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USERGUIDE

MNL-00009

PICK & PLACE MECHANISM

HIM-150/250/300/400
S,G,SW,GW w/PC-II
SK,GK,SWK,GWK w/kg

⚠ **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This manual is out-of-date and is provided only for its technical information, data and capacities.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containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.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 HIM series robot 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 80 to 400 tons.

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

The HIM-300/400 series robot is equipped with the remote adjustment for strip forward and backward end position. So, no tool is required for strip stroke adjustment.

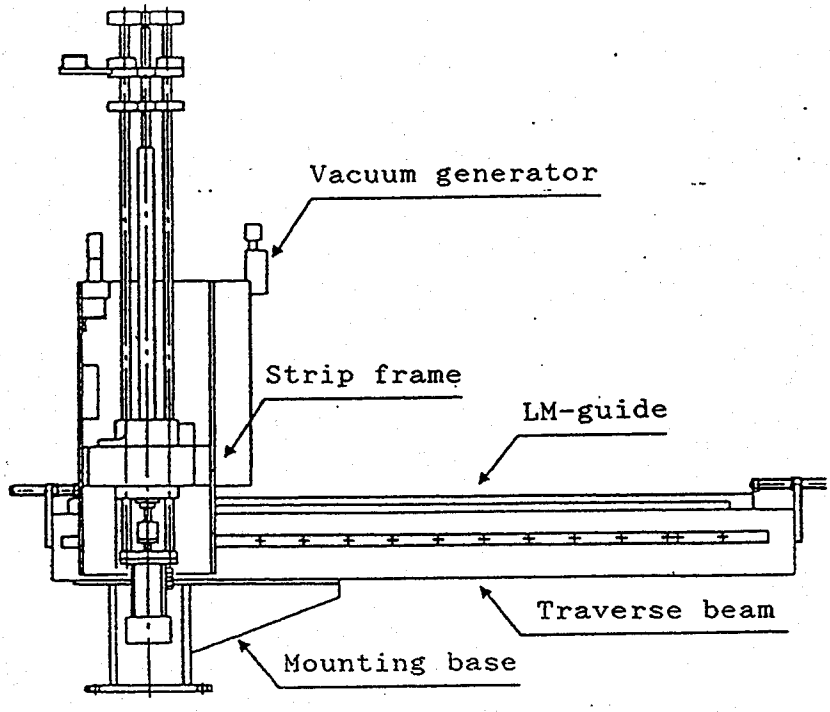
On the HIM-K series robot, the stop positions for take-out, sprue release and part release etc. on the traverse beam are NC controlled by KG-101 controller. And multi-row placing on the conveyor is available as standard.

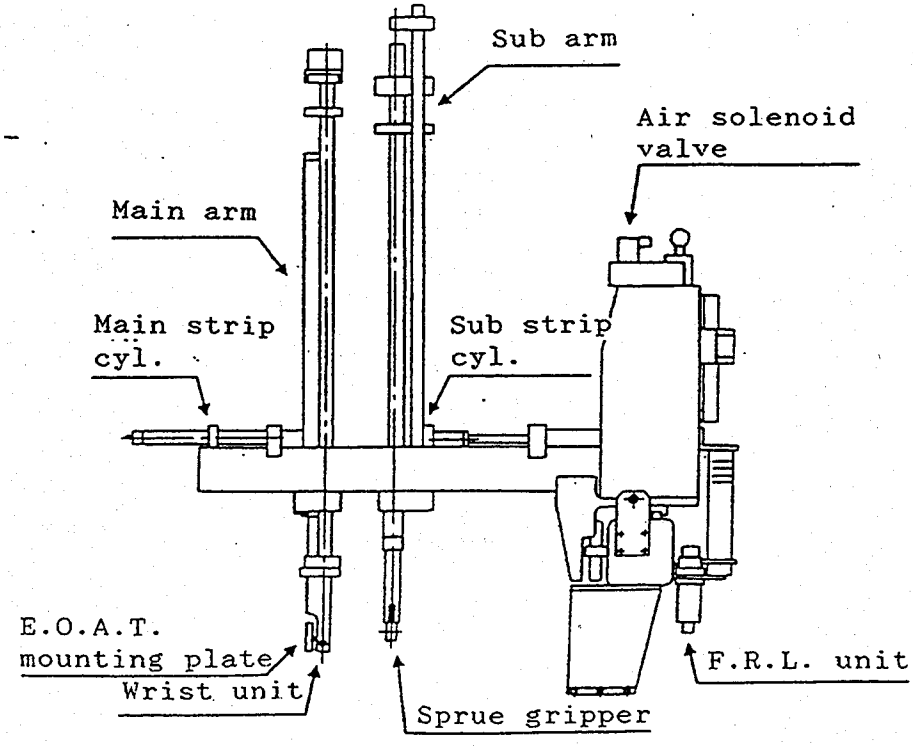
The handy console of the KG-101 controller is convenient for mode/timer/position setting, manual operation and each stroke adjustment.

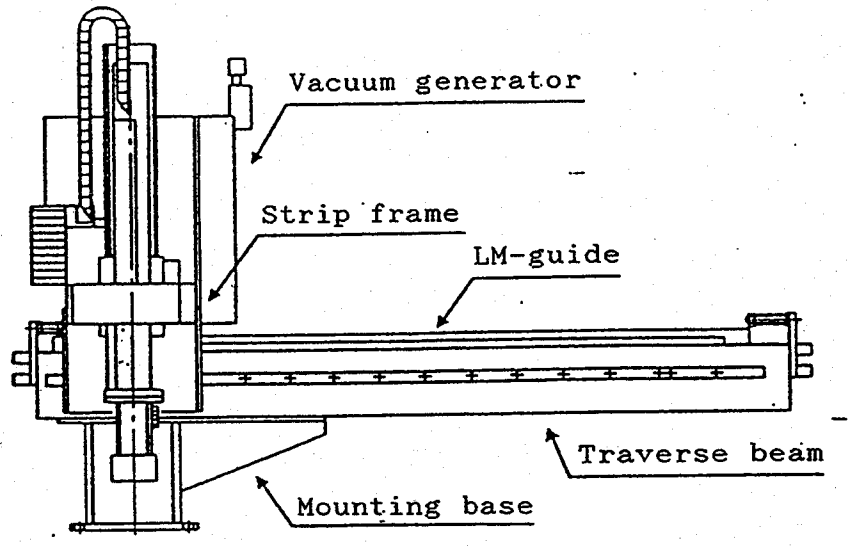
This instruction manual is describing the robot functions for the HIM series robot with PC-II·IM controller and HIM-K series robot with KG-101 controller.

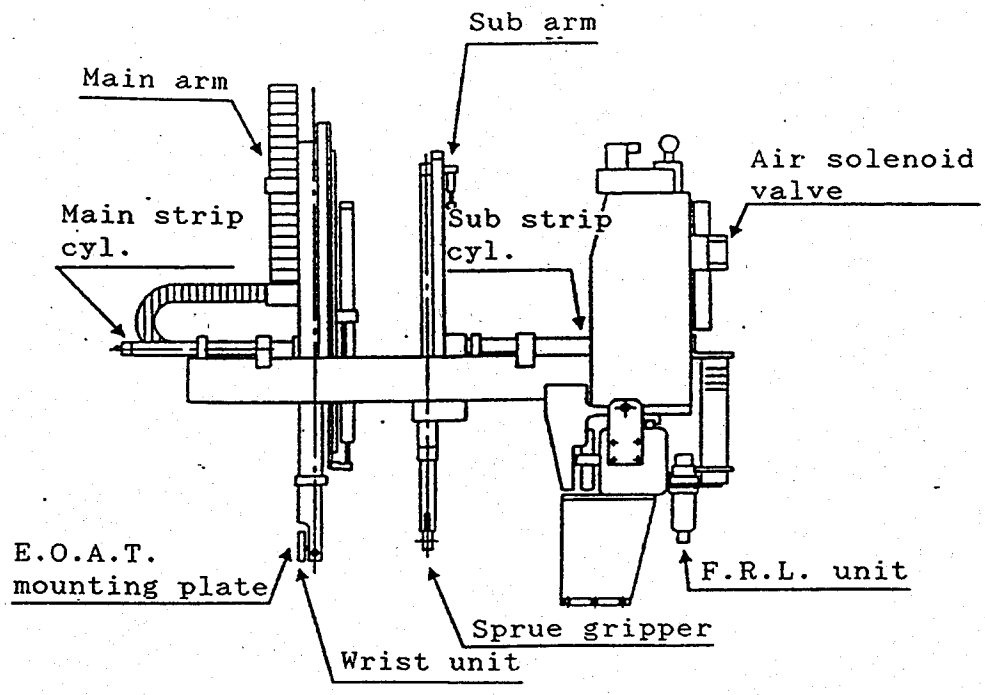
2. Names of parts

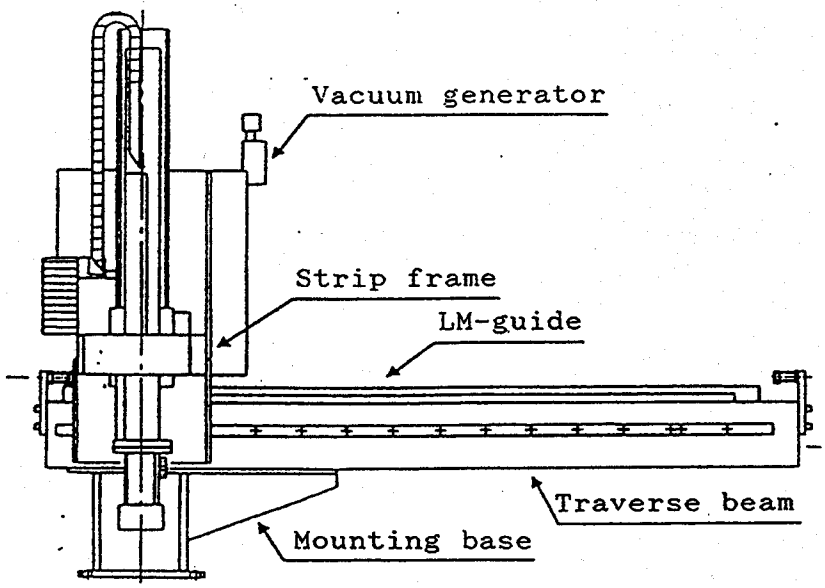
MODELs HIM-150/200 S(G) & K

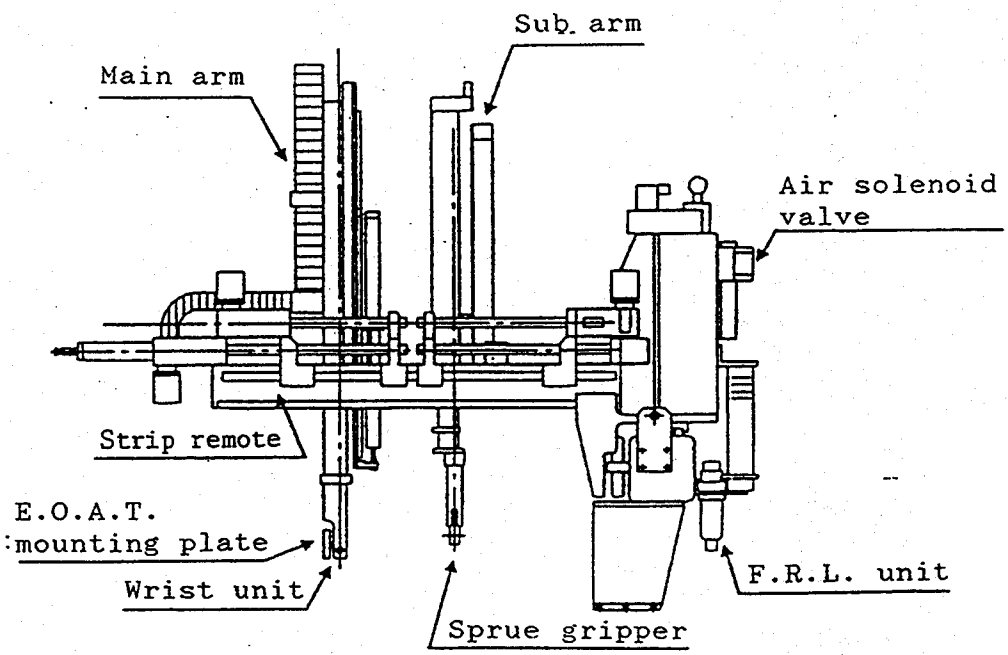





Vacuum generator
Strip frame
LM-guide
Traverse beam
Mounting base


Sub arm
Main arm
Air solenoid valve
Main strip cyl.
Sub strip cyl.
E.O.A.T. mounting plate
F.R.L. unit
Sprue gripper
Wrist unit


Vacuum generator
Strip frame
LM-guide
Traverse beam
Mounting base


Sub. arm
Main arm
Air solenoid valve
Strip remote
E.O.A.T. mounting plate
Wrist unit
Sprue gripper
F.R.L. unit

3. Application

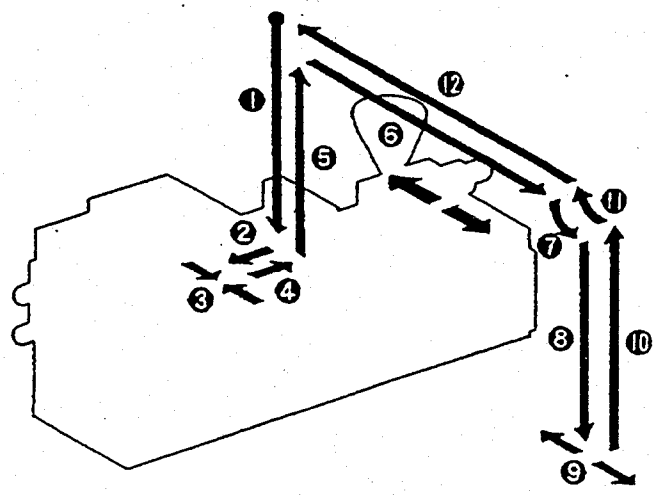
The HIM series robots are used to automatically remove molded parts and sprue/runner system at the same time from an injection molding machine ranging from 80 to 400 tons.

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. Grip molded parts (and sprue/runner system)
4. Strip off
5. Main (and sub) arm ascent
6. Traverse outward, and release the sprue on the way
   Injection machine mold close
7. E.O.A.T. (End of arm tooling) wrist flip horizontal
8. Main arm descent
9. Release moldings
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.

For HIM robot with PC-II·IM controller

1. Vacuum suction system kit with air ejector
2. Sprue gripping circuit on E.O.A.T.
3. 3-row placing program on traverse
4. 5-row placing program on traverse
5. Home position change to midway on traverse

The above are standard on HIM-K series robot.

For HIM robot with PC-II·IM or KG-101 controller

6. Vacuum suction system kit with vacuum pump
7. Wrist rotation system (90° or 180°)
8. Nipper circuit on E.O.A.T.
9. Nipper circuit on E.O.A.T. with primary and secondary pressure
10. Fixed type externally degating unit mounted on the traverse beam end
11. Sliding type externally degating unit
12. Signal output for synchronous motion of conveyor
13. Alarm light
14. Change of take-out direction of main arm
15. Special color to order

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

B. SPECIFICATIONS

Model	HIM-150		HIM-200	
	S,SK	G,GK	S,SK	G,GK
Injection machine size range (ton)	80 - 150		150 - 260	
Max. main arm stroke (mm)	700		800	
Wrist axis to top platen (mm)	110		170	
Main strip stroke (mm)	150		150	
Max. sub arm stroke (mm)	-	750	-	850
Gripper center to top platen (mm)	-	140	-	190
Sub strip stroke (mm)	-	100	-	100
Traverse stroke (mm)	1300		1500	
Wrist flip angle (°)	90		90	
Min. take out time (sec.)	1.4		1.6	
Min. cycle time (sec.)	9.0		10.0	
Max. payload (kgs)*	5.0		5.0	
Working air pressure (kg/cm^2)	6.0 - 6.5			
Air consumption (Nℓ/cycle)	38	42	40	44
Drive	Arm up/down, fwd./bkwd. --- Pneumatic Traverse -- Inverter controlled motor			
Power supply	AC200V, 50/60Hz, Single phase for PC-II·IM controller Three phase for KG-101 controller			
Power consumption	1.56 KVA			
Control	PC-II·IM : Stored program control KG-101 : NC and Stored program control			
Control voltage	DC 24V			

* : Including the end of arm tooling

Model	HIM-150		HIM-200		HIM-300		HIM-400	
	SWK	GWK	SW SWK	GW GWK	SWK	GWK	SW SWK	GW GWK
Injection machine size range (ton)	70 - 150		150 - 260		250 - 350		260 - 400	
Max. main arm stroke (mm)	700		800		1000		1200	
Wrist axis to top platen (mm)	180		165		170		220	
Main strip stroke (mm)	150		150		300		300	
Max. sub arm stroke (mm)	-	750	-	850	-	1000	-	1200
Gripper center to top platen (mm)	-	215	-	190	-	190	-	240
Sub strip stroke (mm)	-	100	-	100	-	150	-	150
Traverse stroke (mm)	1300		1500		1800		2000	
Wrist flip angle (°)	90							
Min. take out time (sec.)	1.5		2.0		2.6		2.6	
Min. cycle time (sec.)	10.0		11.0		13.0		15.0	
Max. payload (kgs)*	5.0				5.0			
Working air pressure (kg/cm^2)	6.0 - 6.5							
Air consumption (Nℓ/cycle)	41	45	43	47	48	52	50	54
Drive	Arm up/down, fwd./bkwd. --- Pneumatic Traverse -- Inverter controlled motor							
Power supply	AC200V, 50/60Hz, Single phase for PC-II·IM controller Three phase for KG-101 controller							
Power consumption	1.56 KVA 4.5 AMPS							
Control	PC-II·IM : Stored program control KG-101 : NC and Stored program control							
Control voltage	DC 24V							

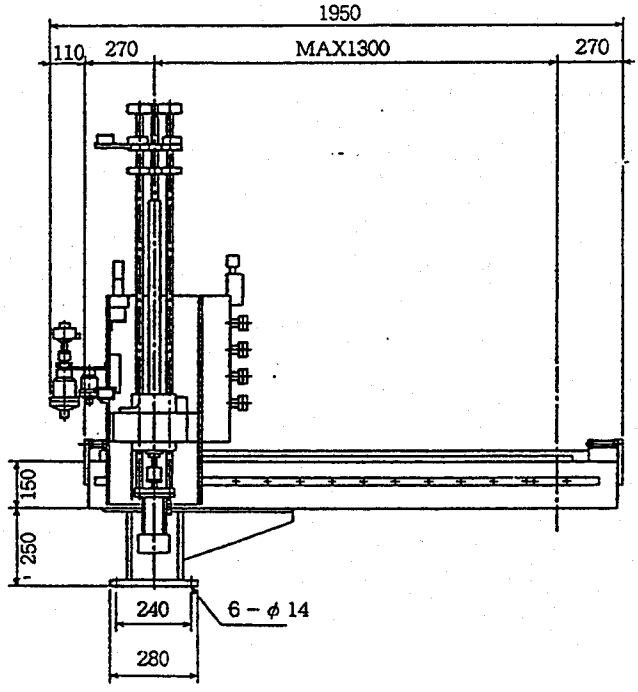
* : Including the end of arm tooling

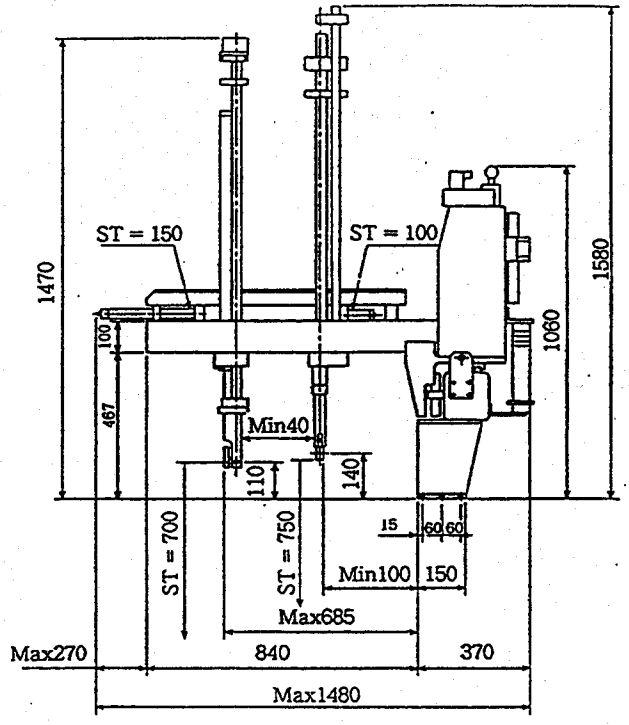
C. DIMENSIONS

1. Robot dimensions

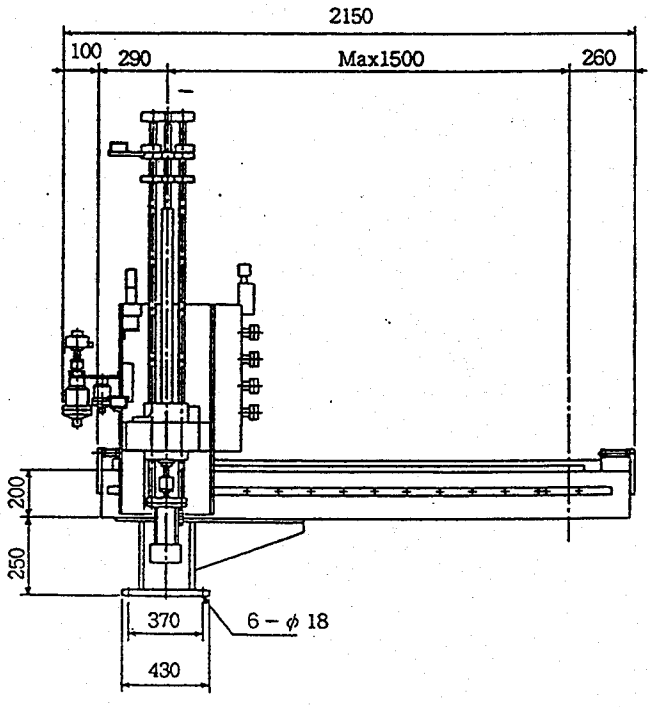
Unit : mm

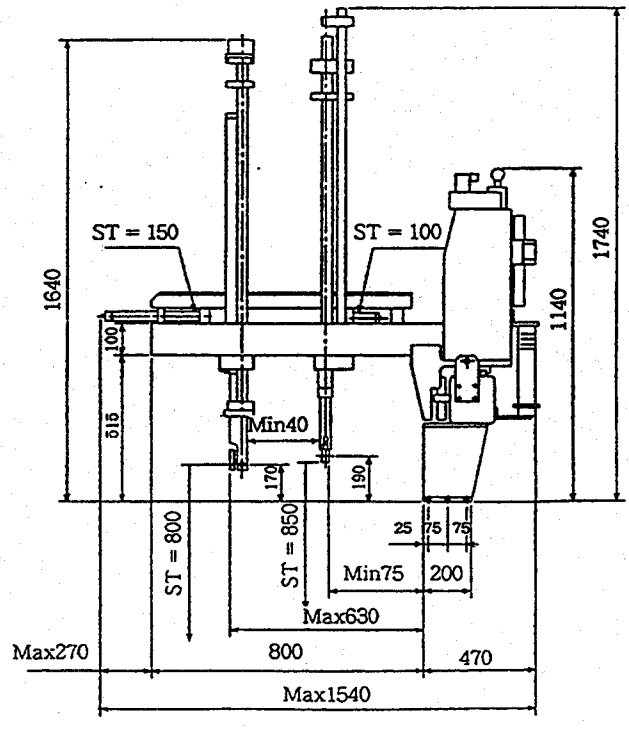
MODEL HIM-150S(G)





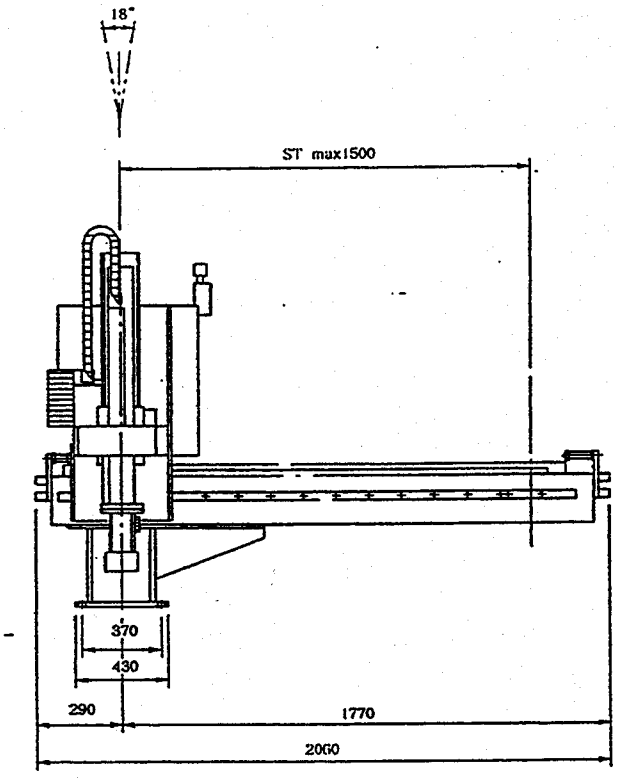
MODEL HIM-200S(G)

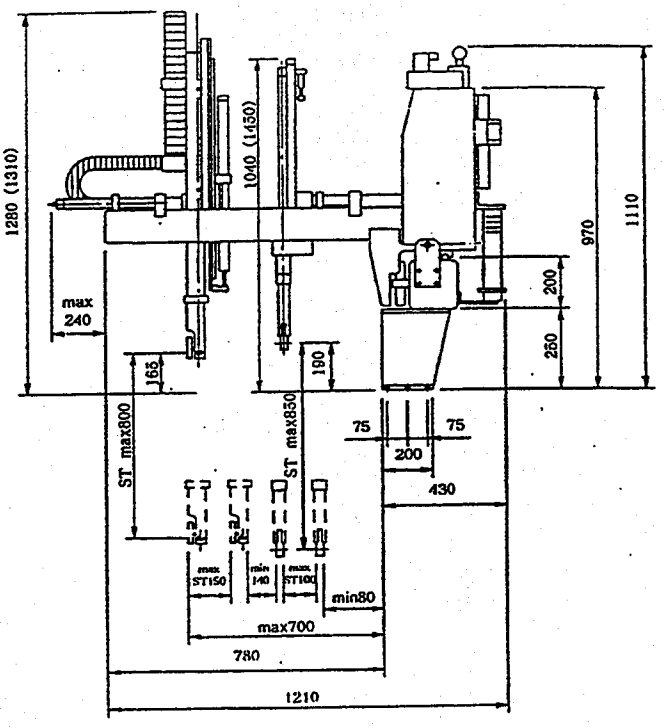




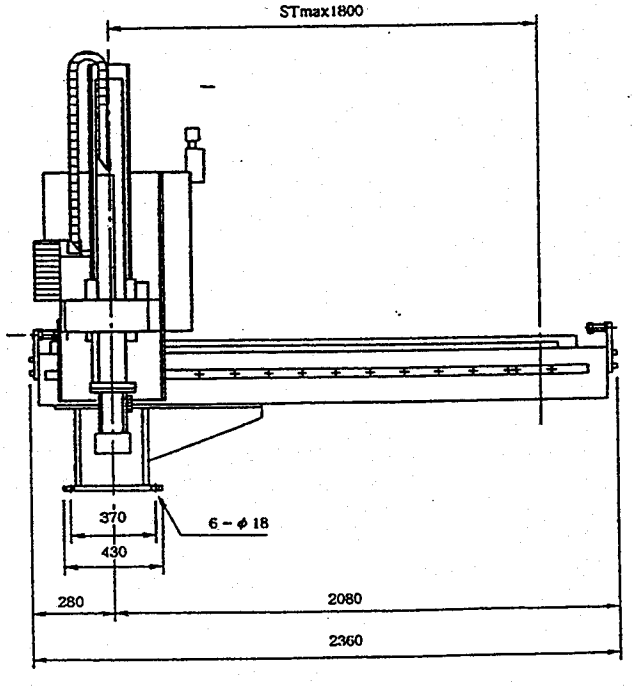
Unit : mm

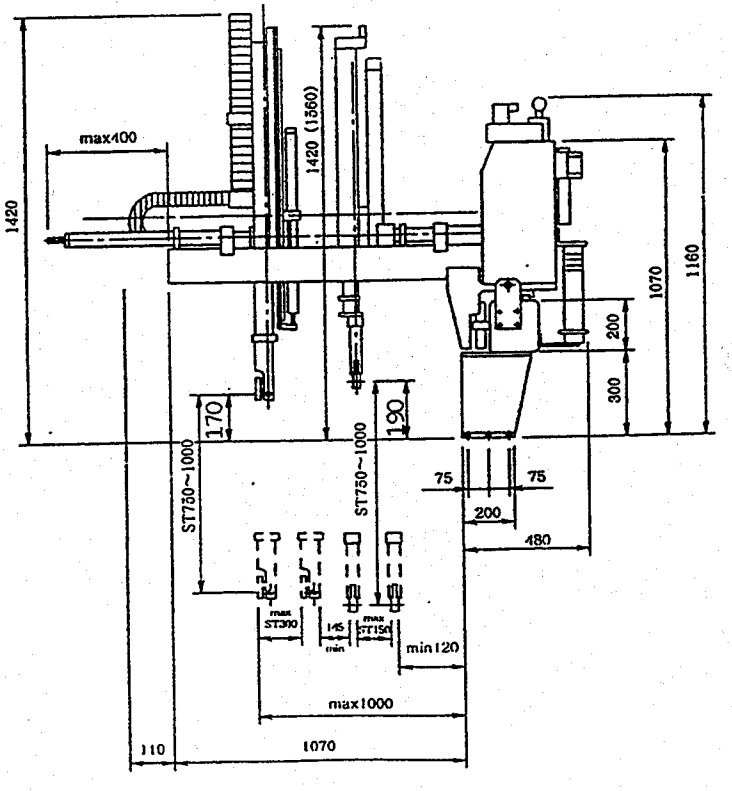
MODEL HIM-200SW(GW)





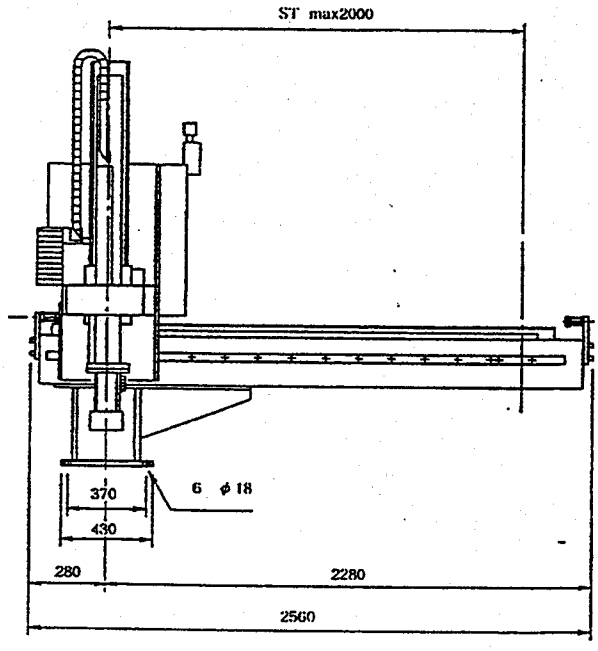
MODEL HIM-300SWK(GWK)

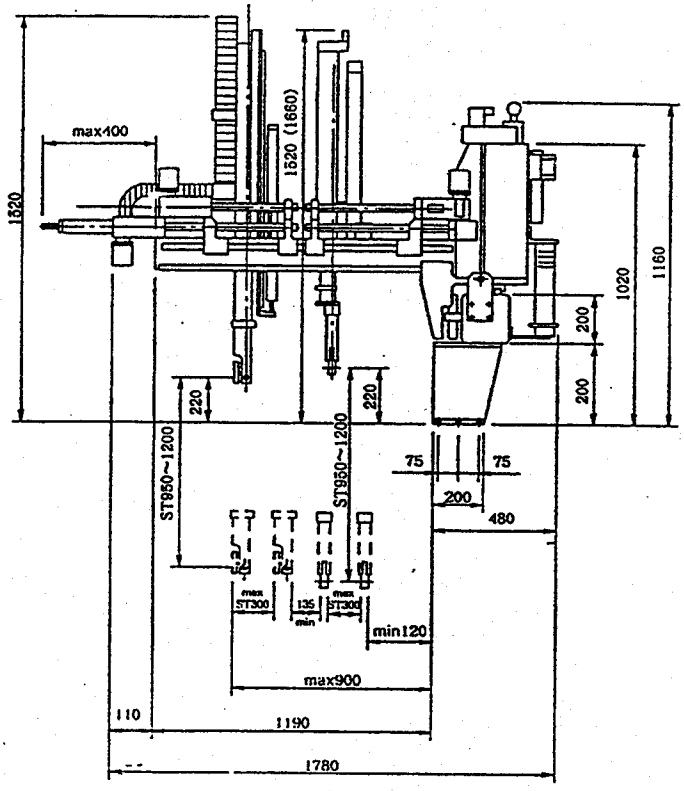




Unit : mm

MODEL HIM-400SWK(GWK)



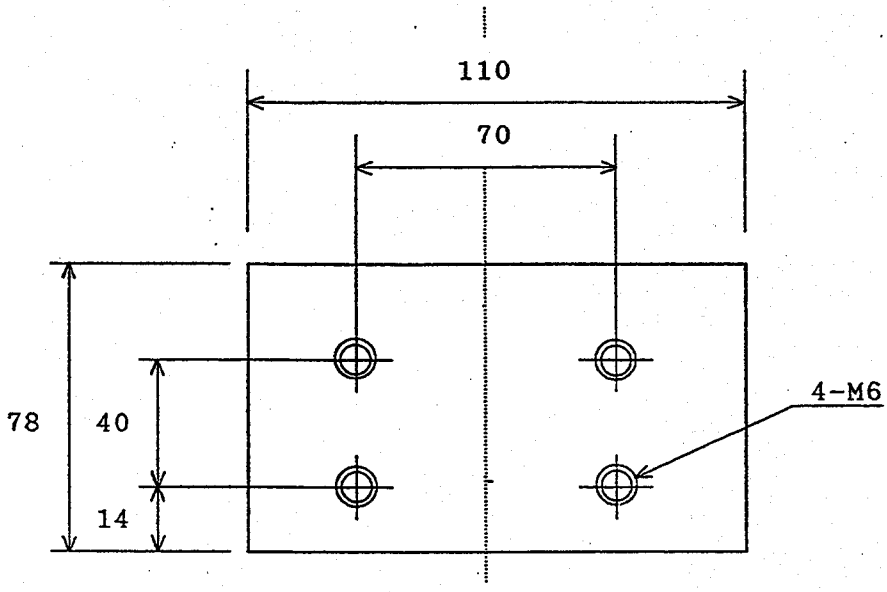


2. Mounting End Of Arm Tooling

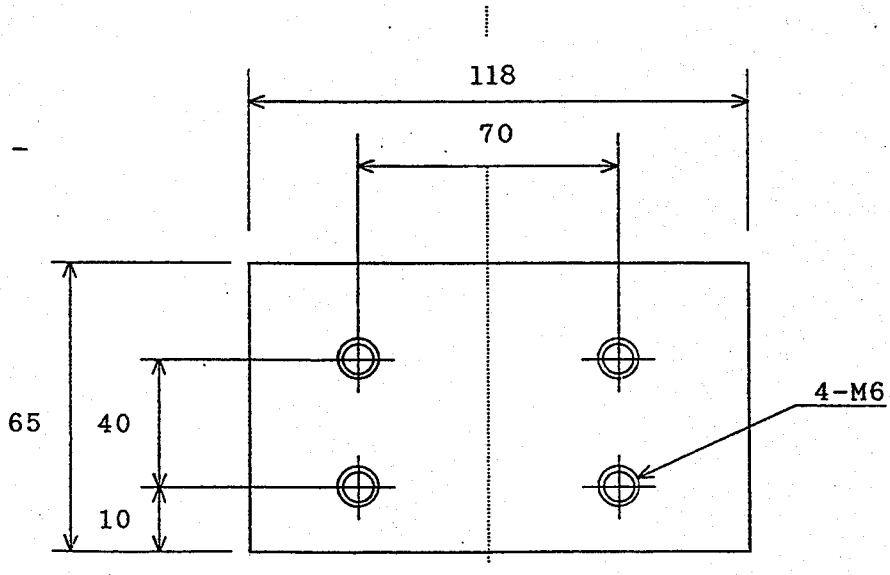
Dimensions for the End Of Arm Tooling (E.O.A.T.) mounting plate on main arm end.

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

HIM-150/200S(G) type



HIM-200W/300W/400W type

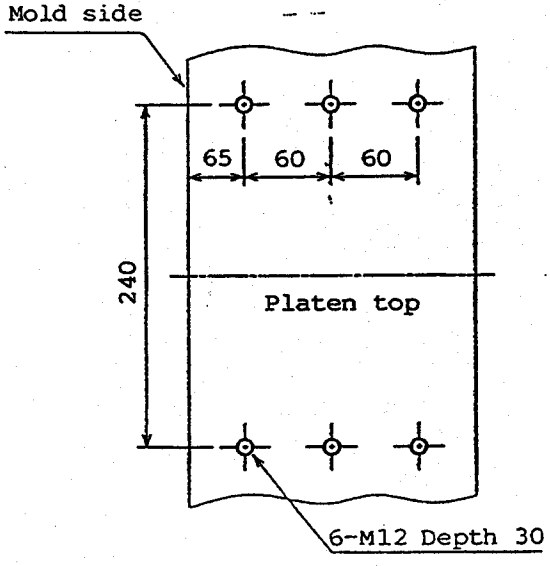


D. ROBOT MOUNTING TAP HOLES

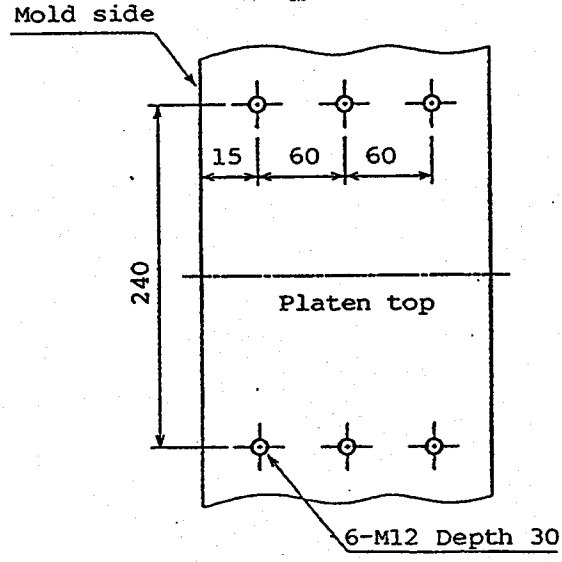
Make tap holes for mounting the robot according to the following dimensions.

1. For Model HIM-150

a) Direct mounting

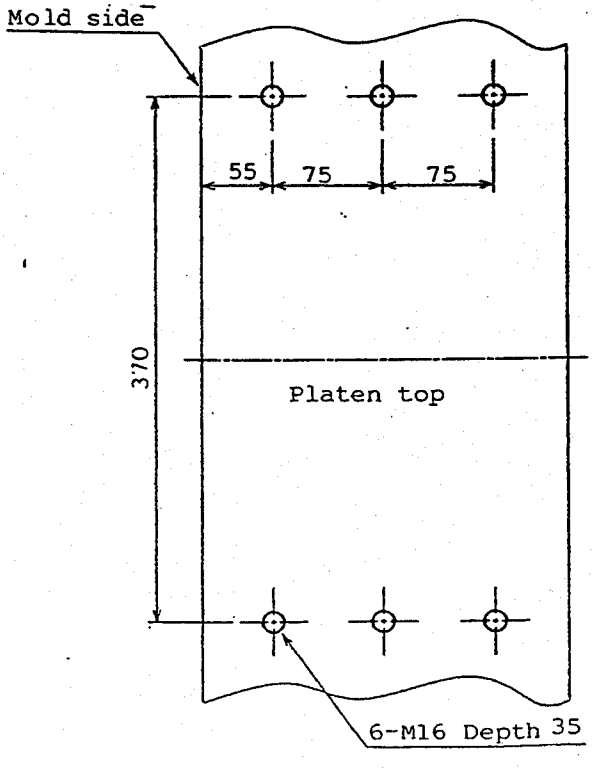


b) Mounting with Harmo standard raising spacer

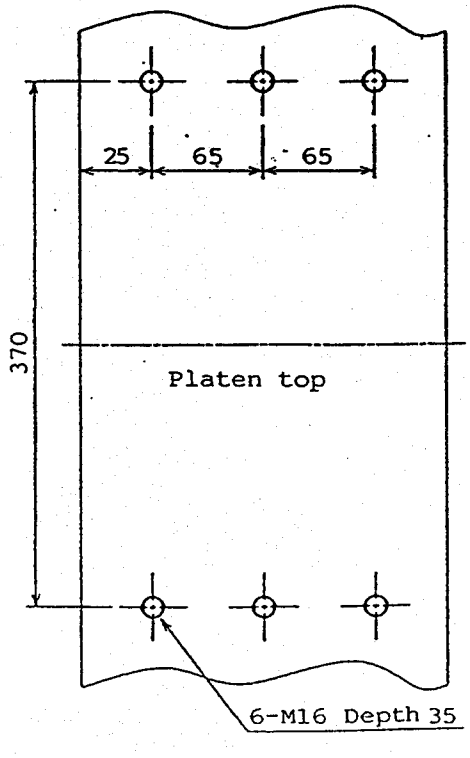


2. For Models HIM-200/300/400

a) Direct mounting



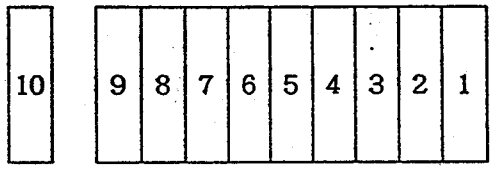
b) Mounting with Harmo standard raising spacer

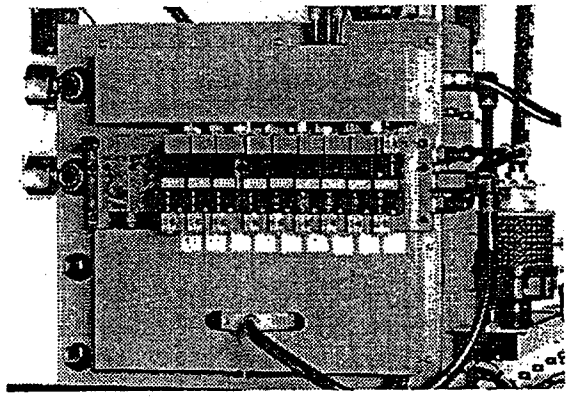


E. AIR SOLENOID VALVES

The air 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.

A) Robot with PC-II·IM controller

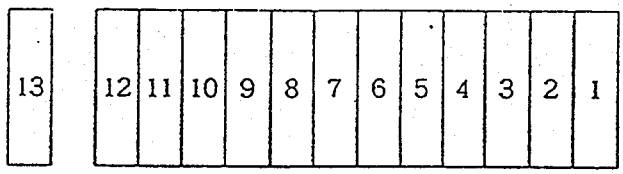




REF	FUNCTION	TYPE OF VALVE	SOL. NO.
1	WRIST FLIP HORIZ./VERT.	4L229 Double solenoid valve	SOL- 7 8
2	TRAVERSE LOCK RELEASE	4L219 Single solenoid valve	SOL-12
3	MAIN ARM STRIP FORWARD	4L219 Single solenoid valve	SOL- 4
4	SUB ARM DESCENT	4L219 Single solenoid valve	SOL- 9
5	SUB ARM STRIP FORWARD	4L219 Single solenoid valve	SOL-10
6	SUB ARM SPRUE GRIP	4L219 Single solenoid valve	SOL-11
7	VACUUM	4L219 FL Single solenoid valve	SOL- 6
8	PART GRIP	4L219 FL Single solenoid valve	SOL- 5
9	MAIN ARM SPRUE GRIP	4L219 FL Single solenoid valve	SOL-14
10	MAIN ARM DESCENT	4F410 Single solenoid valve	SOL- 3

Manufacturer : CKD

B) Robot with KG-101 controller



REF	FUNCTION	TYPE OF VALVE	SOL. NO.
1	WRIST FLIP HORIZ./VERT.	4L229 Double solenoid valve	S - R2 R1
2	MAIN ARM STRIP FORWARD/BKWD.	4L229 Double solenoid valve	S - Y2 Y1
3	SUB ARM DESCENT/ASCENT	4L229 Double solenoid valve	S - H2 H1
4	SUB ARM STRIP FORWARD/BKWD.	4L229 Double solenoid valve	S - W2 W1
5	SUB ARM SPRUE GRIP	4L219 Single solenoid valve	S - G4
6	AUX.		
7	VACUUM	4L219 FL Single solenoid valve	S - G2
8	PART GRIP	4L219 FL Single solenoid valve	S - G1
9	MAIN ARM SPRUE GRIP	4L219 FL Single solenoid valve	S - G3
10-12	AUX.		
13	MAIN ARM DESCENT/ASCENT	4KB420-M1L Double solenoid valve	S - Z2 Z1

Manufacturer : CKD

When manually operating the robot, select the manual mode and operate the switches on the controller. 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 valve used on robot is 24V DC rating.

F. 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.

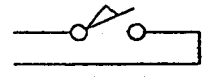
The wiring for the wrist flip horizontal and vertical end proximity switch is done as shown. Connect the switches for part verification and/or sprue verification to the designated terminals.

Example) Using NPN type proximity switch [L-G3](LS-14)

Blue & Black .... (-)
Brown & Red .... (+)
White .... OUTPUT (-)

Using dry contact limit switch

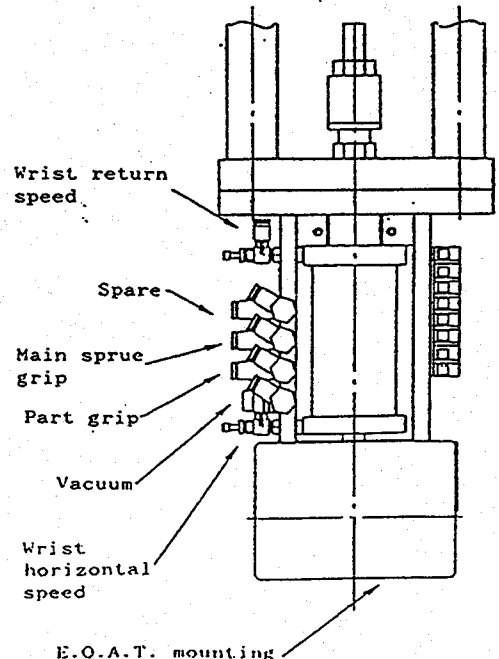
Black & Blue .... (-)
White .... OUTPUT



A) HIM-150/200

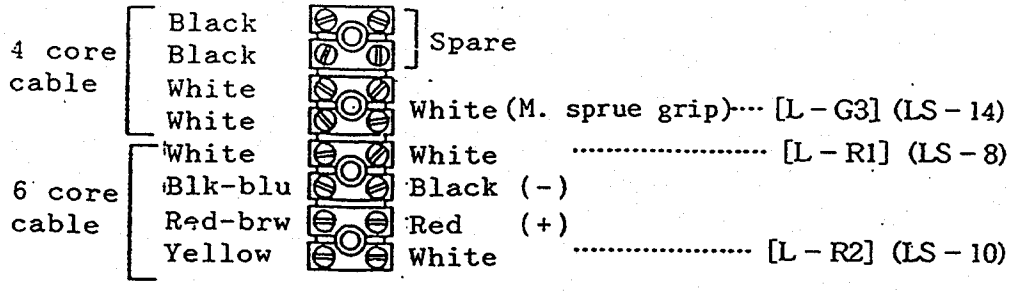
[ ] for KG-101
( ) for PC-II·IM

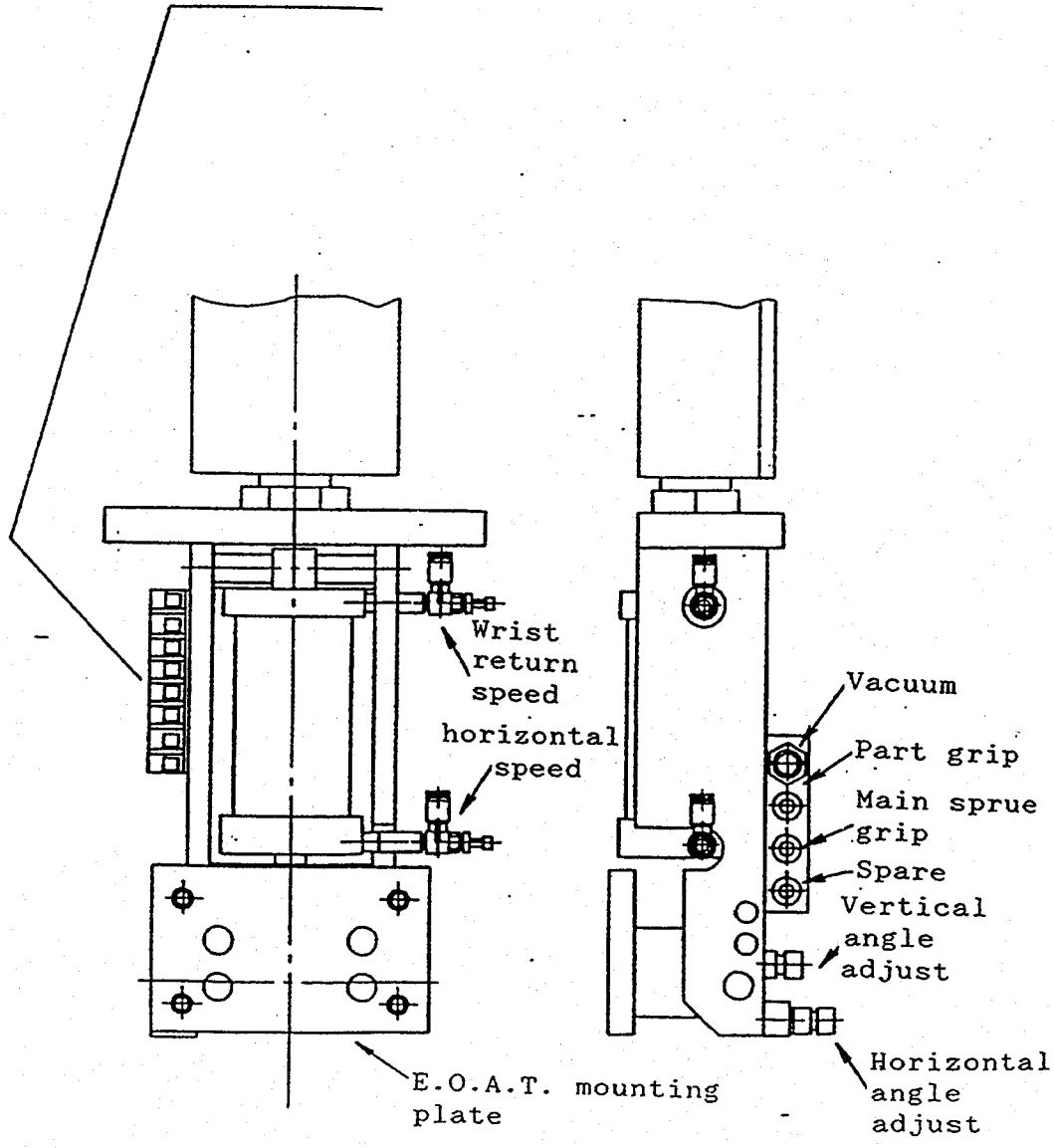
4 core cable	Black	Spare	
	Black		
	White	(M. sprue grip)	..... [L-G3] (LS-14)
	White		
6 core cable	White	White	..... [L-R1] (LS-8)
	Blk-blu	Black (-)	
	Red-brw	Red (+)	
	Yellow	White	..... [L-R2] (LS-10)



B) HIM-200W/300W/400W

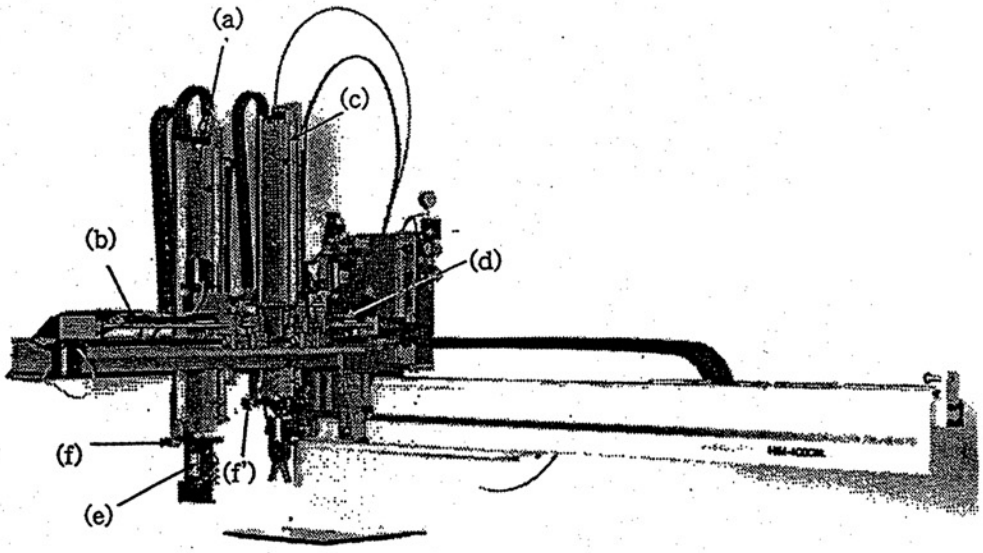
[ ] for KG-101
( ) for PC-II·IM





G. FUNCTION AND ADJUSTMENT

1. Function of each cylinder



(a) Main arm cylinder

The main arm cylinder vertically moves the end of arm tooling on the arm end, which accommodates grippers or vacuum or other components to remove a molded part from the molds.

(b) Main arm strip cylinder

The main arm approaches to the mold and after gripping the molded parts, strip off the parts from the mold.

(c) Sub arm cylinder

The sub arm cylinder vertically moves the fingers on the arm end, which grips the sprue/runner system when the main arm cylinder removes a molded parts from the three plate molds.

(d) Sub arm strip cylinder

The sub arm approaches to the mold and grip the sprue/runner system, then strip off the runner system from three plate mold.

(e) Wrist flip cylinder

The wrist flip cylinder positions the End Of Arm Tooling mounted at the end of the main arm to the horizontal or vertical position.

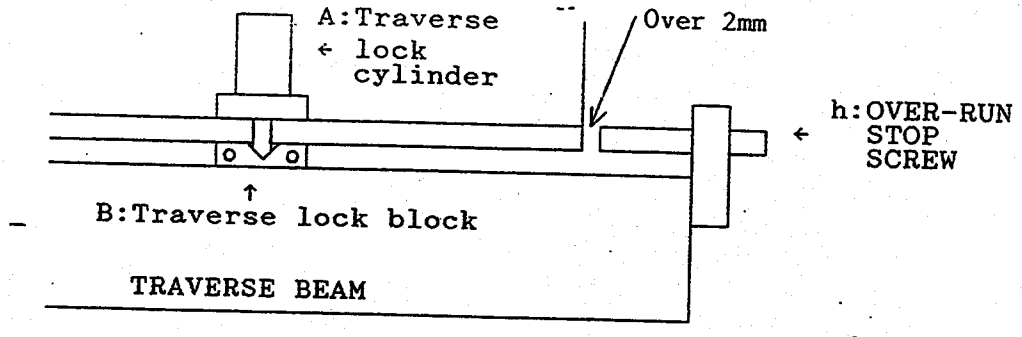
(f) Safety lock cylinder for the main and sub arm

For the both of Main and Sub arm , the safety lock cylinders are provided, preventing the arms cylinder from dropping if the pneumatic pressure suddenly decreases, the pneumatic hose is disconnected or the compressor is stopped.

(g) Traverse lock cylinder
(for the robot with PC-II·IM controller)

When the traverse inward end proximity switch LS-2 or traverse outward end proximity switch LS-1 detects that the strip frame reaches the traverse inward or outward end, traverse lock cylinder (A) extends its rod,engaging the rod end with lock block (B) at the traverse inward or outward end, precisely holding the strip frame at the traverse inward and outward end, respectively. When the Home position is changed, it is necessary to readjust the position of the lock block (B) and proximity switches LS-1 and LS-2.

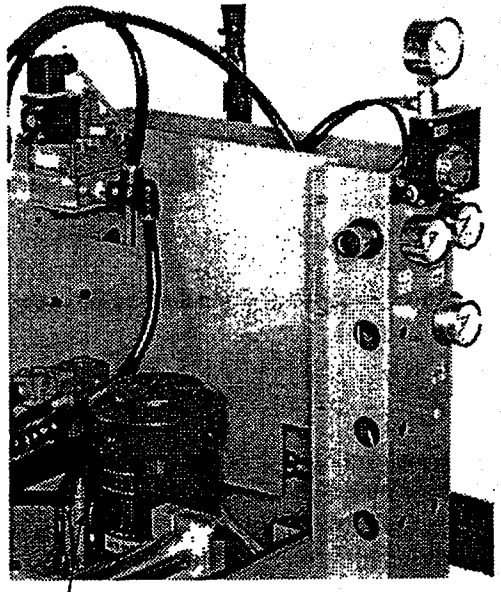
A : Traverse lock cylinder
B : Lock block
h : Overrun stop screw

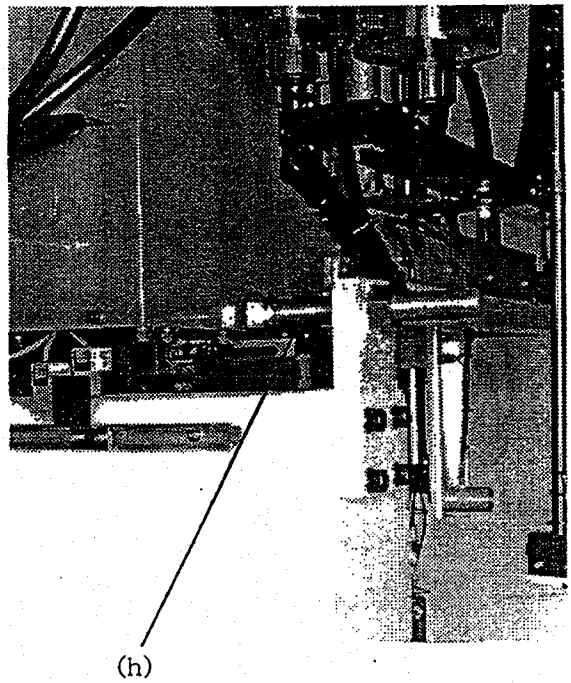


** Adjust overrun stop screw (h) at the traverse inward end in the following manner.

1. Position lock block (B) at a position so that the rod end of lock cylinder (A) engages with lock block (B) at home position.
2. Loosen the nut securing overrun stop screw (h).
3. Position overrun stop screw (h) so that the overrun stop screw end is over 2 mm away from the strip frame.
4. Secure overrun stop screw (h) by tightening the nut.
5. Adjust the overrun stop screw at the traverse outward end in the same manner as the above steps 1 to 4.

CAUTION : If the position adjustment of the lock block (B), LS-1 & 2 and overrun stop screw is wrong, electrical and/or mechanical problem may happen.





2. Cylinder stroke adjustment

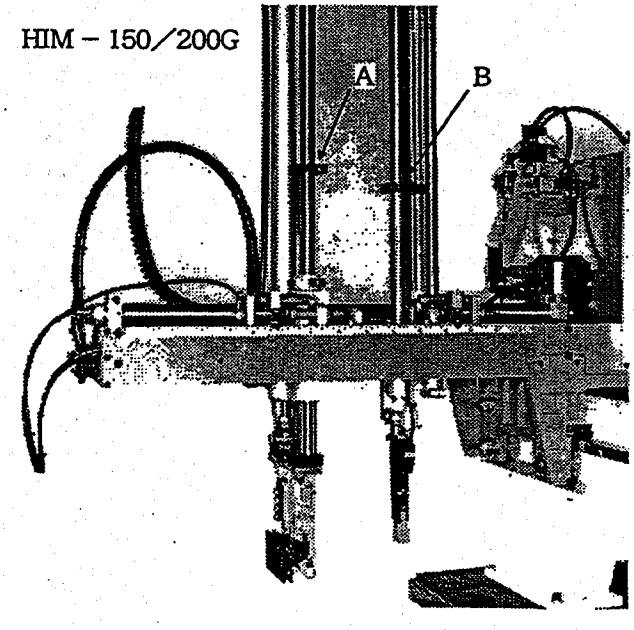
Adjust the stroke of each cylinder in the following manner.

a) Main arm cylinder

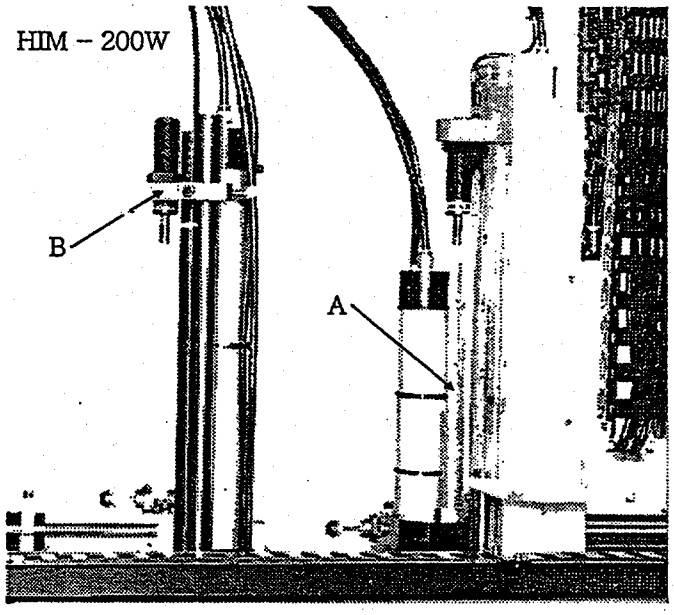
1. Press the AUTOMATIC OPERATION STOP button, then press the MANUAL OPERATION ARM DESCENT button.
2. Reduce the air pressure until it reaches 0 kg/cm^2.
3. Position main arm stopper (A) so that the main arm cylinder moves the end of arm tooling correctly to a molded part to be removed from the molds at the descent end position.
4. Increase the air pressure to 6.0 to 6.5 kg/cm^2.
5. Move the main arm cylinder to the ascent end by pressing the MANUAL OPERATION ARM ASCENT button.

b) Sub arm cylinder

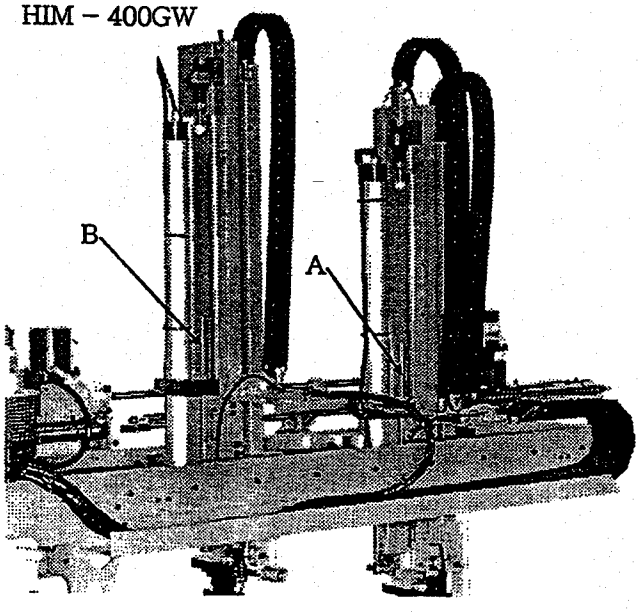
1. Reduce the air pressure until it reaches 0 kg/cm^2.
2. Loosen sub arm cylinder stopper (B).
3. Extend the sub arm cylinder so that the fingers can grip a sprue/runner system correctly.



HIM – 200W



HIM – 400GW



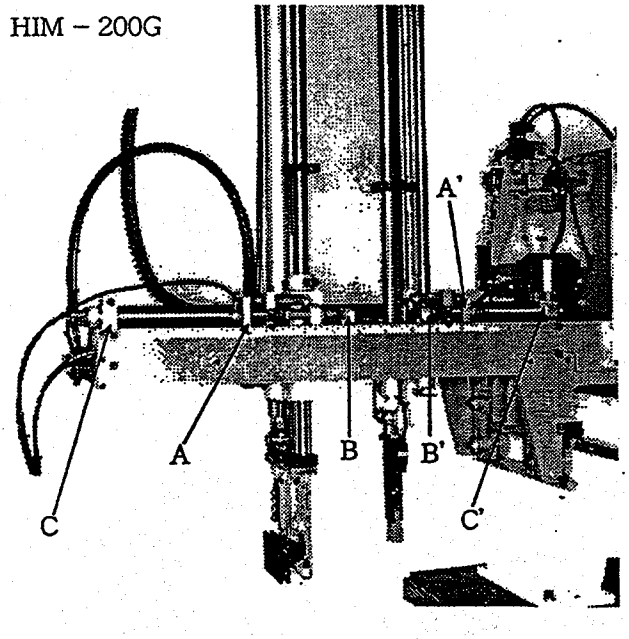
c) Main/sub arm strip cylinder

1. Open the molds, then reduce the air pressure until it reaches 0 kg/cm².
2. Roughly adjust the backward end position of the main and sub arm using strip stoppers (B) and (B').
3. Loosen strip cylinder fixing screw (C) and (C'). Roughly adjust the forward end position of the arms by moving the strip cylinder.
4 Increase the air pressure to 6.0 - 6.5 kg/cm².
5. Press the MANUAL OPERATION ARM DESCENT button to extend the arms, adjust the backward end position of the arm by moving the shock absorber.
6. Extend the strip cylinder, adjust the forward end position of the arm by moving shock absorber.

Make sure the strip stopper (A) and (A') touches the shock absorber head correctly.

Actuating the cylinders with their stroke ends causes damage on it. Set the strokes in the adjustable range.

HIM – 200G

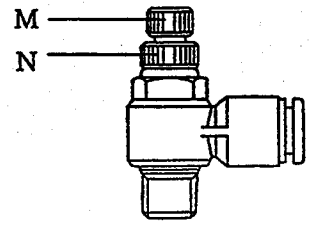


3. Cylinder Speed Adjustment

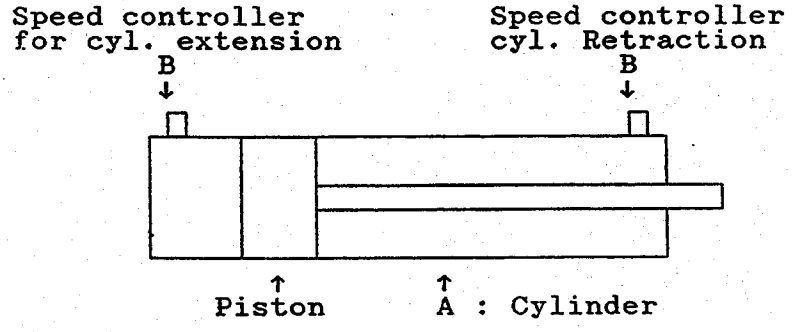
The operation speed of each cylinder can be changed by adjusting the speed controllers provided at both ends of each cylinder. The speed controller controls the flow rate of air discharged from the cylinder.

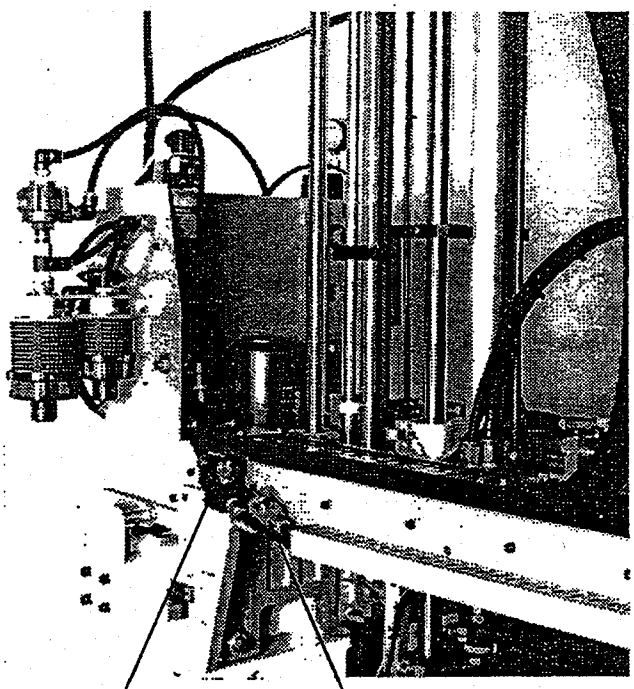
As needle (M) is tightened with lock nut (N) loosened, flow rate of air discharged from the cylinder decreases, thereby reducing the cylinder operation speed. On the contrary, as needle (M) is loosened, the flow rate of air discharged from the cylinder increases, thereby increasing the cylinder operation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

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



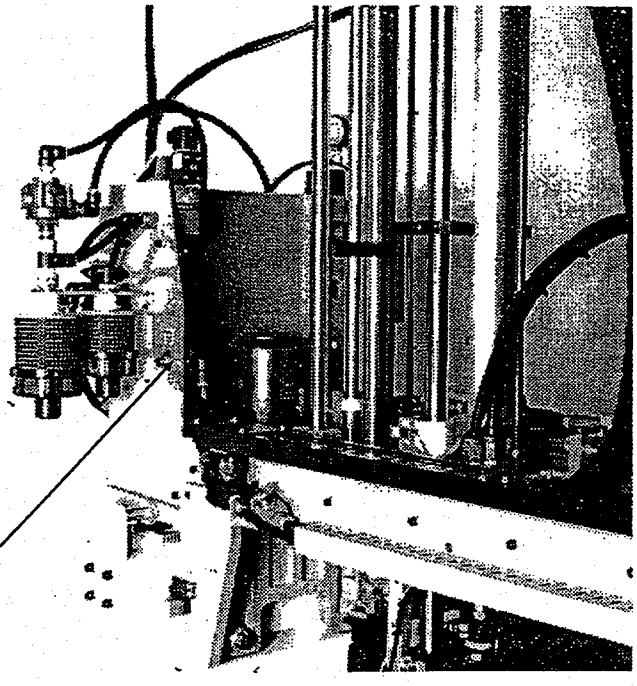
A: Cylinder
B: Speed controller
M: Needle
N: Lock nut



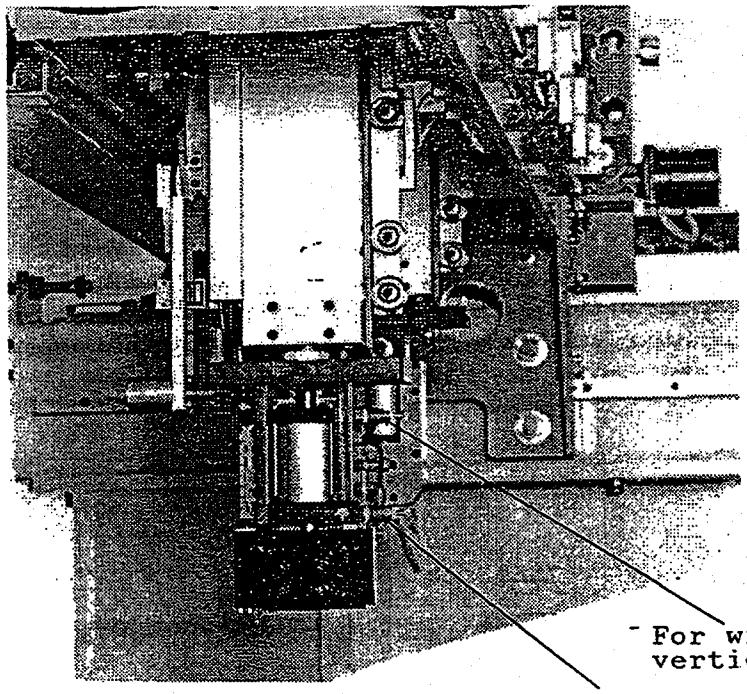


For main arm ascent

For main arm descent



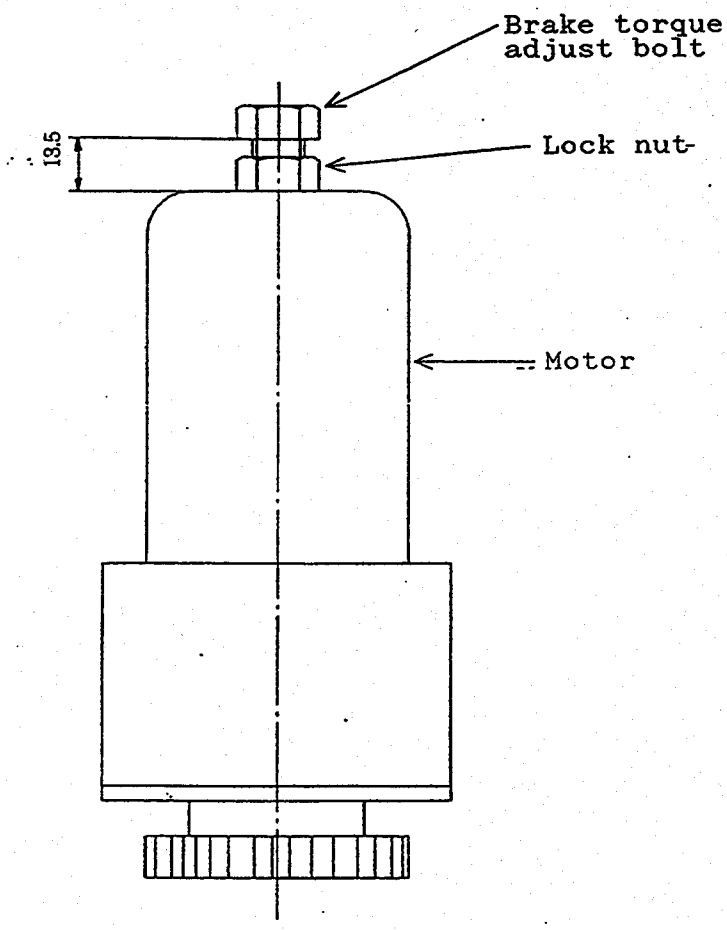
For main arm second descent


For wrist return vertical
For wrist flip horizontal

H. TRAVERSE MOTOR BRAKE

The brake incorporated in the traverse motor is released when it is energized.
When needed to release the brake manually, loosen the brake torque adjust bolt.
Make it back to the original position which 13.5mm (standard) as shown before robot auto operation.

CAUTION : **Incorrect adjustment of the motor brake torque causes the traverse problem such as overrun, mechanical overload and electrical overcurrent. Make sure of the 13.5mm shown below.**



I. MECHANICAL STRIP STROKE ADJUSTMENT

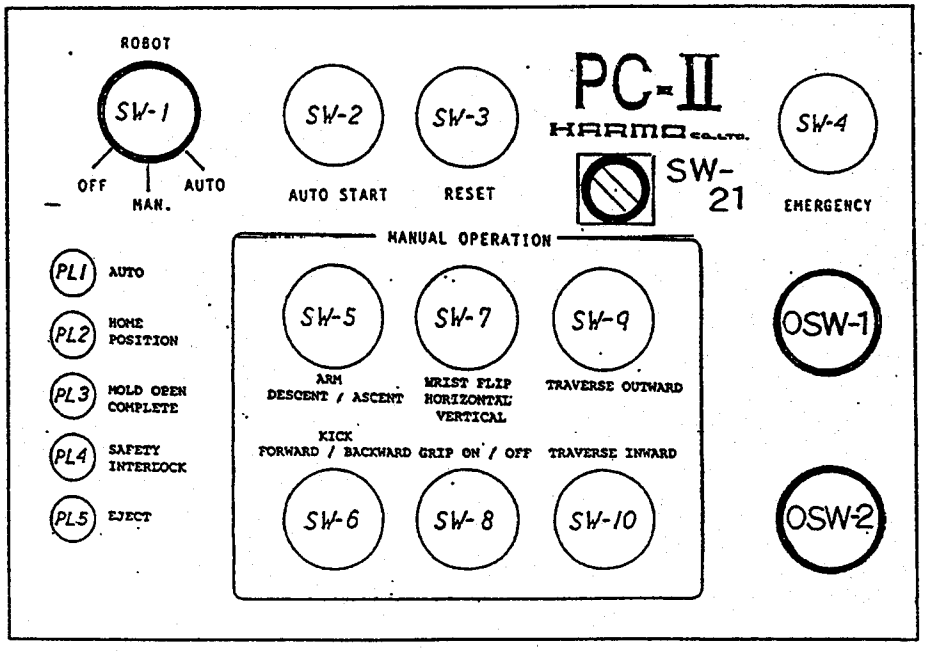
HIM series robot with PC-II·IM controller

The mechanical strip stroke adjustment can be done when the key switch is in MANUAL mode. And it is possible to do it regardless of mold open and close.

a) Turn the key switch to "MAN".

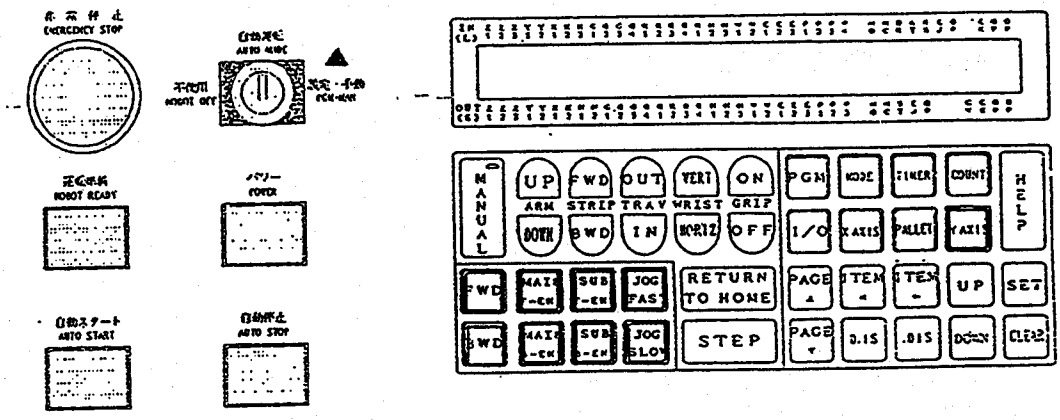
b) Select arm (main or sub) to adjust the strip stroke by SW-21.

c) The pushbutton switches OSW-1 and OSW-2 have a knob which select the motor rotate direction.
To adjust the strip backward end position, turn this knob of OSW-1 to **FORWARD** or **BACKWARD**, then press the inner button to run the motor.
Adjust the strip forward end position with the switch OSW-2 in the same manner.



HIM-K series robot with KG-101 controller

Adjustment of strip forward/backward position can be done on the HANDY console.



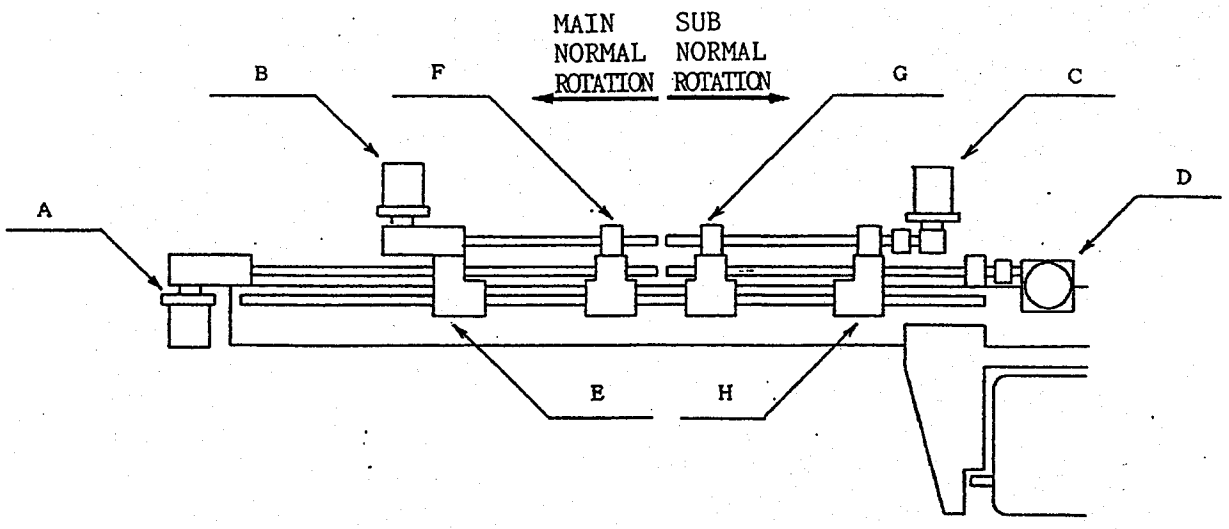
a) Turn the key switch to [PGM·MAN].

b) Press [Y AXIS] key, then the following message is shown.

```
=== Y AXIS (W AXIS) ADJUSTMENT MODE ==
PRESS [FWD]OR[BWD] & [F-FWD]OR[B-END]
```

c) Adjust forward and backward end position by [FWD]/[BWD] and [MAIN F-END]/[MAIN B-END]/[SUB F-END]/[SUB B-END] key.

MOTORS



1. Move E (Main arm fwd. end) by Motor A.
2. Move F (Main arm bwd. end) by Motor B.
3. Move G (Sub arm fwd. end) by Motor C.
4. Move H (Sub arm bwd. end) by Motor D.

--

Alarm for end positions of adjustable range

There are proximity switches to detect the each end position of adjustable range.
Before the adjusting screws come out from its holding bracket, or before main arm and sub arm touches each other, the proximity switches goes on and alarm sounds.
In such case, reverse the motor rotation so that alarm stops.

NOTE : The motor does not stop even alarm sounds. Release the button immediately.

Greasing

Periodically wipe out dust on the adjusting screws and linear rail of the mechanism, then apply grease on them.

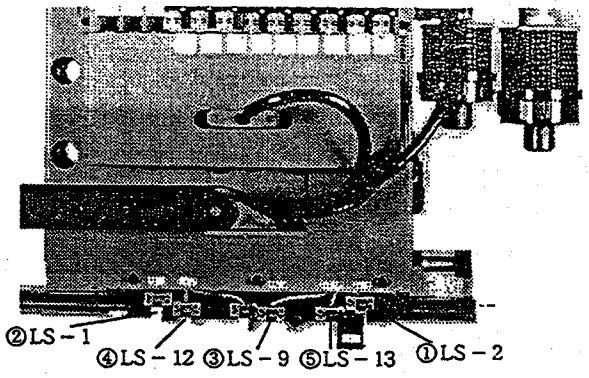
J. PROXIMITY SWITCHES

Ref. No.	Switch No.		Name	Function
	PC-II	KG-101		
1	-	L-X1	First descent safety	Detect that arm is at first descent position on the beam
	LS- 2	-	Traverse inward end	
2	-	L-X2	Second descent safety	Detect that arm is at second descent allowable area
	LS- 1	-	Traverse outward end	Detect that arm is at traverse end position
3	LS- 9	-	Sprue release position	Detect that arm passed mid traverse, and for sprue rel.
4	LS-12	-	Traverse out slow down	Slow down traverse out speed
5	LS-13	-	Traverse in slow down	Slow down traverse in speed
6	-	L-X3	Overrun at traverse + end	Detect traverse out overrun
7	-	L-X4	Overrun at trav. - end	Detect traverse in overrun
8	LS- 6	L-Y1	Main strip backward end	Detect that arm is strip bkwd. end and allow up/down
9	-	L-Y2	Main strip forward end	Detect that arm is strip fwd end and allow next motion
10	LS- 3	L-Z1	Main arm upward end	Detect that main arm is at upward end
11	LS-11	L-Z2	Main arm downward end	Detect that main arm is at downward end
12	-	L-Z3	Main lock cyl. retract end	Detect that main lock cyl. is retracted (Option)
13	-	L-W1	Sub strip backward end	Detect that sub arm is strip bkwd. end and allow up/down
14	-	L-W2	Sub strip forward end	Detect that arm is strip fwd end and allow next motion

Ref. No.	Switch No.		Name	Function
	PC-II	KG-101		
15	LS- 7	L-H1	Sub arm upward end	Detect that sub arm is at upward end
16	-	L-H2	Sub arm downward end	Detect that sub arm is at downward end
17	-	L-H3	Sub lock cyl. retract end	Detect that sub lock cyl. is retracted (Option)
18	LS- 8	L-R1	Wrist return vertical end	Detect that End Of Arm Tooling is in vertical
19	LS-10	L-R2	Wrist horizontal end	Detect that E.O.A.T. is in horizontal
20	-	L-R3	Wrist rotate return end	Detect that rotary actuator is in return end (Option)
21	-	L-R4	Wrist rotate out end	Detect that rotary actuator is in out end (Option)
22	LS- 4	L-G1	Part grip verification	Detect that part is gripped by EOAT
23	VS- 1	L-G2	Vacuum verification	Detect that part is sucked by suction pad
24	LS-14	L-G3	Main sprue verification	Detect that sprue is gripped by EOAT
25	LS- 5 *NOTE	L-G4	Sub sprue grip verification	Detect that sprue is gripped by sub arm gripper
26	-	L-E1	Slide return end	Detect slide return end of external degating unit (Opt)
27	-	L-E2	Slide out end	Detect slide out end of external degating unit (Opt)
28	-	L-E3	Air pressure check	Check the 2ndary air press. and alarm when abnormal

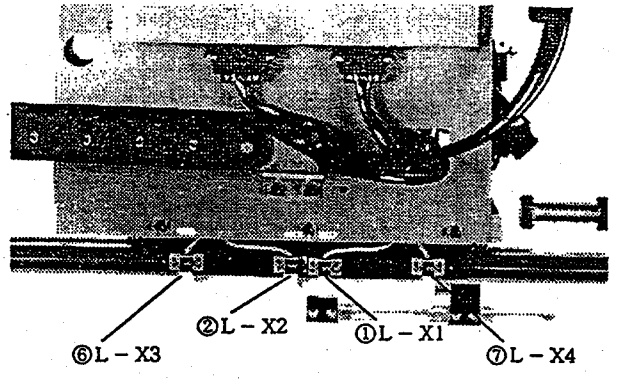
◆ PC-II-IM controller

MODEL : HIM – 150G

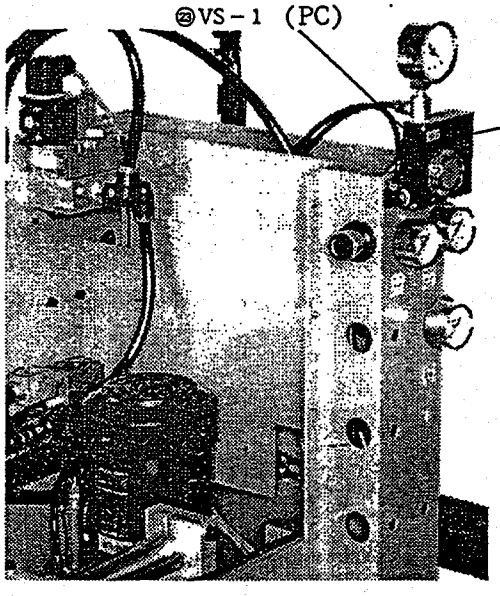


◆ KG-101 controller

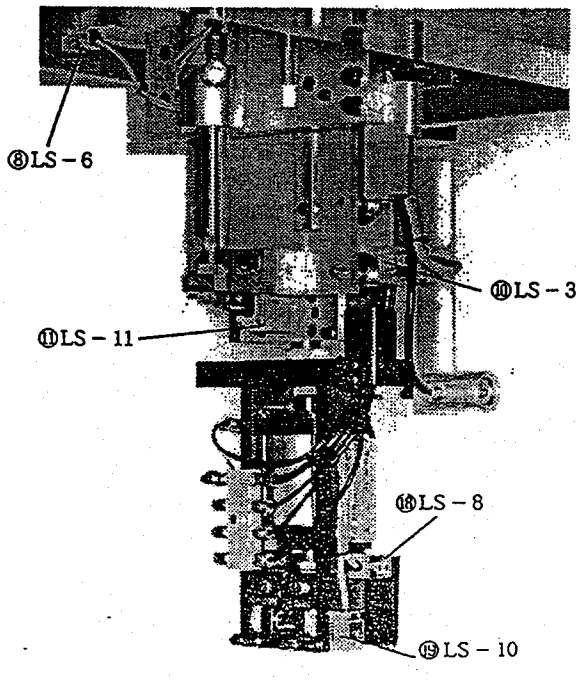
MODEL : HIM – 200GK



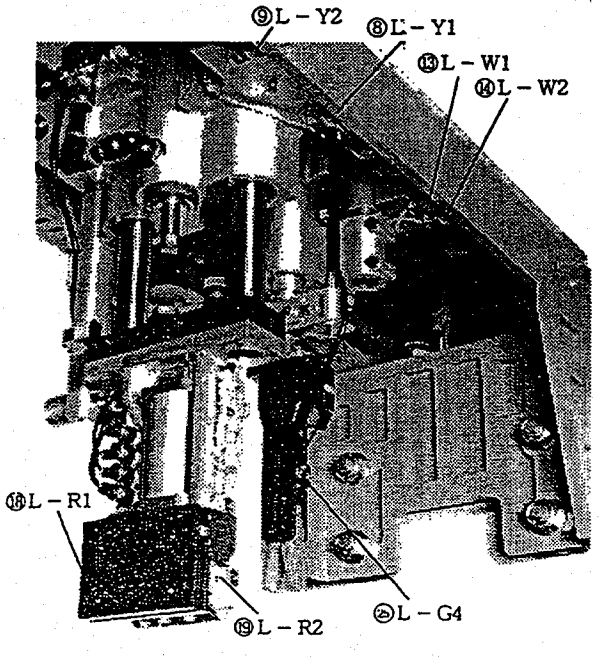
MODEL : HIM – 150G



MODEL : HIM – 400GW

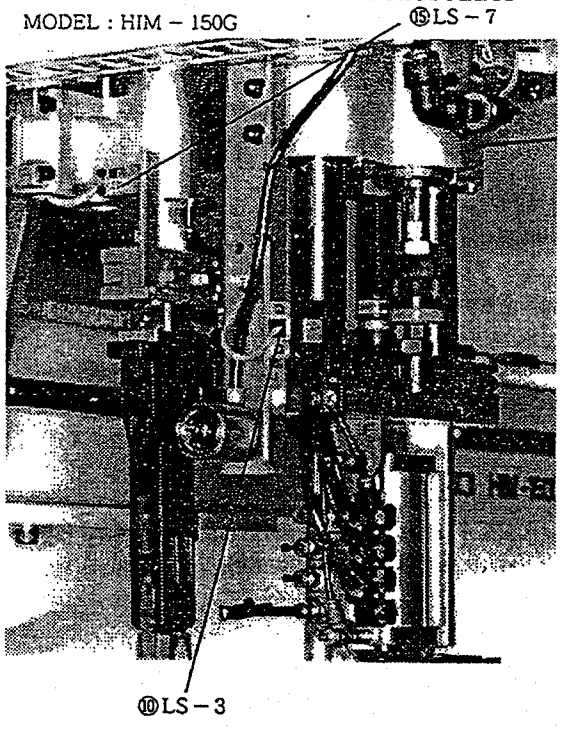


MODEL : HIM – 200GK



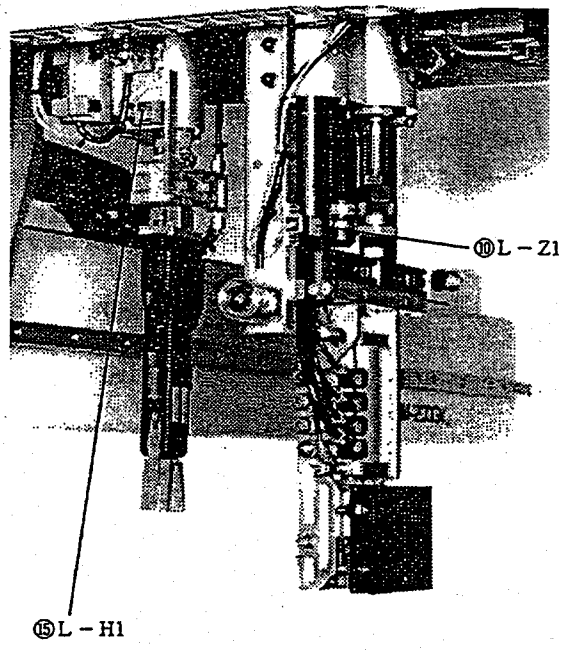
◆ PC-II-IM controller

MODEL : HIM – 150G

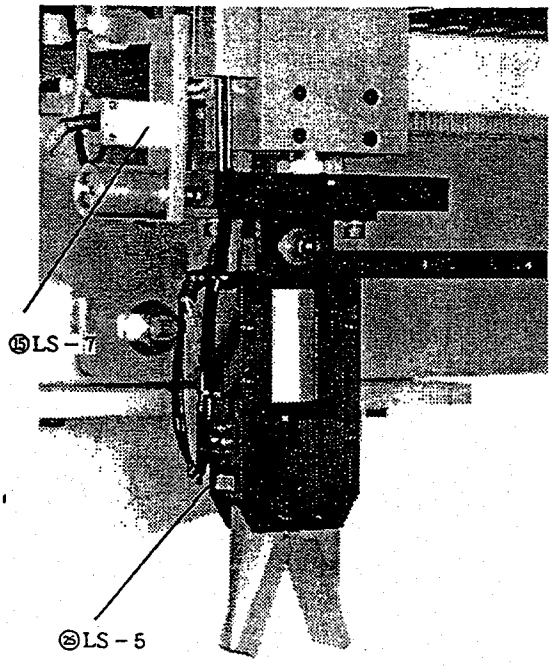


◆ KG-101 controller

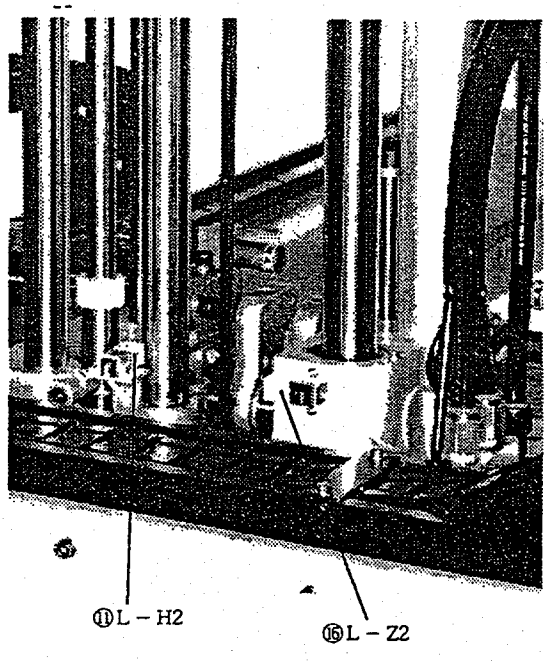
MODEL : HIM – 200GK



MODEL : HIM – 400GW



MODEL : HIM – 200GK



*NOTE : SPRUE GRIP VERIFICATION (LS-5),[L-G4]

Adjustment of sprue verification switch position
(For the models except HIM-150/200 W)

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.

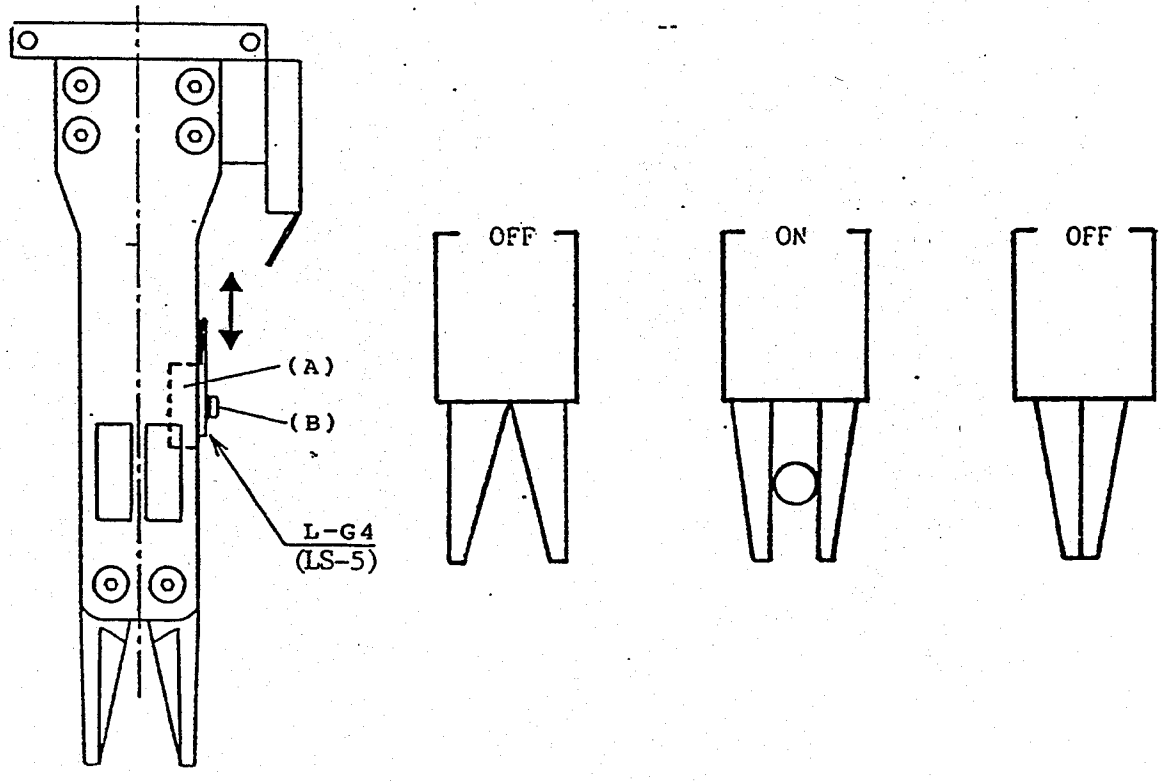
Adjust the switch position as follows.

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. ADJUSTMENT OF SUB SPRUE GRIPPER POSITION

It is possible to adjust the position of the gripper on sub arm to grip the sprue which is located out of center line of the mold.
On the robots HIM-150/200 series, there are three fixing screws fixing the sub arm on the slide unit. Loosen these screws and sub arm can be inclined to left or right.
On the robots HIM-300/400 series, the gripper can slide left and right, and in addition, the gripper can incline left or right with loosening its mounting screw.

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

1. By part verification switch [LS-4],(L-G1)

   The micro limit switch or proximity switch may be mounted on the end of arm tooling to verify that 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 [LS-14],(L-G3)

      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 [LS-5],(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 built-in the gripper. If this switch 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 [VS-1],(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.

M. AIR PRESSURE REGULATORS

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

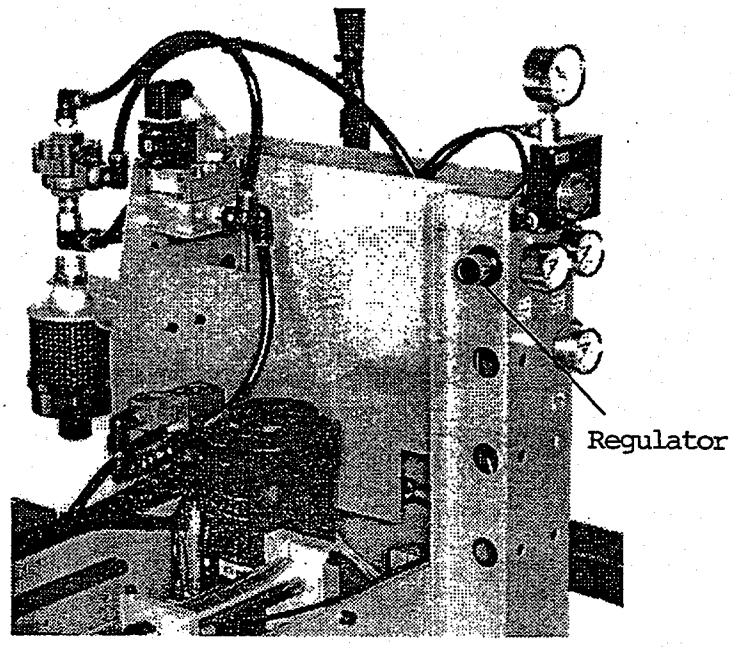
As the knob of the air pressure regulator is rotated clockwise, the pressure of the compressed air supplied to the corresponding solenoid valve increases.

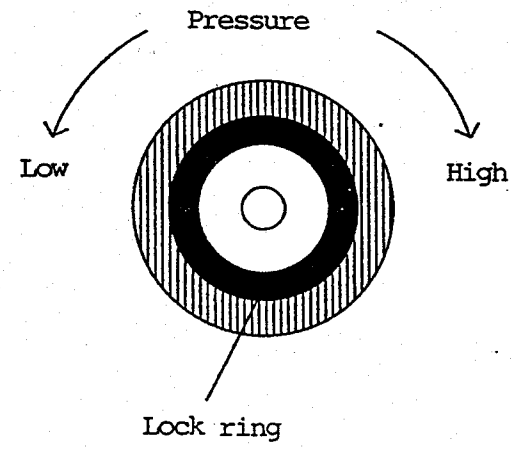
Note that the degree of vacuum suction power cannot be increased by rotating the knob of the air pressure regulator for the vacuum after the degree of vacuum has reached a certain level. **The maximum vacuum power is obtained at 5 kg/cm² of the compressed air pressure.**

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.





N. VACUUM GENERATOR (Venturi air ejector)

1. Specifications

Model	: KEA-60M
Nozzle hole diameter	: 1.5 mm
Max. vacuum pressure	: 650 mmHg or more
Max. flow rate of vacuum	: 55 ℓ/min or more
Compressed air consumption	: 100 ℓ/min or under
Compressed air pressure	: 5 kg/cm²
Fluid	: Air
Operating temperature	: 0 to 50° C (Free from condensation)
Oil supply	: No need
Working air pressure range	: 0 to 6 kg/cm²
Filter rating	: 30 μ

2. Maintenance

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

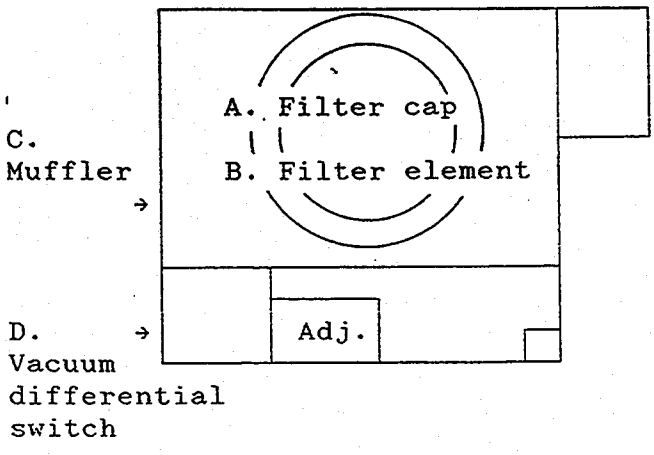
b. Filter cap
Clean the filter cap without using an organic solvent.

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.

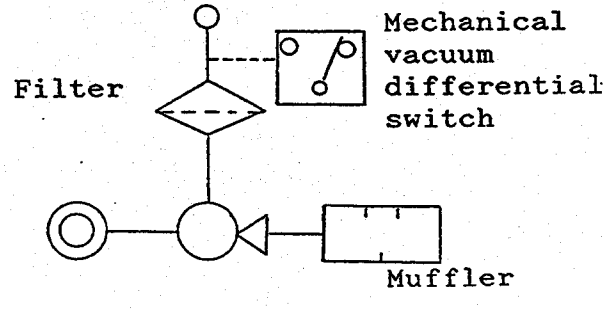
3. Vacuum differential switch

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

VACUUM GENERATOR



Block diagram



Switch specifications

Vacuum pressure range	:	150 to 550 mmHg
Differential pressure	:	80 to 120 mmHg
Contacts (color of leads)	:	Normally open contact and common lines (black & white)
Working air press. range	:	2 to 6 kg/cm^2
Electrical rating	:	125VAC / 5A or 250VAC / 3A

4. Vacuum sensitivity adjustment

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

   b. Actuate the vacuum valve manually.

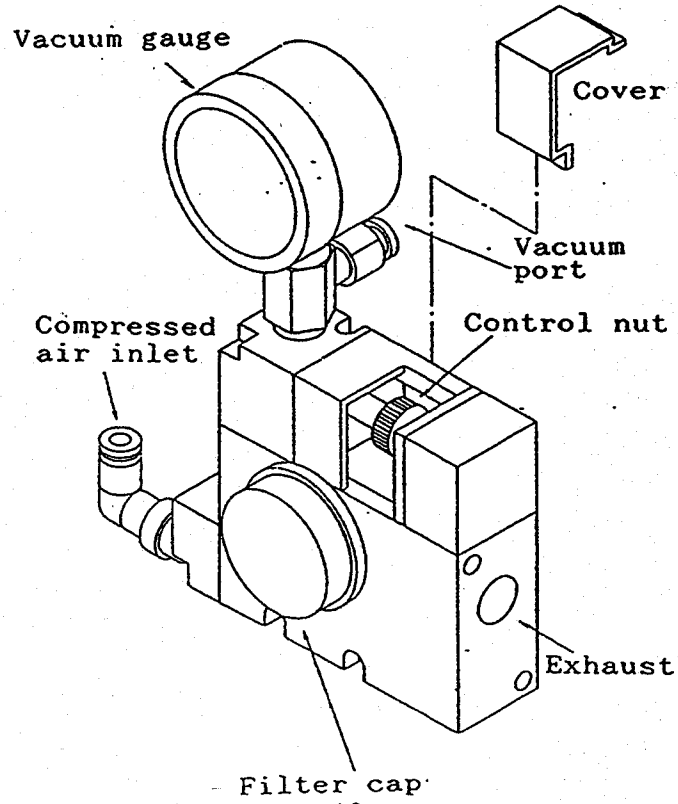
   c. Attach the all molded parts to the suction pads on the End Of Arm Tooling.

   d. On I/O status indication on the handy console of KG-101 or the LEDs of PC-II·IM controller, confirm that the vacuum verification is ON with holding the parts.

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

   f. Attach the removed part again and confirm that the switch goes ON again.

   g. Put the cover for control nut.



O. EXHAUST CLEANER

1. Functions

The exhaust cleaner has two functions as a silencer and oil separator which separates oil particle from oil mist. The exhaust cleaner is attached to the exhaust port of the solenoid valves to maintain better working conditions. The big exhaust cleaner is used for the main arm cylinder, and small exhaust cleaner is used for the other cylinders and optional air circuit.

2. Specifications

Items	Model FA531-20A	FA431-15A
Connection aperture (PT)	3/4	1/2
Max. filtering flow rate (Nℓ/min)	1000	600
Silencer efficiency	35 dB or more	35 dB or more
Oil separation efficiency	99.9 % or more	99.9 % or more
Max. operating temperature	65° C	65° C
Effective sectional area (mm^2)	55	33
Weight (kg)	0.4	0.3

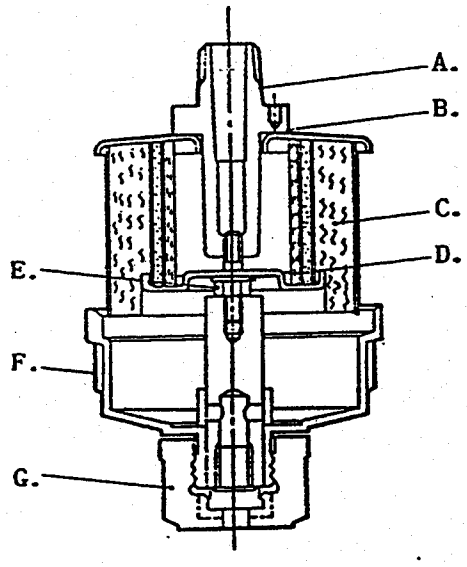
3. Filtration principle

When the oil mist, exhaust air containing oil particle gets into the exhaust cleaner, the oil mist diffuses by Brouwnian motion, the oil particles contained in the oil mist are thus caught by the cotton core or glass filters. The caught oil particles cohere and are carried to the coarse separation layer along the high wettability fiber texture. The oil drop runs down along the thread of the course separation layer to the oil case. On the other hand, the spread of air exhaust noise from solenoid valves is suppressed by the filter elements permits the oil mist to flow restrictively and the velocity of oil mist passing though the larger than the exhaust aperture.

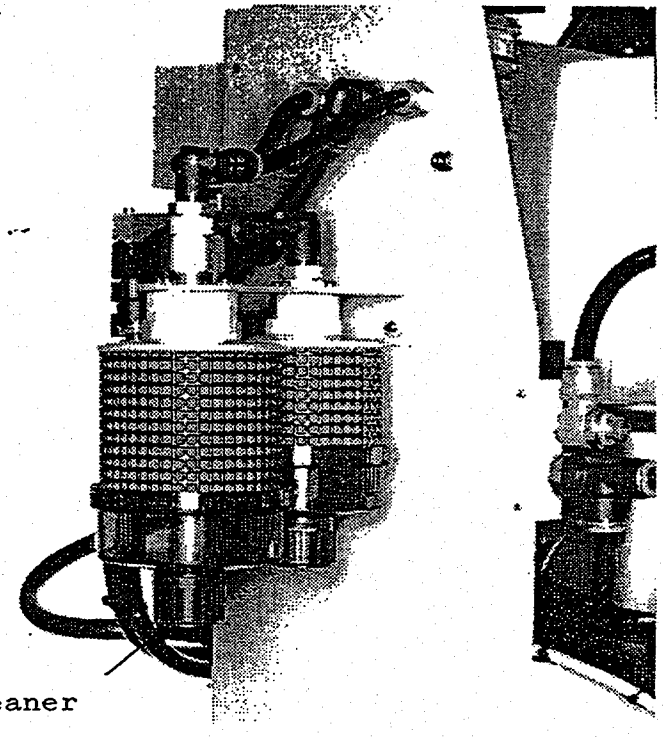
4. Cleaning exhaust cleaner

a. Rotate the drain cock counterclockwise to discharge oil. Be sure to rotate the drain cock clockwise as far as it goes after discharging drain.
b. When cleaning the exhaust cleaner, rotate the drain cock counterclockwise, then rotate the oil case counterclockwise to remove the oil case from the exhaust cleaner.
c. Wash the oil case with neutral detergent. Never use organic solvent such as thinner, alcohol, etc. because they erode the oil case.
d. Be sure to completely wipe water from the oil case by using soft cloth or dry the oil case after washing it.
e. Attach the oil case reversing the above procedures in (a).

Exhaust air from
solenoid valves



A : Adopter
B : Seal
C : Filter element
D : Gasket
E : Nut
F : Oil container
G : Drain cock



Exhaust cleaner

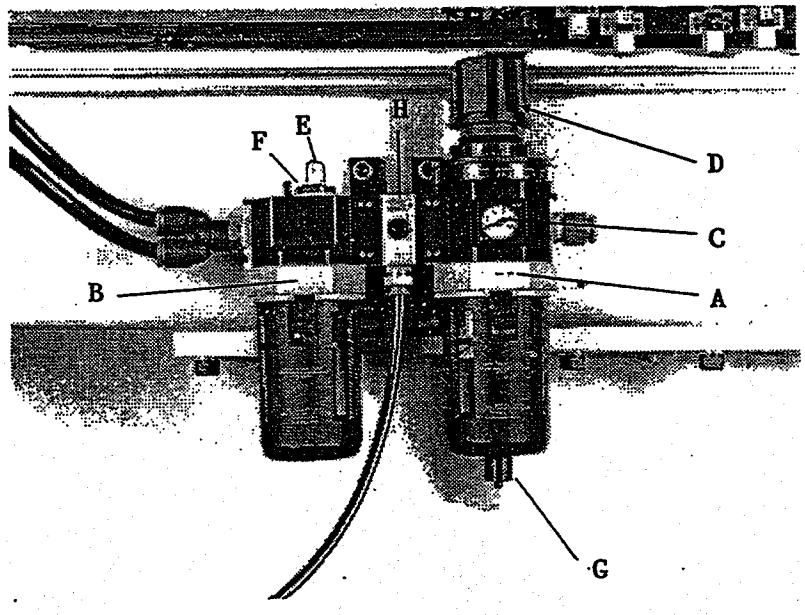
P. F-R-L UNIT

1. Construction

   The HIM series robot is equipped with an F-R-L unit consisting of FR unit, Lubricator , distributor and pressure gauge manufactured by CKD Corp.

2. Components

   A : Filter regulator
   B : Lubricator
   C : Pressure gauge
   D : Adjusting knob (Pressure regulator)
   E : Sight dome
   F : Adjusting knob (Lubrication)
   G : Drain cock
   H : Distributor



3. Pressure adjustment

   a. Pull up (unlock) the adjusting knob (D), then rotate adjusting knob clockwise to increase the secondary pressure or counterclockwise to decrease the secondary pressure.
   b. Lock the adjusting knob by pressing down the knob.

   CAUTION: The pressure of the compressed air supplied to the F-R-L unit should be max. 9.5 kg/cm² or less. Working pressure of robot should be 6 to 6.5 kg/cm².

4. Drain discharge

Filter regulator (A) includes the floating type auto drain device which discharges the drain automatically when the drain reaches a certain level. The drain may be manually discharged by rotating the drain knob counterclockwise. If the drain is not automatically discharged or if foreign matter is accumulated at the bottom of the bowl, manually discharge the drain.

5. F-R-L unit cleaning precautions

a. Use neutral detergent when cleaning the plastic bowls.
b. Keep the bowls away from paint and organic solvent such as thinner, trichloroethylene, alcohol, carbon tetrachloride, sulphuric acid, nitric acid, phosphate ester based synthetic oil, acetone and chloroform.
c. If the filter element easily gets dirtied, frequently replace it with a new one.

6. Lubrication

a. Use turbine oil #90 to #140.
b. Periodically supply lubricating oil without foreign matter of water to lubricator (B) according to the oil consumption.
c. Reduce the air pressure until it reaches to 0 kg/cm2. Then remove the lubrication bowl.
d. Supply lubricating oil to the bowl until the oil level reaches the upper level arrow shown in the yellow seal attached to the bowl of lubricator.
e. Attach the bowl to lubricator.

7. Oil drip adjustment

a. The number of oil drops increase as adjusting knob (F) is rotated counterclockwise, and vice versa. Position adjusting knob (F) so that <u>one oil drop drips every 10 to 15 robot cycles.</u> Once the ratio of the number of oil drops to the air flow rate has been determined, the ratio is maintained even though the air flow rate changes.

b. If adjusting knob (F) is excessively rotated counterclockwise, or if the O-ring attaches to the adjusting screw is damaged, lubricating oil may leak from the adjusting knob. If it happens, rotate the adjusting knob clockwise until the oil leak stops or check the O-ring for damage.

8. Recommended lubrication oil

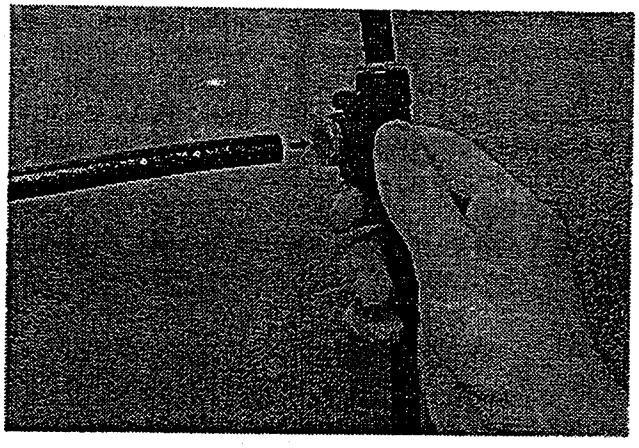
It is recommended to use the following lubricating oil and grease or equivalent for the HARMO robot and the sliding part (cylinder tube inside, cylinder piston, Linear bearing, guide pipe etc.) respectively.

Manufacturer	Lubricating oil	Grease
	Turbine oil No.32 Viscosity; 32 cst.	Lithium grease
Shell	Shell turbo T32	Alvanis grease 1,2,3
Esso	Teresso 32	Beacon 2,3,Q2
Mobil	Mobil DTE oil light	Mobilux 2
General	Turbinol 32	Zemico grease MP-00,0,1,2,3

Q. CONNECTING AND DISCONNECTING OF AIR TUBE

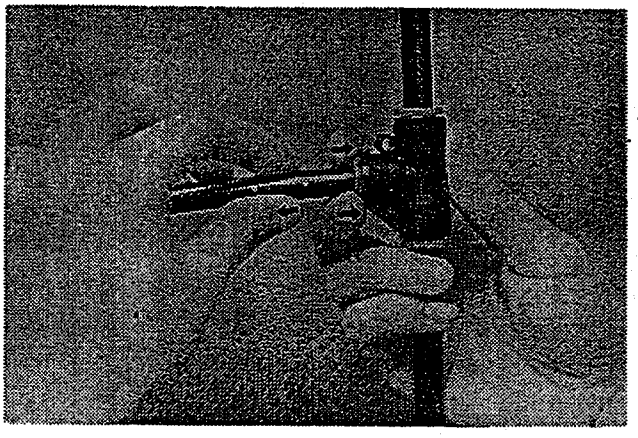
a. Connecting

Push the tube into the joint.



b. Disconnecting

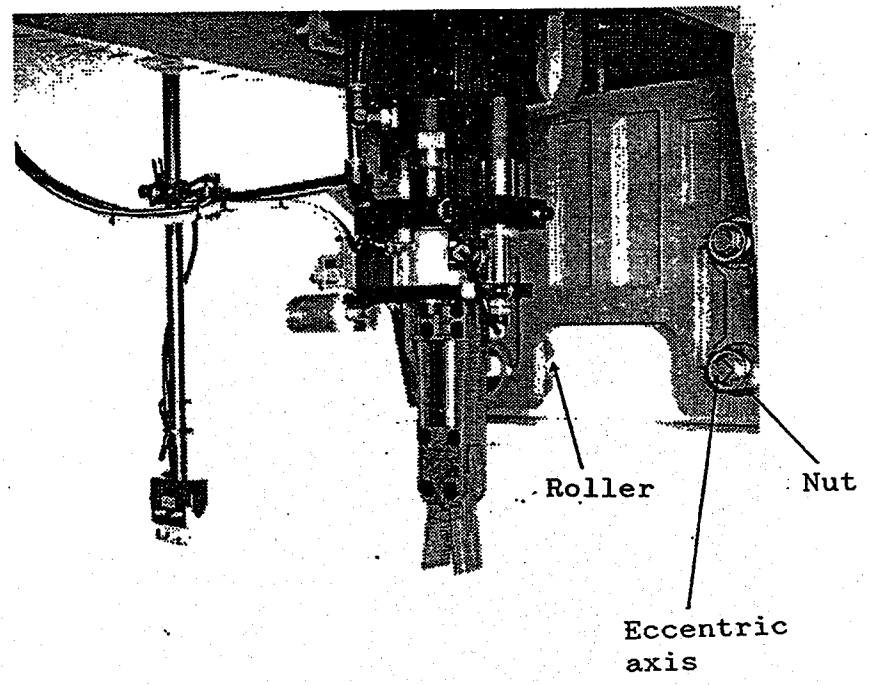
Push the releasing bush in.
Pull out the tube with the bush pushed in.



R. TRAVERSE RAIL AND GUIDE ROLLERS

Even though the guide roller position is fully adjusted at the factory, there is a possibility that a small gap will be exist between guide rollers and traverse rail after long operation of the robot. If it happens, adjust the positions of the two lower adjustable guide rollers in the following manner.

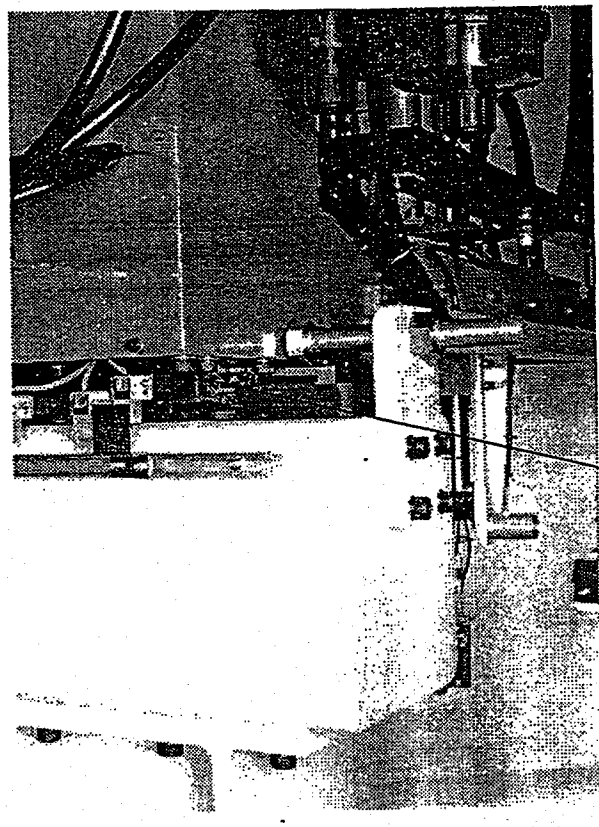
1. Loosen the two hexagon nuts securing the adjustable guide rollers.
2. Rotate the eccentric collars by rotating the roller shaft using an open end wrench to adjust the positions of the adjustable guide rollers.
3. Secure the adjustable guide rollers by tightening the two hexagon nuts.

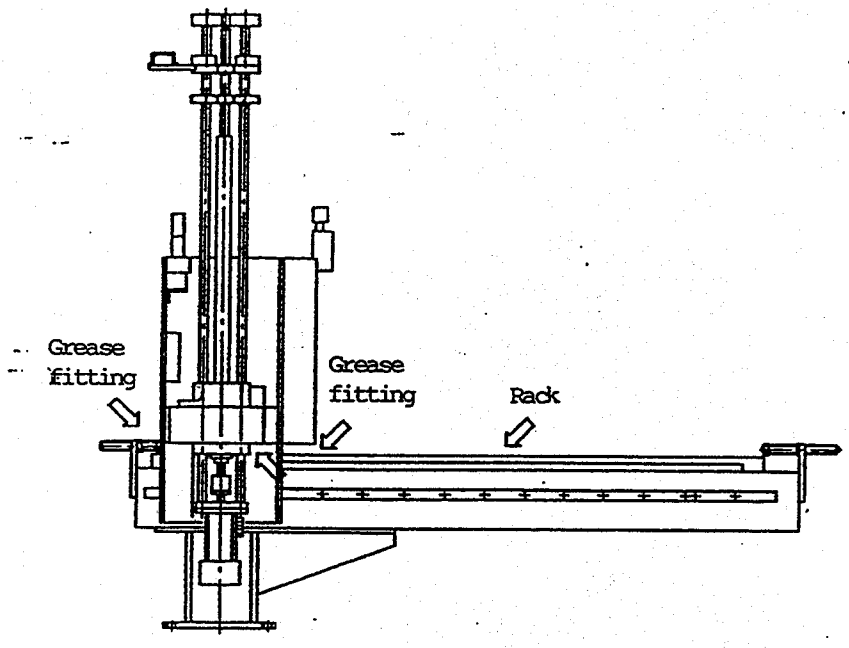


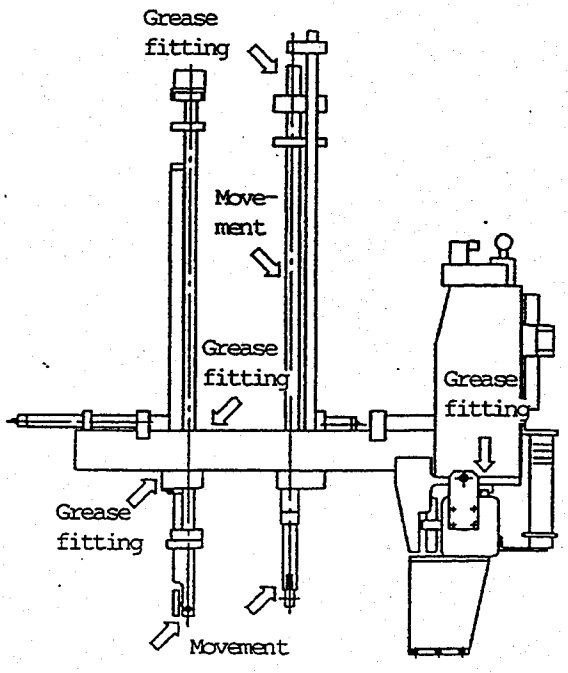
S. GREASING THE LINEAR BEARINGS

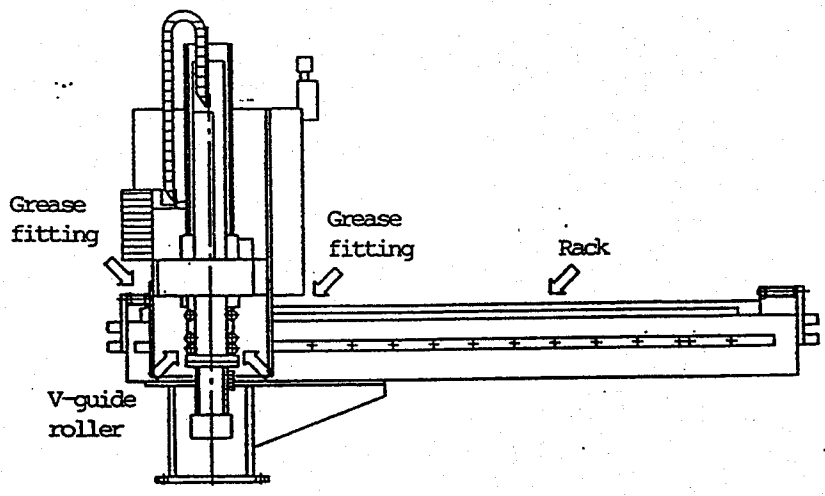
Since the slide unit of the linear bearing includes steel balls, it can be installed without misalignment and deformation which cannot be eliminated in ordinary slideways. This allows high-precision linear motion and excellent rigidity even for a load.

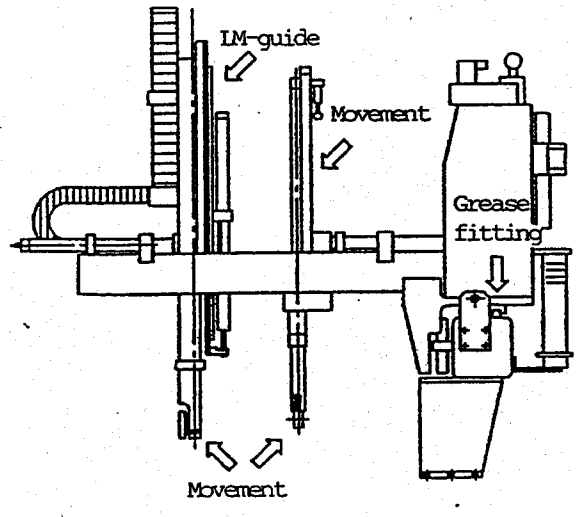
Apply lithium soap grease No.2 to the linear bearings through grease fittings which are pointed with arrow mark shown below after every 100km of travel. -

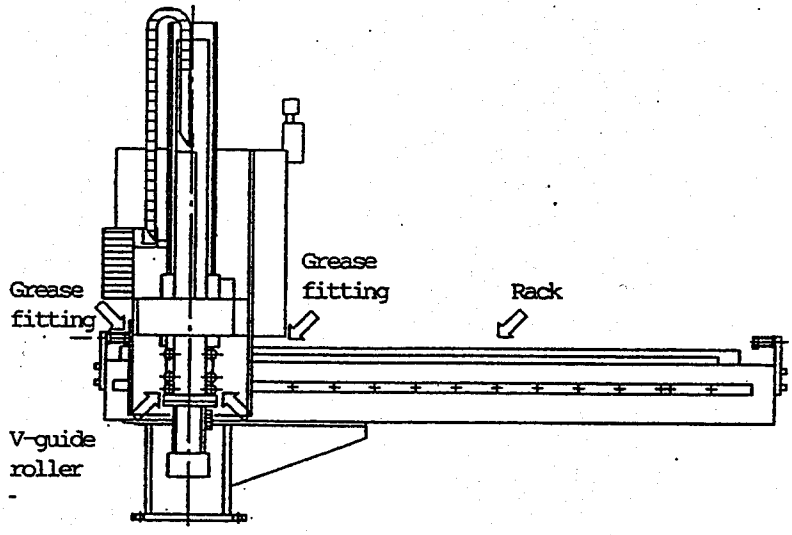


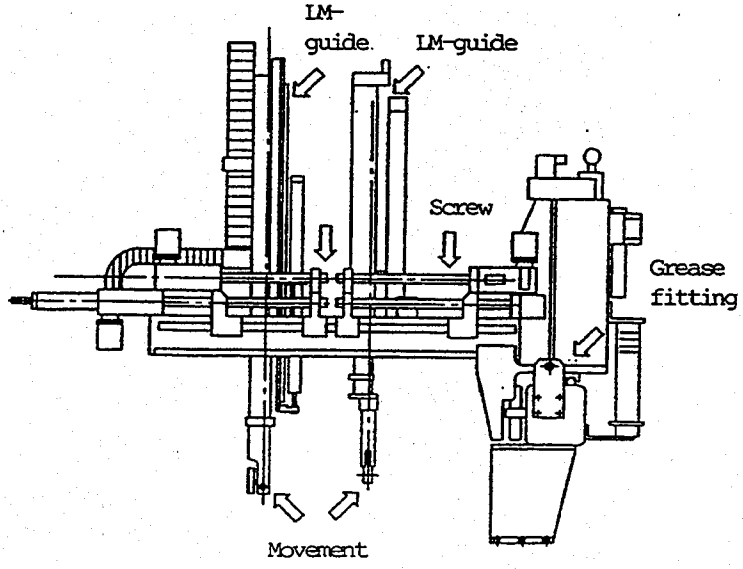

Grease fitting
Grease fitting
Rack


Grease fitting
Move-ment
Grease fitting
Grease fitting
Grease fitting
Movement


Grease fitting
Grease fitting
Rack
V-guide roller


LM-guide
Movement
Grease fitting
Movement


Grease fitting
Grease fitting
Rack
V-guide roller


LM-guide
LM-guide
Screw
Grease fitting
Movement

T. REGISTRATION OF ROBOT APPLICATION FOR EACH MOLD

The robot controller KG-101 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.

Example for the robot with KG-101 controller

ROBOT APPLICATION FORMAT NO. 1 DATE / /

MOLDING HOUSING

ROBOT HIM-200 GK

I.M.M. 200 ton

MODE SETTING — KG CONTROLLER, HARMO CO., LTD.

M01	M02	M03	M04	M05	M06	M07	M08
(c)	(a)	(a)	(b)	(a)	(c)	(a)	(b)
M09	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**
(a)	(a)	(a)	(b)	(a)	(a)	(a)	(a)

TIMER SETTING (sec.)

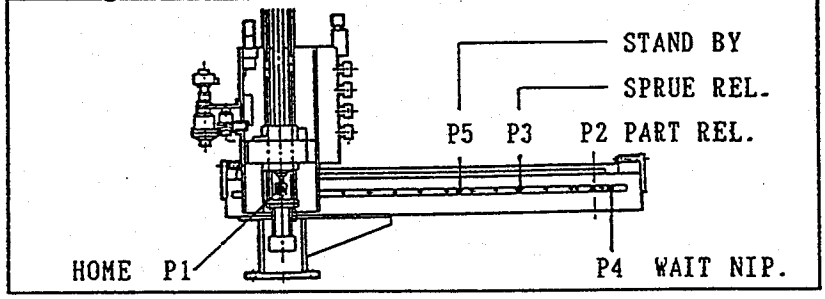
T01	T02	T03	T04	T05	T06	T07	T08
(0)	(0.5)	(0.5)	(0.7)	(0.3)	(0)	(0.5)	(0.5)
T09	**T10**	**T11**	**T12**	**T13**	**T14**	**T15**	**T16**
(0.5)	(0.2)	(0.5)	(0.3)	(0)	(0)	( )	( )
T17	**T18**	**T19**	**T20**	**T21**	**T22**	**T23**	**T24**
( )	( )	( )	( )	( )	( )	( )	( )

MOLDS/INJECTION MOLDING MACHINE

MOLD NO.	NO. 7
OPEN END POS	550 mm
EJECT STROKE	35 mm
INTERVAL TIM	4.5 sec.
OTHERS :	

POSITION (mm) / SPEED SETTING

P1= 0	P2= 1400	P3= 1200	P4=	P5= 1100
V1= 5	V2= 5	V3= 5	V4=	V5= 5

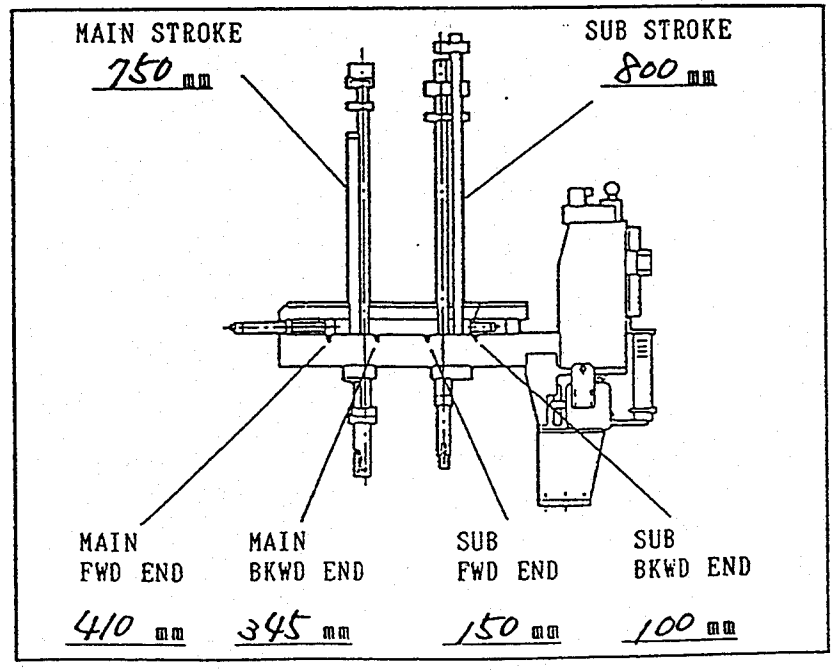


ROBOT

PROGRAM NO.	NO. 2	
TOOLING NO.	NO. 14	
AIR CIRCUIT (✓ IF USED)	PART GRIP	
	M SPRUE GRIP	✓
	VACUUM	✓
	NIPPER	
	OTHERS	

OTHERS : -

STROKE ADJUSTMENT



MULTI ROW PLACING

STOPS :	3 TIMES
PITCH :	50 mm

ROBOT APPLICATION FORMAT NO. DATE / /

MOLDING

ROBOT

I.M.M.

MODE SETTING KG CONTROLLER, HARMO CO., LTD.

M01	M02	M03	M04	M05	M06	M07	M08
( )	( )	( )	( )	( )	( )	( )	( )
M09	M10	M11	M12	M13	M14	M15	M16
( )	( )	( )	( )	( )	( )	( )	( )

MOLDS/INJECTION MOLDING MACHINE

MOLD NO.	NO.
OPEN END POS	mm
EJECT STROKE	mm
INTERVAL TIM	sec.
OTHERS :	

TIMER SETTING (sec.)

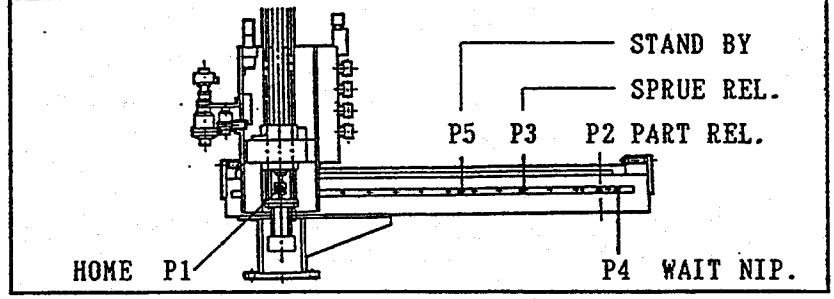
T01	T02	T03	T04	T05	T06	T07	T08
( )	( )	( )	( )	( )	( )	( )	( )
T09	T10	T11	T12	T13	T14	T15	T16
( )	( )	( )	( )	( )	( )	( )	( )
T17	T18	T19	T20	T21	T22	T23	T24
( )	( )	( )	( )	( )	( )	( )	( )

ROBOT

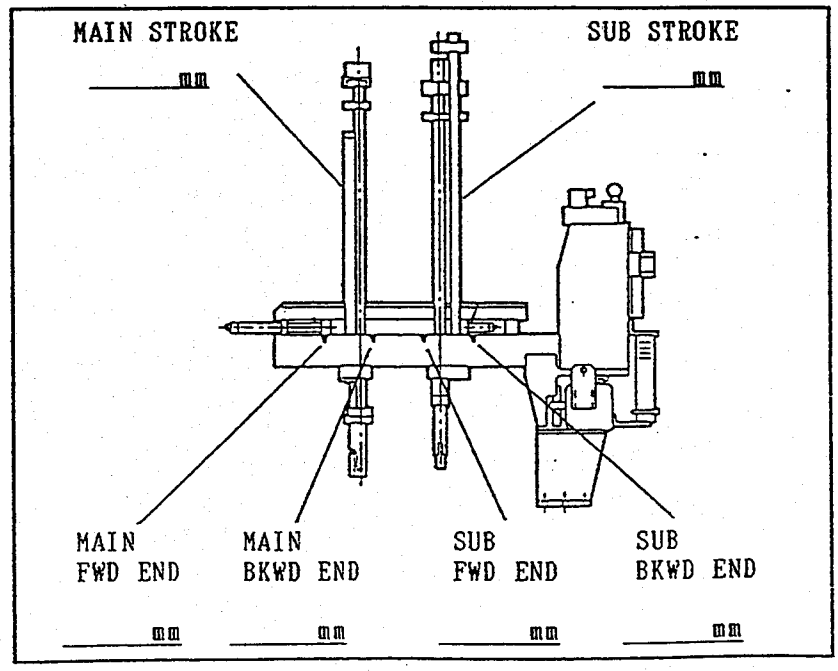
PROGRAM NO.	NO.	
TOOLING NO.	NO.	
AIR CIRCUIT (✓ IF USED)	PART GRIP	
	M SPRUE GRIP	
	VACUUM	
	NIPPER	
	OTHERS	
OTHERS : -		

POSITION (mm) / SPEED SETTING

P1=	P2=	P3=	P4=	P5=
V1=	V2=	V3=	V4=	V5=



STROKE ADJUSTMENT



MULTI ROW PLACING

STOPS :	TIMES
PITCH :	mm

Example for the robot with PC-II.IM controller

ROBOT APPLICATION FORMAT NO. 1 DATE 09/1/93

HARMO CO., LTD.

MOLDING HOUSING

ROBOT HIM-200G

I.M.M. 200 ton

MOLDS/INJECTION MOLDING MACHINE

MOLD NO.	NO. 7
OPEN END POS	550 mm
EJECT STROKE	35 mm
INTERVAL TIM	4.5 sec.
OTHERS :	

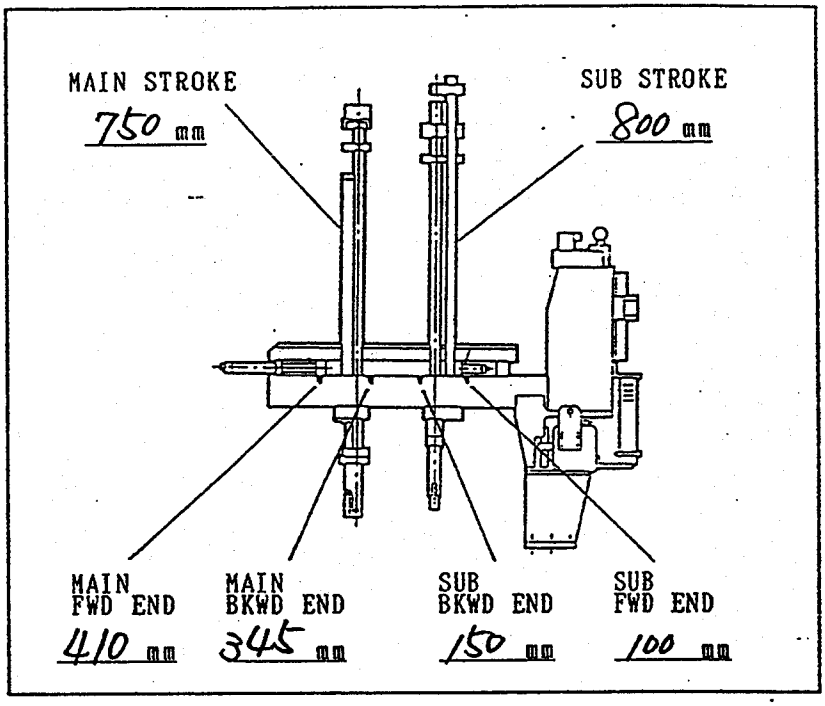
ROBOT

TOOLING NO.	NO. 14	
AIR CIRCUIT (✓ IF USED)	PART GRIP	
	M SPRUE GRIP	✓
	VACUUM	✓
	NIPPER	
	OTHERS	
PART RELEASE	1500 mm	
SPRUE REL.	1000 mm	

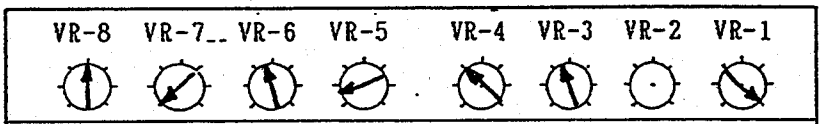
OTHERS :

MOTOR SPEED ADJUSTMENT

STROKE ADJUSTMENT

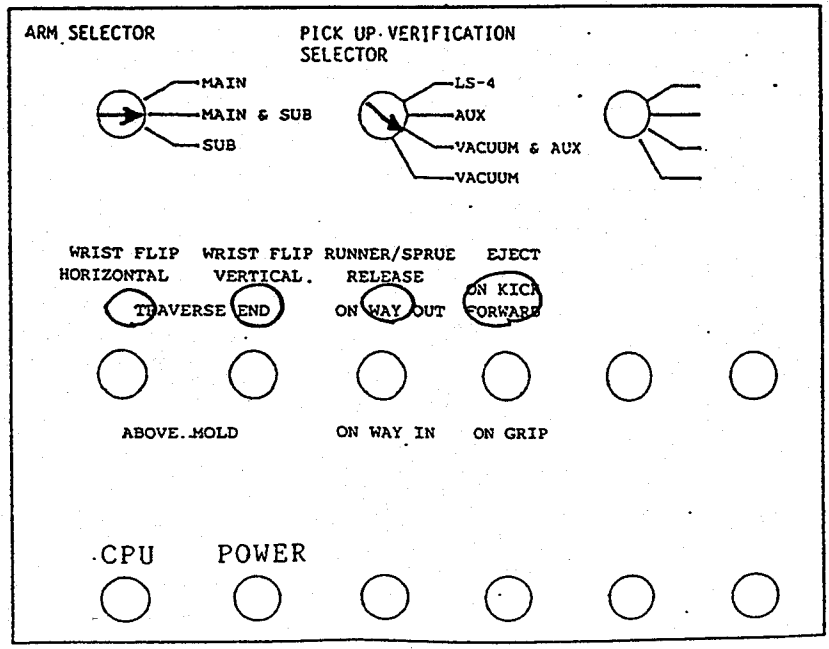


TIMER ADJUSTMENT



VR-5 : STRIP BACKWARD	VR-1 : CYCLE MONITOR
VR-6 : GRIP	VR-2 :
VR-7 : STRIP FORWARD	VR-3 : SECOND ASCENT
VR-8 : NIPPER CUT	VR-4 : GRIP RELEASE

MODE SETTING



ROBOT APPLICATION FORMAT

NO. _____ DATE / /

HARMO CO., LTD.

MOLDING _____

ROBOT _____

I.M.M. _____

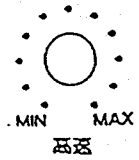
MOLDS/INJECTION MOLDING MACHINE

MOLD NO.	NO.
OPEN END POS	mm
EJECT STROKE	mm
INTERVAL TIM	sec.
OTHERS :	

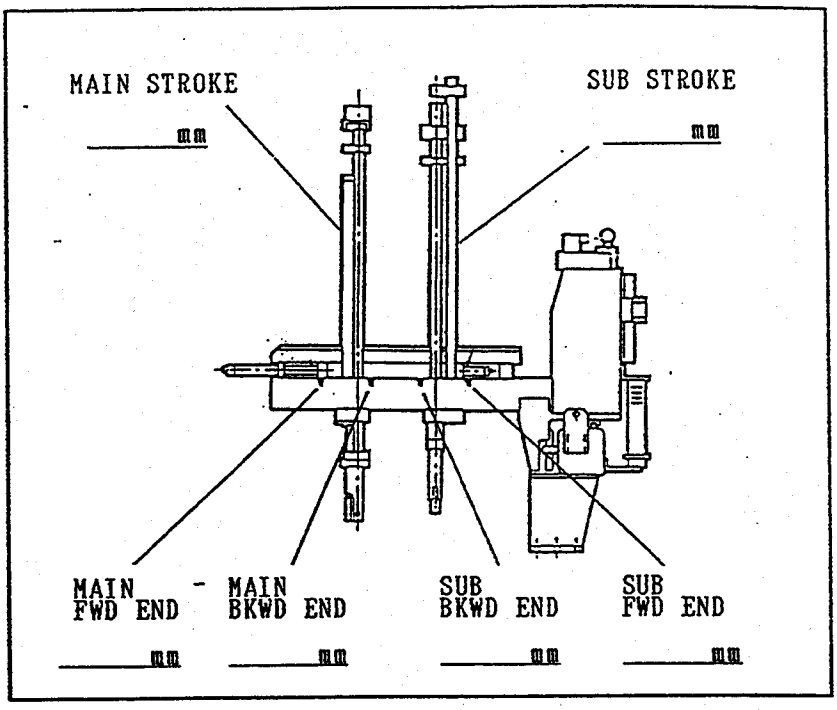
ROBOT

TOOLING NO.	NO.	
AIR CIRCUIT (✓ IF USED)	PART GRIP	
	M SPRUE GRIP	
	VACUUM	
	NIPPER	
	OTHERS	
PART RELEASE	mm	
SPRUE REL.	mm	
OTHERS :		

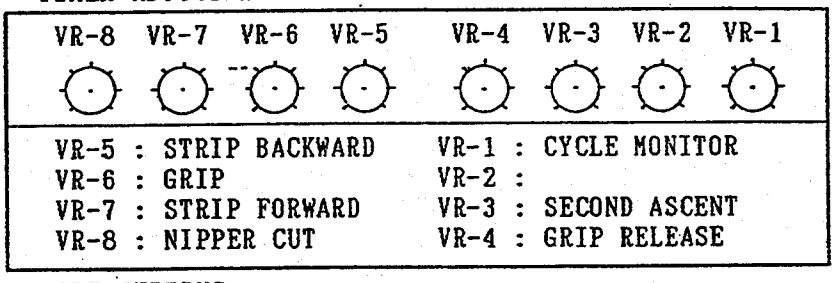
MOTOR SPEED ADJUSTMENT



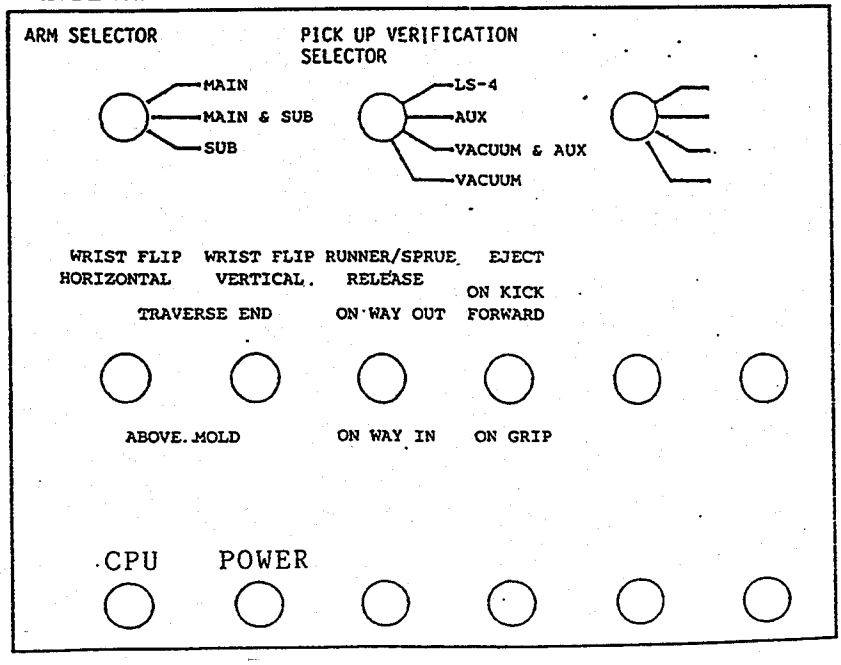
STROKE ADJUSTMENT



TIMER ADJUSTMENT



MODE SETTING



U. TROUBLE SHOOTING GUIDE

Refer to the following trouble shooting guide for the problems.

Problem	Check list	Remedy
Power does not go ON	1 Circuit breaker ON ? 2 Interface cable connected ? 3 Power of press ON ?	1 Turn the breaker ON 2 Connect the cable 3 Check the press
No arm extension/ retraction	1 Mold open end signal 2 Down/up speed control 3 Down/up sol. valve 4 Home condition 5 Emergency stop switch	1 Check relay & wiring 2 Adjust or replace 3 Replace the valve 4 Check home condition 5 Release the switch
No strip forward	1 strip speed control 2 Strip solenoid valve 3 Main down end LS on ?	1 Adjust or replace 2 Replace the valve 3 Check the switch
No grip	1 Gripper position OK ? 2 Air pressure correct? 3 Grip solenoid valve 4 Tube, seal in gripper 5 Molding stuck on mold	1 Adjust the position 2 Adjust air pressure 3 Replace the valve 4 Replace tube or seal 5 Use release agent or Maintain mold
No strip backward	1 Strip speed control 2 Strip solenoid valve	1 Adjust or replace 2 Replace the valve
No part verification	1 Part verification ON? 2 Selection of part verification method	1 Adjust, Replace,check wiring 2 Check setting and correct
Molds do not close	1 Arm in the mold area? 2 Part verification ON? 3 Arm up end switch ON? 4 Down end sw. still on	1 Move arm by manual sw 2 Adjust, Replace,check the wiring 3 Check switch & wiring 4 Check switch & wiring
Molds do not open	1 Arm up end switch ON? 2 Down end sw. still on	1 Check switch & wiring 2 Check switch & wiring
Output is on but No traverse motion	1 Motor speed adjust 2 Strip frame locked by lock cyl. 3 Inverter alarm lamp	1 Readjust 2 Check lock condition 3 Check mechanical load
Motor r.p.m. not increase	1 Variable resister faulty, misconnection short circuit	1 Consult with service engineer

Problem	Check list	Remedy
No traverse slow down (PC-II)	1 LS-12,13 faulty 2 RY12 in controller	1 Check switches 2 Replace the relay
Overruns on traverse (PC-II)	1 Incorrect slow down switch position	1 Correct the positions

V. 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/cm²
Beam type robot ------ 6.0 - 6.5 kg/cm²

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-101/KG-102

   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:

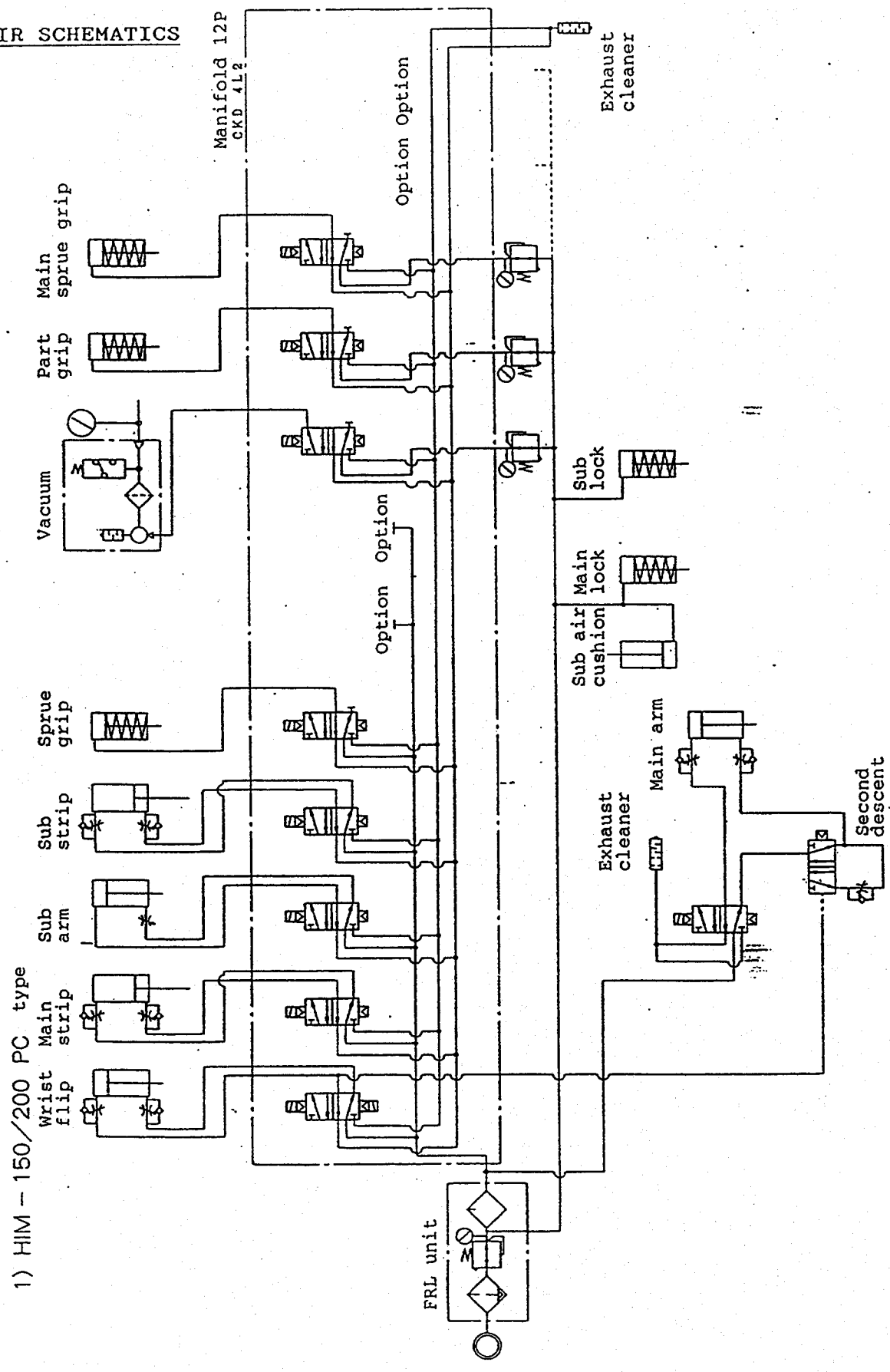
- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the 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.

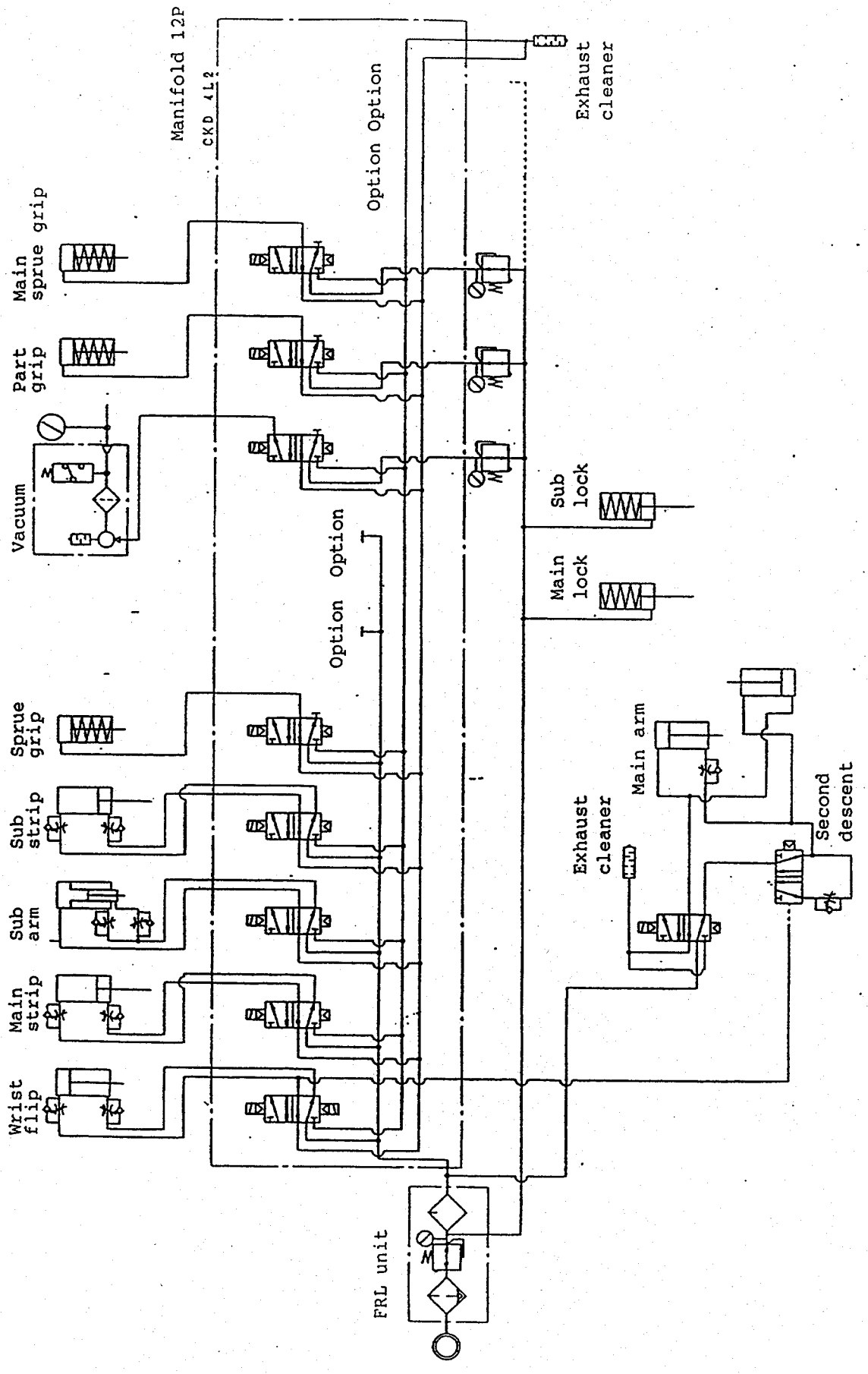
WARRANTY LIMITATIONS

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.

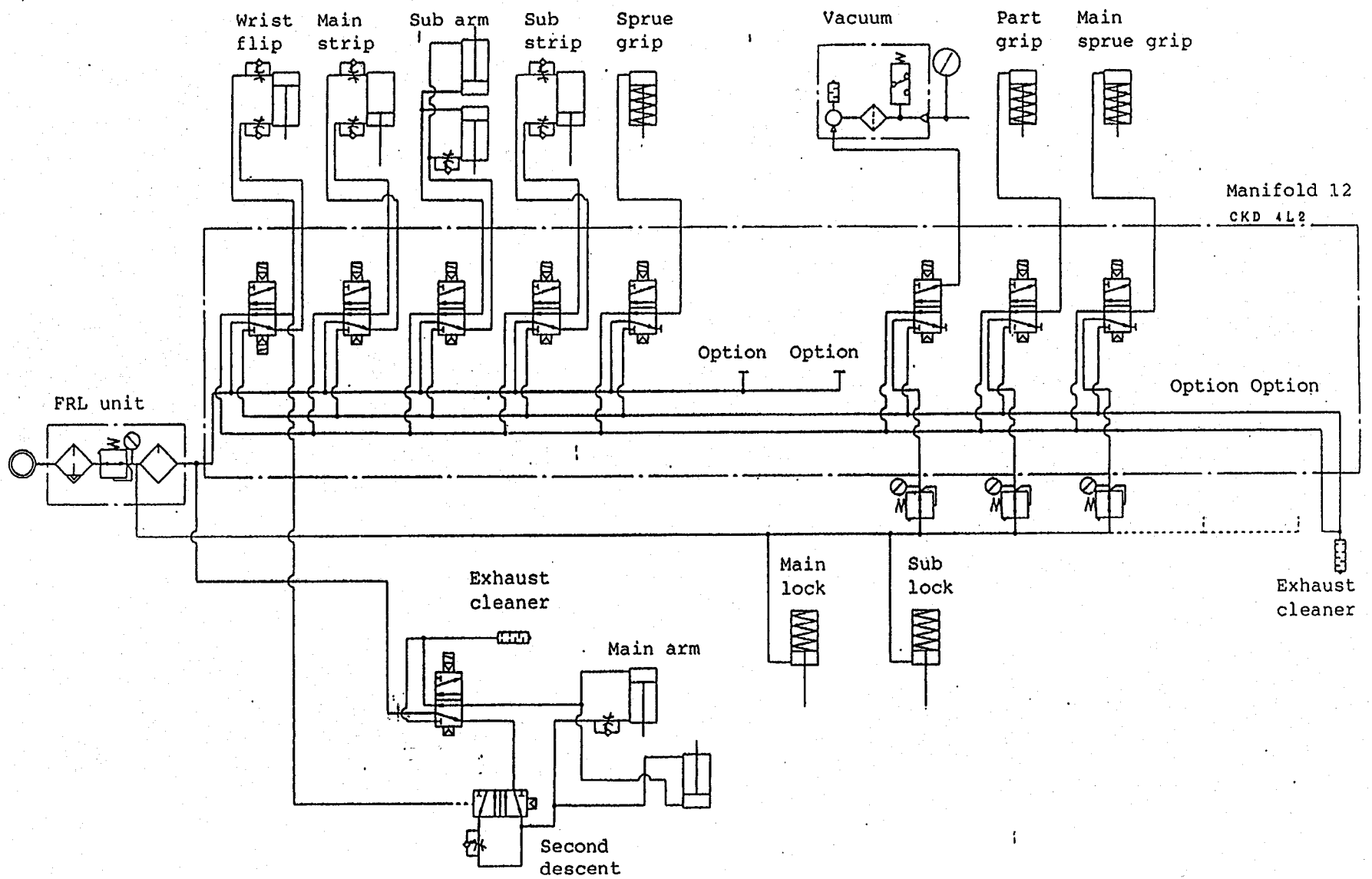
W. AIR SCHEMATICS



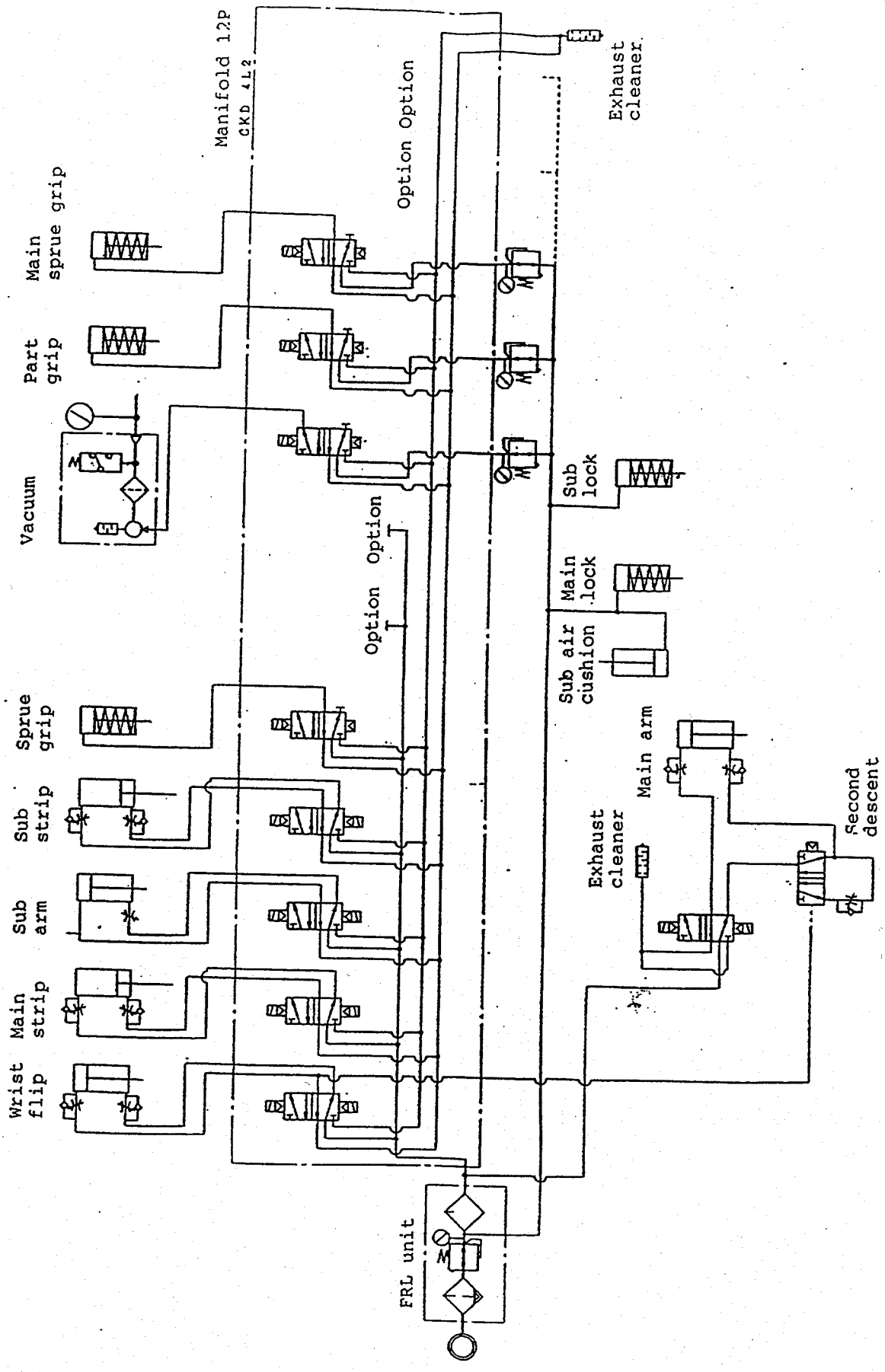
2) HIM – 200W PC_type



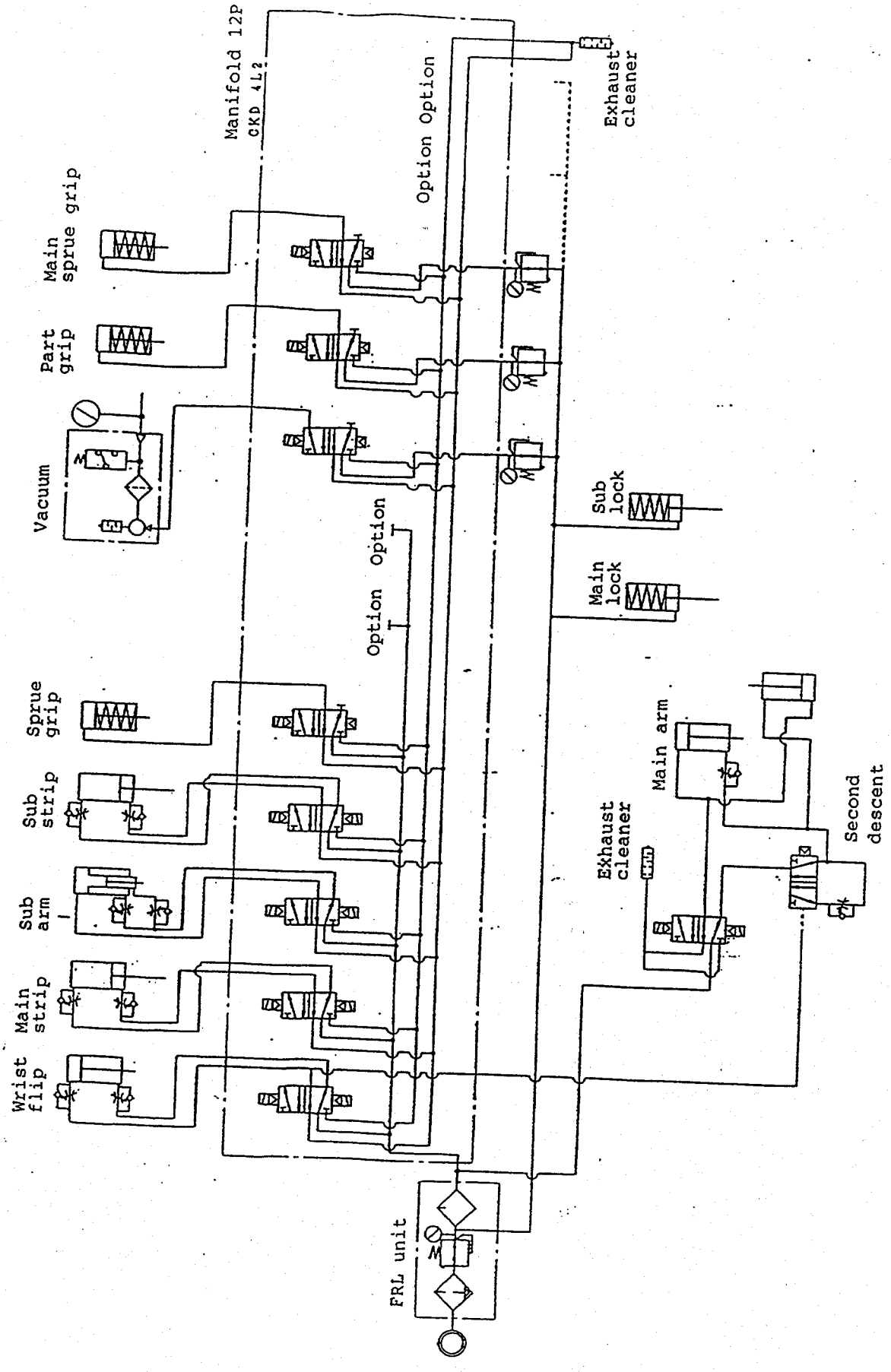
3) HIM – 300W/400W PC type



4) HIM – 150K/200K K type



5) HIM – 200WK K-type



6) HIM – 300WK/400WK K type