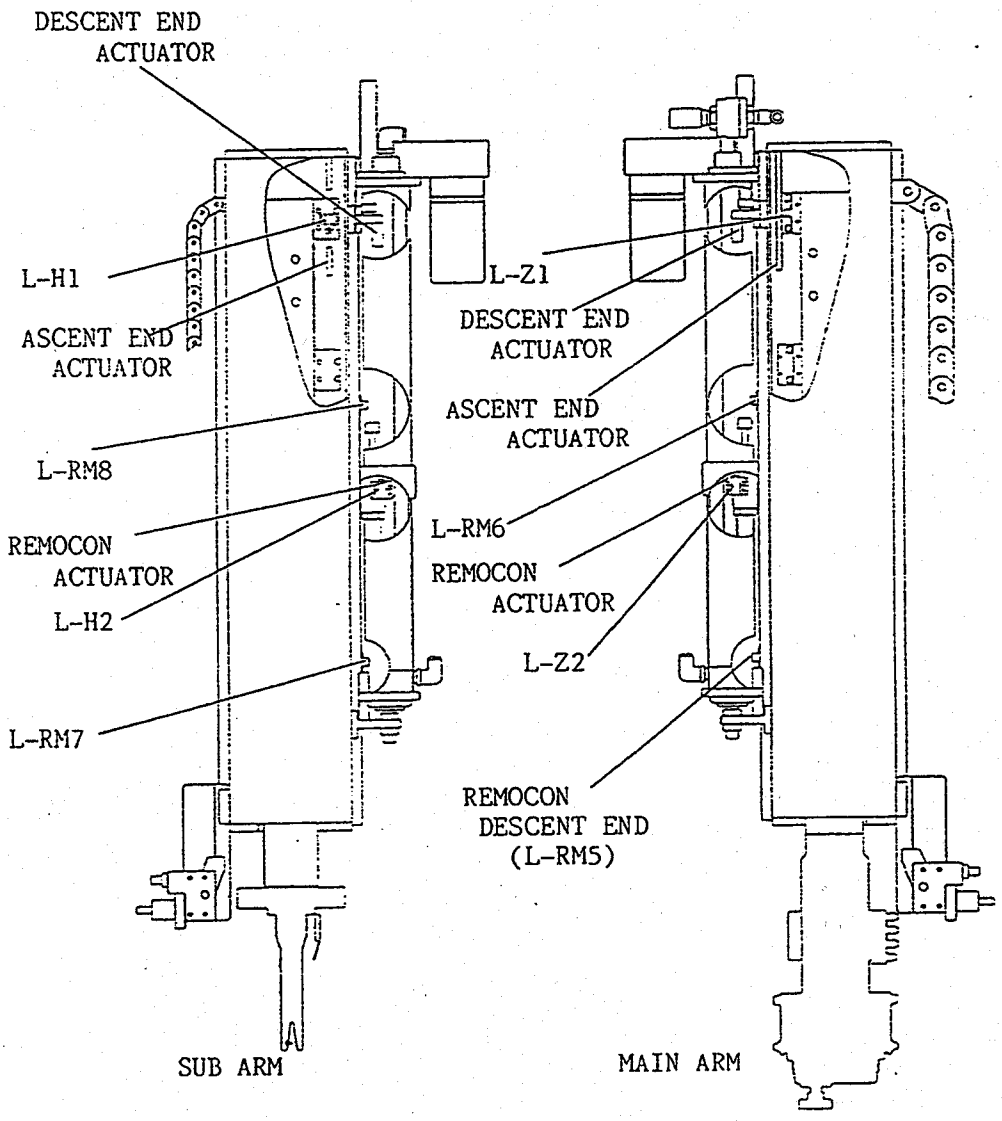
L-H2 : SUB ARM DOWNWARD END
It is actuated by actuator (m) and detect that the sub arm is at downward end position.

L-RM8: SUB ARM MINIMUM STROKE LIMIT
It is actuated by actuator (m) and detect that the sub arm stopper is at upward end position. When it goes ON, the alarm sounds and remote stroke adjustment motor stops.

L-RM7: SUB ARM MAXIMUM STROKE LIMIT
It is actuated by actuator (n) and detect that the sub arm stopper is at downward end position. When it goes ON, the alarm sounds and remote stroke adjustment motor stops.

Sub arm

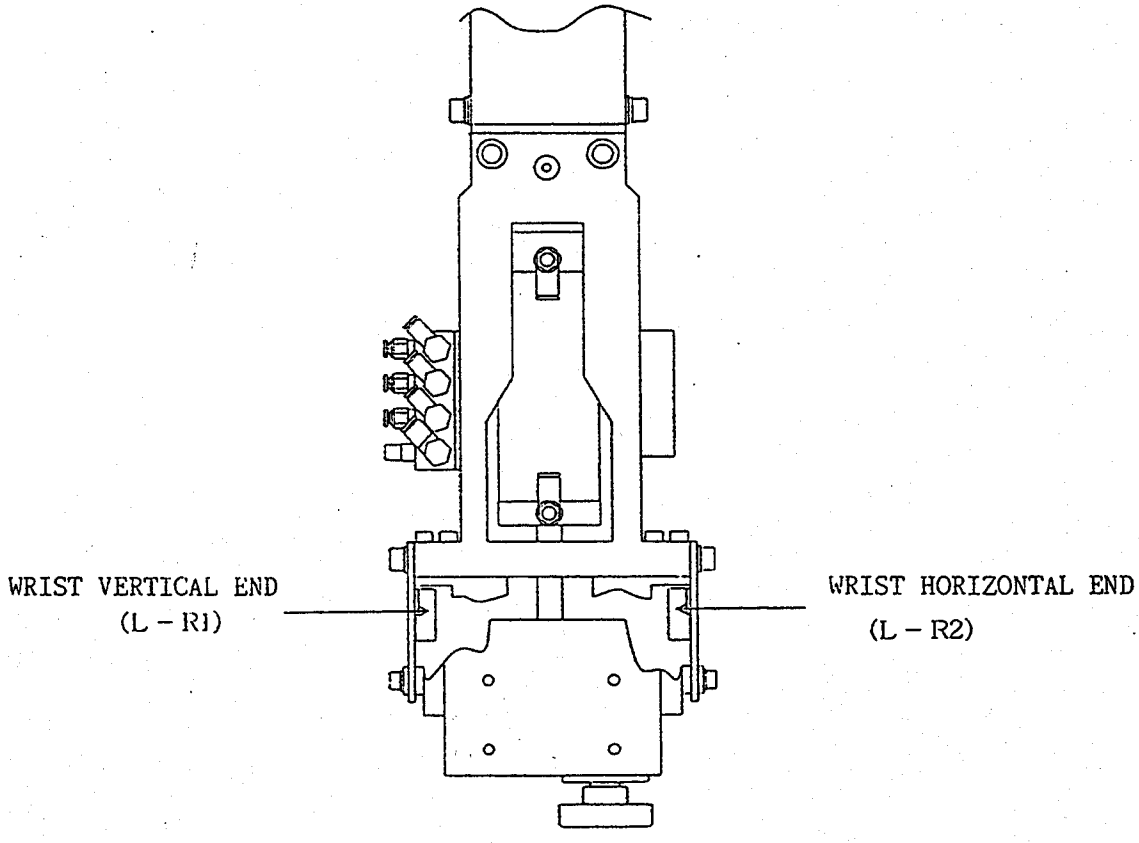
Main arm



4. ON WRIST FLIP UNIT

L-R1 : WRIST VERTICAL END
It is actuated by actuator (o) and detect that the End Of Arm Tooling is in vertical.

L-R2 : WRIST HORIZONTAL END
It is actuated by actuator (o) and detect that the End Of Arm Tooling is wrist flopped horizontally.



5. ON SUB ARM END

L-G4 : SPRUE GRIP VERIFICATION
To detect the sprue with the proximity switch built-in the gripper body.

Adjustment of sprue verification switch position

In order to have a secure verification, the position of the proximity switch built-in the gripper has to be adjusted according to the diameter of the sprue, and its material.

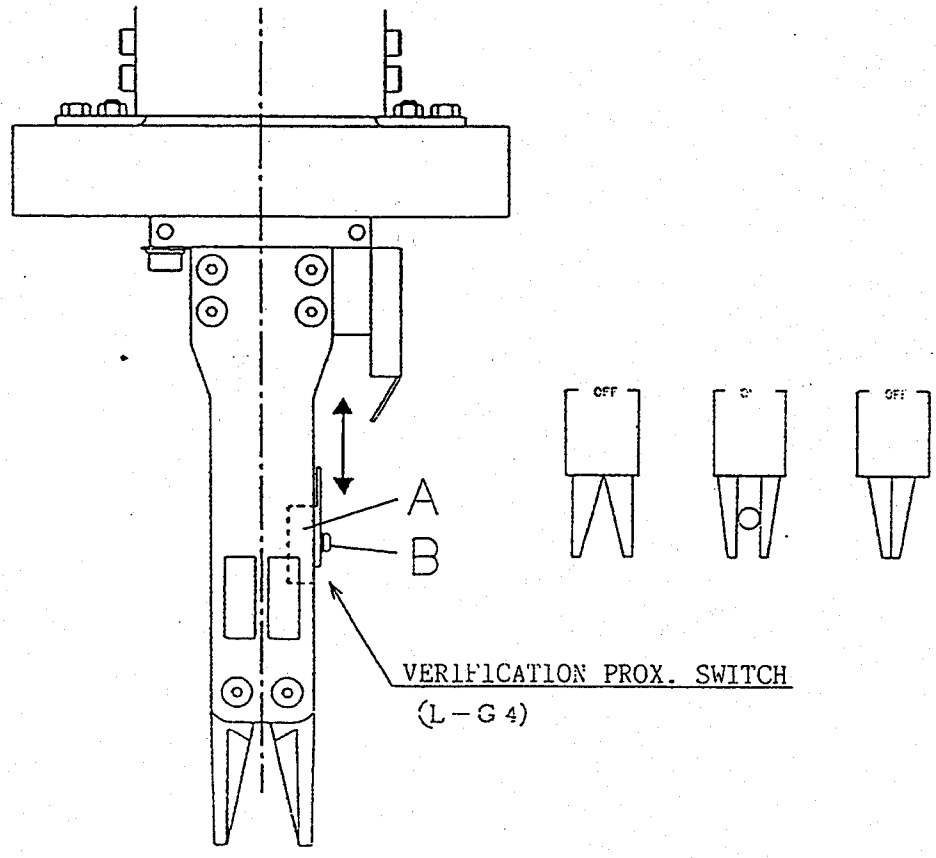
Adjust the switch position as follows.

1) Loosen the fixing screw (B).

2) Actuate the "Grip" solenoid valve by manual operation key on the handy console or mechanical manual actuator on the valve.

3) Slide the proximity switch (A) and set it to proper position so that LED on the proximity switch or LED on the handy console to be ON when the gripper grips the sprue and to be OFF when the gripper opened or closed completely.

4) Tighten the fixing screw.



K. PICK-UP VERIFICATION FOR MOLDED PARTS AND SPRUE/RUNNER

1. By part verification switch (L-G1)

   The micro limit switch or proximity switch may be mounted on the end of arm tooling to verify that a molded parts are removed from the molds.

2. Verification of sprue runner system

   a) For the sprue/runner taken by End Of Arm Tooling on main arm (L-G2)

      The sprue runner system removed from the movable mold of the two-plate molds, in case the submarine gate, should be verified by the switch equipped on the end of arm tooling.

   b) For the sprue/runner taken by sub arm gripper (L-G4)

      The sprue/runner system removed from the stationary mold of the three-plate molds by the sub arm should be verified by the proximity switch (L-G4) built-in the gripper. If the L-G4 is not actuated, the injection molding machine does not close the molds even though all the other conditions for the mold close operation are satisfied.

3. By vacuum differential switch (L-G2)

   When a molded part is removed from the molds by suction pads, a vacuum differential switch, which is activated by the negative pressure generated inside the suction pads, may be used to verify that the molded part is removed from the molds.

4. Others

   The ways of verifying molded parts and sprue/runner systems widely vary with the shapes and quantity of molded parts. There are some molded parts which are difficult to verify with switches or vacuum switch. In such a case, a photo sensor or the like may be used to verify that a molded part and sprue/runner system are removed from the molds. Further, the number of molded parts may be counted using a photo sensor and counter.

* For nonstandard verifying methods, consult our sales representatives.

L. INPUT/OUTPUT LIST

INPUT		OUTPUT	
L-X1	1st descent safety	S-X1	Option
L-X2	2nd descent safety	S-X2	Option
L-X3	Overrun out end limit	S-X3	Option
L-X4	Overrun in end limit		
L-Y1	Main strip bkwd. end	S-Y1	Main strip bkwd. sol.
L-Y2	Main strip fwd. end	S-Y2	Main strip fwd. sol.
L-Z1	Main arm upward end	S-Z1	Main arm ascent sol.
L-Z2	Main arm downward end	S-Z2	Main arm descent sol.
L-Z3	Option	S-Z3	Option
L-W1	Sub strip backward end	S-W1	Sub strip bkwd. sol.
L-W2	Sub strip forward end	S-W2	Sub strip fwd. sol.
L-H1	Sub arm upward end	S-H1	Sub arm ascent sol.
L-H2	Sub arm downward end	S-H2	Sub arm descent sol.
L-H3	Option	S-H3	Option
L-R1	Wrist vertical end	S-R1	Wrist vertical sol.
L-R2	Wrist horizontal end	S-R2	Wrist horizontal sol.
L-R3	Wrist rotate ret. end	S-R3	Wrist rotate ret. sol.
L-R4	Wrist rotate end	S-R4	Wrist rotate solenoid
L-G1	Part grip verification	S-G1	Part grip solenoid
L-G2	Vacuum verification	S-G2	Vacuum solenoid
L-G3	M. sprue verification	S-G3	Main sprue grip sol.
L-G4	S. sprue verification	S-G4	Sub sprue grip sol.
		S-N1	Wait. nipper cut sol.
		S-N2	Option

INPUT		OUTPUT	
L-E1	Option	S-E1	Option
L-E2	Option	S-E2	Option
L-E3	Option	S-E3	Option
L-P1	INPUT OPTION 1	S-P1	OUTPUT OPTION 1
L-P2	INPUT OPTION 2	S-P2	OUTPUT OPTION 2
L-P3	INPUT OPTION 3	S-P3	OUTPUT OPTION 3
L-P4	INPUT OPTION 4	S-P4	OUTPUT OPTION 4
L-P5	INPUT OPTION 5	S-P5	OUTPUT OPTION 5
L-RM1	Strip stop front end		
L-RM2	Main and sub clearance		
L-RM3	Strip stop back end		
L-RM4	Option		
L-RM5	Main stroke max. limit		
L-RM6	Main stroke min. limit		
L-RM7	Sub stroke max. limit		
L-RM8	Sub stroke min. limit		
L-RM9	M. Strip overrun max		
L-RM10	M. Strip overrun min		
L-RM11	S. Strip overrun max		
L-RM12	S. Strip overrun min		

M. VACUUM GENERATOR (Venturi air ejector)

1. Specifications

Model	:	VDBH12C6-06-H4
Nozzle hole diameter	:	1.2 mm
Max. vacuum pressure	:	650 mmHg(-0.085MPa) or more
Max. flow rate of vacuum	:	38 Nℓ/min or under
Compressed air consumption	:	12.5 Nℓ/min or under
Compressed air pressure	:	5 kg/cm²(0.5MPa)
Fluid	:	Air
Operating temperature	:	0 to 50°C (Free from condensation)
Oil supply	:	No need
Working air pressure range	:	0 to 6 kg/cm²(0 to 0.6MPa)
Filter rating	:	10 μ

2. Maintenance

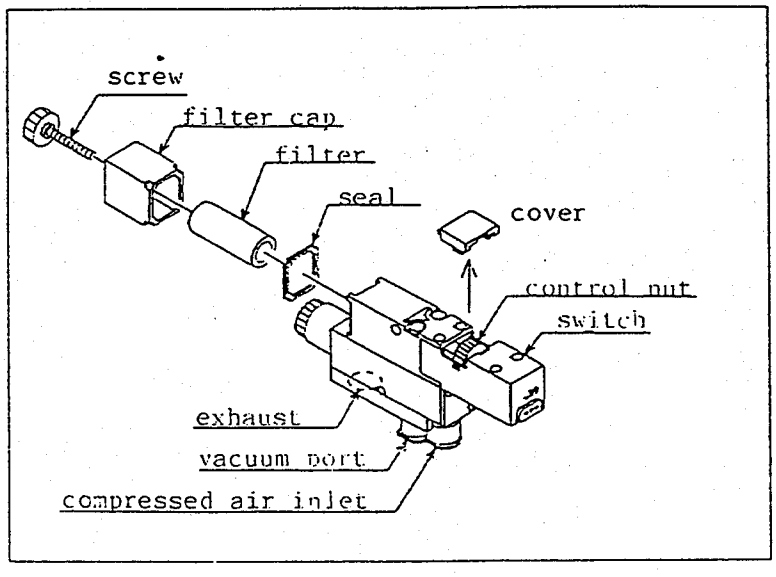
a. Filter element
Periodically blow oily particles and foreign matter off the filter element to prevent it from being clogged.

b. Filter cap
Clean the filter cap without using an organic solvent.

c. Muffler
Periodically blow or remove oily particles and foreign matter passing through the filter element from the sound absorbing material to prevent the vacuum generator performance from deteriorating.

3. Vacuum differential switch

A mechanical vacuum differential switch is used for the vacuum generator.



Switch specifications

Vacuum pressure range	: -150 to -600 mmHg (-0.02 to -0.08MPa)
Differential pressure	:
Contacts (color of leads)	: Normally open contact and common lines (black & white)
Electrical rating	: 7A 250V AC

4. Vacuum sensitivity adjustment

   a. Remove the cover for control nut on the vacuum generator.

   b. Actuate the vacuum valve manually.

   c. Attach the all molded parts to the suction pads on the End Of Arm Tooling.

   d. On I/O status indication on the handy console of the KG-203 controller, confirm that the vacuum verification (L-G2) is ON with holding the parts.

   e. Remove one of the parts from the suction pads and adjust the control nut so that the L-G2 goes OFF.

   f. Attach the removed part again and confirm that L-G2 goes ON again.

   g. Put the cover for control nut.

N. F.R. (FILTER & REGULATOR) UNIT

Oil free cylinders are used on the HE series robots. It is not necessary to supply lubricating oil to these robots.

* Drain Maintenance

1. Auto drain system is applied to this F.R. unit. Drainage is discharged automatically when its level reached a certain level. Put 6mm inside dia. tube to the discharging port (fitting). It is also possible to discharge the drainage manually with rotating drain cock.

   CHECK THE LEVEL ONCE A DAY

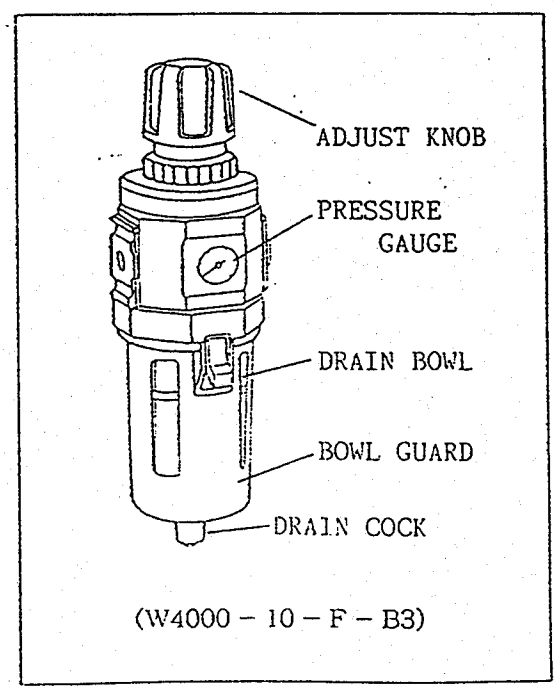
2. Drain bowl

   Drain bowl is made of polycarbonate. When molding the resin which generates the organic gas, cover the F.R. unit with plastic bag to prevent the drain bowl from cracking.

   Keep the bowls away from paint and organic solvent such as thinner, trichloroethylene, alcohol, carbon tetrachloride, sulphuric acid, nitric acid, phosphateester based synthetic oil, acetone and chloroform.

   Use neutral detergent when cleaning the plastic bowls.

   If the filter element easily gets dirtied, frequently replace it with a new one.



(W4000 – 10 – F – B3)

* Pressure Control

1. The primary air pressure supplied to F.R. unit should be less than 9.0 kg/cm² and the secondary working pressure should be 6.0 to 6.5 kg/cm².

2. Clockwise rotation of the control knob permits the secondary pressure to increase and anti-clockwise rotation to decrease.

3. Push down (lock) the adjusting knob after air pressure adjustment is finished.

O. AIR PRESSURE REGULATORS

The HE series robot is equipped with air pressure regulators for the part grip, main arm sprue grip and vacuum generator as standard and others as option. This allows the pressure of the compressed air supplied to the above devices to be independently adjusted to the desired level.

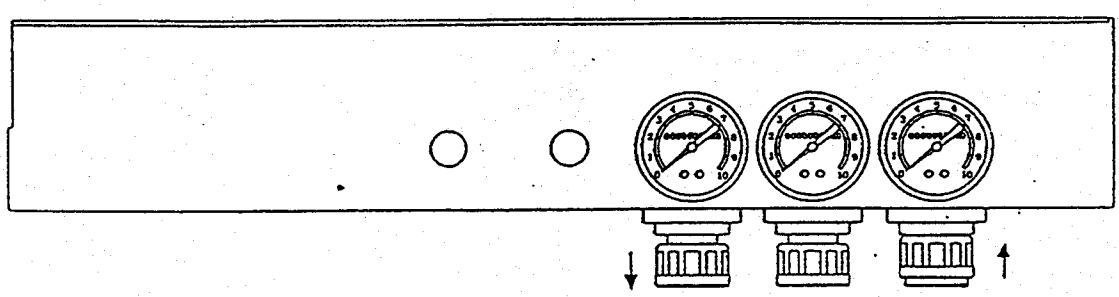
As the knob of the air pressure regulator is rotated clockwise, the pressure of the compressed air supplied to the corresponding solenoid valve increases.

Note that the degree of vacuum suction power cannot be increased by rotating the knob of the air pressure regulator for the vacuum after the degree of vacuum has reached a certain level. The maximum vacuum power is obtained at a 5 kg/cm^2 of the compressed air pressure.

Adjust the pressure of the air supplied to the main arm grip to a sufficient level for chucking an molded part. Being careful not to damage or deform the molded part by large gripper chucking force due to too much air pressure.

After the air pressure has been adjusted, lock the knob of the air pressure regulator by pressing the red lock ring.

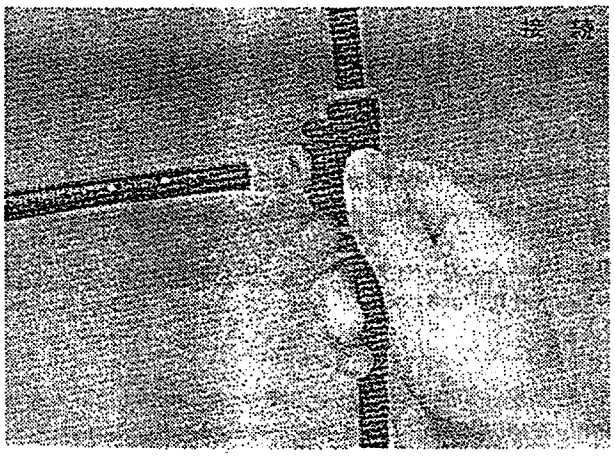
Adjust the pressure of the air supplied to the solenoid valves for the other optional devices using the corresponding air pressure regulator in the same way as above.



P. CONNECTING AND DISCONNECTING OF AIR TUBE

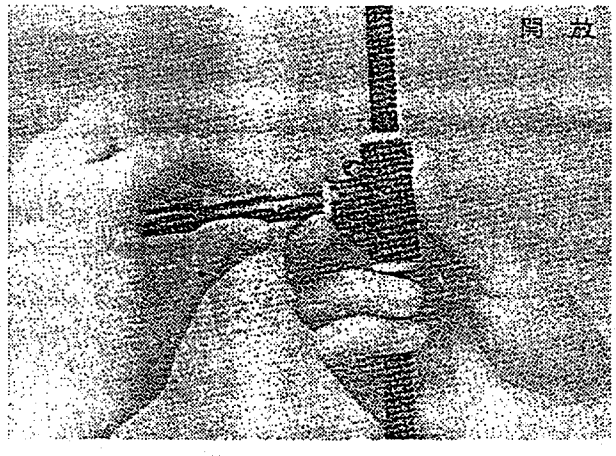
a. Connecting

Push the tube into the joint.



b. Disconnecting

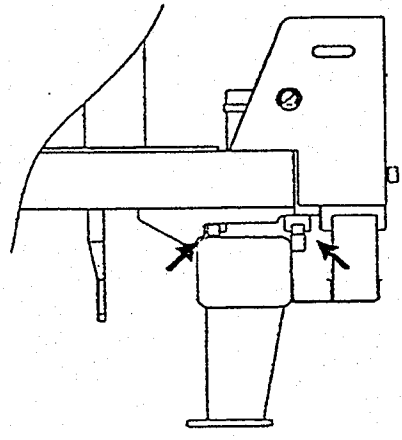
Push the releasing bush in.
Pull out the tube with the bush pushed in.

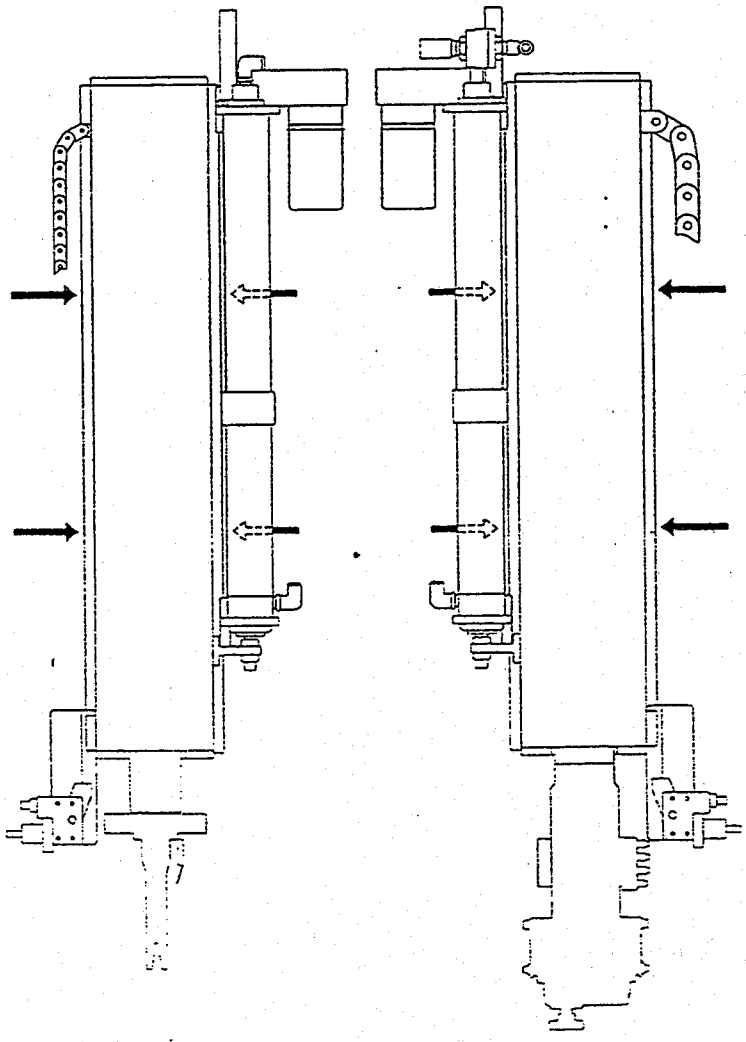


Q. GREASING THE LINEAR BEARINGS

Since the slide unit of the linear bearing includes steel balls, it can be installed without misalignment and deformation which cannot be eliminated in ordinary slideways. This allows high-precision linear motion and excellent rigidity even for a load.

Apply lithium soap grease No.2 to the linear bearings through grease fittings which are pointed with arrow mark shown below after every 100km of travel.





R. REGISTRATION OF ROBOT APPLICATION FOR EACH MOLD

The robot controller KG-203 has a capability to store the max. 16 programs in it. In addition to this, by resistration of robot application for each molds, it makes the robot setting time shorten and be sure the correct setting after changing the molds.

Make use of the attached form for the resistration of mode setting, timer setting, stroke adjustment etc. on each mold. Fill in the conditions refering to the filled in example.

Please copy it accordingly.

Before start operation, make sure of the conditions of the injection molding machine and confirm that all setting is correct.

Scale for each stroke adjustment

There are scales on each axis except traverse beam.
Record each stop position that is pointed by the pointer on each mold application.
By this record, it will be easier to readjust the strokes making use of it when change the molds.

S. CHANGE OF TAKE OUT DIRECTION OF MAIN ARM/SUB ARM

The take out direction of each arms can be changed to the reverse direction by adding an optional electric circuit onto KG-203 controller.

	STANDARD PART/RUNNER TAKEN OUT	OPTION PART/RUNNER TAKEN OUT
MAIN ARM	FROM MOVABLE MOLD	FROM FIXED MOLD
SUB ARM	FROM FIXED MOLD	FROM MOVABLE MOLD

The KG-203 controller included this optional circuit shows the following messages in mode selection M19 (Main take out motion) and M20 (Sub take out motion) on LCD.

M19 MAIN TAKE OUT MOTION

```
*MODE SET*
M19 M.TAKE OUT
MOVABLE FIXED
 MOVABLE
```

1) MOVABLE (MOVABLE MAIN ARM)
   ·Pick up from movable mold.
2) FIXED (FIXED MAIN ARM)
   ·Pick up from fixed mold.

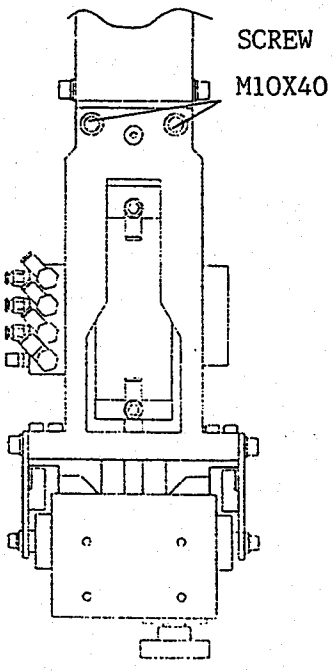
M20 SUB TAKE OUT MOTION

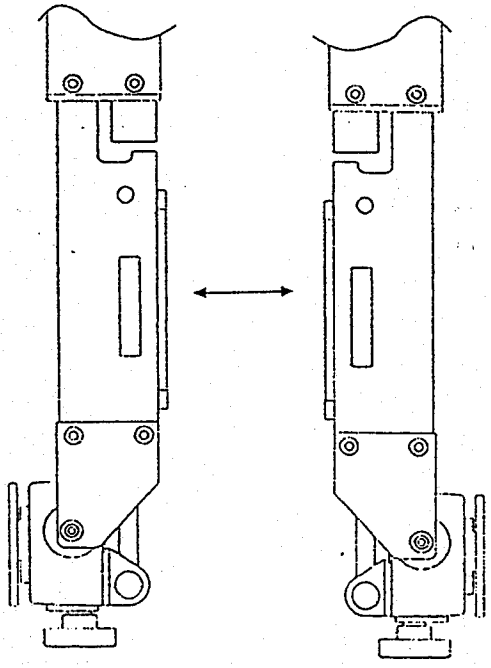
```
*MODE SET*
M20 S. TAKE OUT
FIXED    MOVABLE
 FIXED
```

1) FIXED ·Sub arm pick up from fixed mold.
2) MOVABLE
   ·Sub arm pick up from movable mold.

*NOTE : The above option is available on KG-203 only.

The standard wrist unit can be pivoted to the reverse direction by loosing one lock screw as shown below.
Tighten the screw certainly after change the direction.





T. MAINTENANCE MANUAL

The maintenance manual describes the items to be inspected periodically by the customer. Follow the instructions in the maintenance manual for best results, to ensure long service life.

This manual assumes that the Harmo's standard robots are operated under normal conditions.

Note that the inspection items for nonstandard models differ from those for standard models. Nonstandard models should be inspected accordingly, referring to the inspection items described in this manual.

Inspection procedures and intervals should be determined by the customer, depending on the operating conditions and the results of daily checks, because load applied to each part of the robots varies widely with operating conditions.

The followings are the major operating conditions regarding which extreme care must be taken.

1. Environmental conditions : Dust and moisture

2. Molded part specifications : Material (Emission of gas), weight and shape.

3. Molding cycle : If the molding cycle is short, check the inspection items frequently.

4. Continuous operation period

5. Removal of molded parts (Can molded parts easily be removed from the molds ?)

When operating the robot, for example, moving an air cylinder for inspection, or when inspecting the robot with power supplied, extreme care must be taken to avoid an accident.

INSPECTION SCHEDULES COMMONLY APPLIED TO ALL MODELS

	Daily	Every 3 day	Every 10day	Every Month
A. Mechanical parts				
1. F.R.(L.) unit a. Regulated air pressure, amount of drain	Before operate and every two hours during operation			
b. Filter - check for cleanliness				*
2. Screws and nuts - check for looseness a. Stoppers and adjusting for air cylinder strokes		*		
b. Screws and nuts in other sections			*	
c. Robot mounting screw			*	
3. Air leakage		*		
4. Bent or damaged hose	Before & after operation			
5. Quick fittings and speed controllers	*			
6. Air solenoid valve - check for operation by actuating the manual actuator				*
7. Shock absorbers and cushion	*			
8. Air pressure adjusted by the pressure regulators for option circuit	*			
9. Gripper				*
10. Return spring for gripper	Before operate			

	Daily	Every 3 day	Every 10day	Every Month
11. Wedge and wedge spring in gripper				*
12. Screws securing gripper - check for looseness			*	
13. Main & sub arm safety lock cylinders - check for operation	Before & after operation			
14. Screws securing the End Of Arm Tooling - check for looseness		*		
15. Components on E.O.A.T - check for damage	*			
16. Air nippers - check for sharpness	Every hour			
17. Suction pad - check for damage		*		
18. Exhaust cleaner - discharge the drain and clean the oil bowl	As required			*
B. Electrical parts				
1. Loose, damaged wires and wires which are pulled by robot movement		*		
2. Faulty limit switches wires		*		
3. Loose or faulty relays or timers				*
4. Limit & prox. switch	Before operate			
5. Interlocking function	Before operate			

	Daily	Every 3 day	Every 10day	Every Month
C. External equipment				
1. Compressor - check for discharge pressure and drain	Before & after operation			
2. Dryer	*			
D. Others				
1. Abnormal noise or operation	*			

Note : For details, refer to the description on the followings.

To obtain the best results from the robot, the robot and control box should be periodically checked and compressed air should be kept free of moisture, oil or foreign matter.

Wet or contaminated air adversely affects the air solenoid valves, hoses and air cylinders, shortening their service life.

For operation at a place with high temperature and humidity, a dryer should be provided.

A. Mechanical parts

1. F.R.(L.) unit

a. Check that the air pressure adjusted by the filter regulator is at an appropriate level before operation, and every two hours during operation.

EX,AX srs robot ------ 4.0 - 6.0 kg/cm^2
Beam type robot ------ 6.0 - 6.5 kg/cm^2

b. Check that the excessive drainage is accumulating in the bowl of the filter regulator before operation and every two hours during operation.
The Harmo robot is equipped with a floating type auto drain unit.

c. Check the cleanliness of the filter every month. If the compressed air is contaminated, the filter is easily stained and clogged. If this happens, remove the filter cover, then clean the filter or replace it with a new one.

2. Screws and Nuts

a) Securely tighten the screws and nuts for such as the stoppers for each cylinder where force is directly applied, every three days.

b) Securely tighten the screws and nuts which are subject to vibration, every 10 days.

c) Check the robot mounting screws for looseness every 10 days.

3. Check for air leakage every three days

Operate air cylinders and check that there is no hissing noise caused by air leakage from the cylinders. Check for air leakage by applying turbine oil to any suspected part of the air cylinder.

4. Check for bent or damaged hoses before and after operation

If a bent or damaged hose is found, replace it with a new one to ensure correct air flow through the hose.

5. Check that the hoses are securely connected to the quick fittings and speed controllers, and that the needles of the speed controllers are securely locked by the lock nuts, every 10 days.

6. Stop robot operation, turn the power OFF. Check that the air solenoid valves operate correctly, supplying compressed air to the cylinders by actuating the manual actuator of each solenoid valve, every month.

NOTE: INTERLOCK FUNCTION IS NOT EFFECTIVE ON THIS WORK

7. Check that the shock absorbers and cushion rubbers are not damaged due to long use, every month.

8. Check that the E.O.A.T.(End Of Arm Tooling = Chuck unit) is securely attached to the E.O.A.T. mounting plate and that the components such as mini cylinder grippers and suction pads on the E.O.A.T. operate correctly.

9. Check sharpness of the air nippers, sharpen the blades if necessary.

10. Check that the main and sub arm are supported by the lock cylinders when compressed air is not supplied to the robot. Also check that the lock cylinder rod retracts when compressed air is supplied. Discharge the air from the robot after operation and check that the arms are supported by the cylinders.

11. Periodically wipe out the dust and oil sludge on the cylinder rod and guide rod of the movements.

12. Periodically apply lithium soap grease No. 2 to the grease fitting on the sliding mechanism such as slide unit on swing type robot or Linear bearing on bean type robot, to ensure smooth motion.

B. Electric parts

1. Check for loose, damaged wires and wires which are pulled by robot movement, every 10 days.

   A wire which is pulled by robot movement or whose insulation is damaged may cause broken circuits or shortcircuiting.

2. Limit switches, aux. switches should be checked for damage every three days.

   The robot cannot operate correctly if one limit switch malfunctions. Extreme care should be taken to ensure that molded part verification switches and arm upward end switches operate correctly.

3. Open the front panel of the control box, then check that the relays, timers and a PCB are securely connected and that they are free from water, oil and foreign matter, every month.

4. Controller, PC-RX1/PC-EIID/PC-II·IM/KG-200SRS

   a) Check that the emergency stop function operates correctly, every day.

   b) Check that the robot ON/OFF switch operate correctly, every 10 days.

   c) Check that the LEDs for Inputs/Outputs go on and off correctly, everyday.

The mechanical lives of limit switches, micro switches and relays are as follows ;

* Micro switch (aux. switch) : 100,000 closures
* Limit switches : 300,000 closures
* Relays : 300,000 closures

If one robot operation takes only 20 seconds, the switches should operate three times a minute, and 1.08 million times a year on the assumption that the robot operates 20 hours a day and 300 days a year. This reasonably causes some switches to malfunction within a year after the initial installation.

5. In the following manner, check that the interlocking functions operate correctly before operation.

Signals between the injection machine and robot

Robot issues the following signals in order to protect the molds and robot.

Mold close safety interlock

This signal is issued to prevent the robot from being damaged by molds closing when the arms of the robot is in the mold area.

Mold open safety interlock

This signal is issued to avoid the mold opening when the arms of the robot is not upward end position.

* Both above signals (open and close interlock) are issued at the same time.

Cycle start signal

In addition to the mold open/close safety interlock, robot issues the cycle start signal in order to ensure the safety. This signal is issued as the order signal for the mold closing when the mode selector switch of the robot is set to AUTO.

Ejector forward signal

This signal is equipped in order to make it easy to take out the parts, and it is issued when the timer can be adjusted is up.

Procedure to check the function up

It is available for making the function of signals sure to try the following procedure.

Plug in the short plug for the interface connector and confirm that the injection machine runs normally in manual, semi-auto and auto modes. If normal operation is not available in this condition, it is needed to check the interface connection.

Mold close/open/ejection interlocking function

a. Start the injection machine and stop the mold opening or closing at the middle position in between the open end limit and closed end limit.

b. Remove the short plug from the interface connector.

c. Try to open or close the mold, and confirm that it do not move at all and abnormal sound does not occur. If the molds move even slightly or abnormal sound occur, recheck the interface connection and correct it.

d. Plug in the robot interface connector.

e. Open the molds, and remove the short plug again. Confirm that ejection is not available in this condition.

f. Reduce the air pressure until it gets possible to pull down the arm by hand.

g. Pull down the arm about 50mm so that the arm upward end prox. switch goes off. Turn on the mold close or open switch on the injection machine, and confirm that the molds do not move at all. If the molds move, even slightly, check the cable for a connection error.

Cycle start function

a. Turn the ROBOT ON/OFF switch ON (Robot manual), and operate the injection machine in AUTO mode. After one cycle of the injection machine, (mold closing, injection, mold opening, ejection) then check the molds do not move at all. If the molds move, even slightly, check the cable for a connection error.

b. Operate the injection machine in Auto. After taking out the parts, and part verification has been done, check the molds start to close. If the molds do not start to close, check the cable for a connection error.

C. External Equipment

1. Check that the compressor discharges air with appropriate pressure, and discharge drainage from the compressor before and after operation.

2. Dryer

Check that the dryer sufficiently dehumidifies the air discharged from the compressor.

* To ensure long service life for air cylinders, extreme care should be taken to remove moisture and foreign matter from the compressed air supplied to the cylinders.

We're Here to Help

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

How to Contact Customer Service

To contact Customer Service personnel, call:

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

Before You Call ...

If you do have a problem, please complete the following checklist before calling Conair:

- ❒ Make sure you have all model, serial and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- ❒ Make sure power is supplied to the equipment.
- ❒ Make sure that all connectors and wires within and between loading control and related components have been installed correctly.
- ❒ Check the troubleshooting guide of this manual for a solution.
- ❒ Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- ❒ Check that the equipment has been operated as described in this manual.
- ❒ Check accompanying schematic drawings for information on special considerations.

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Departments for a nominal fee.

EQUIPMENT GUARANTEE

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

WARRANTY LIMITATIONS

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.