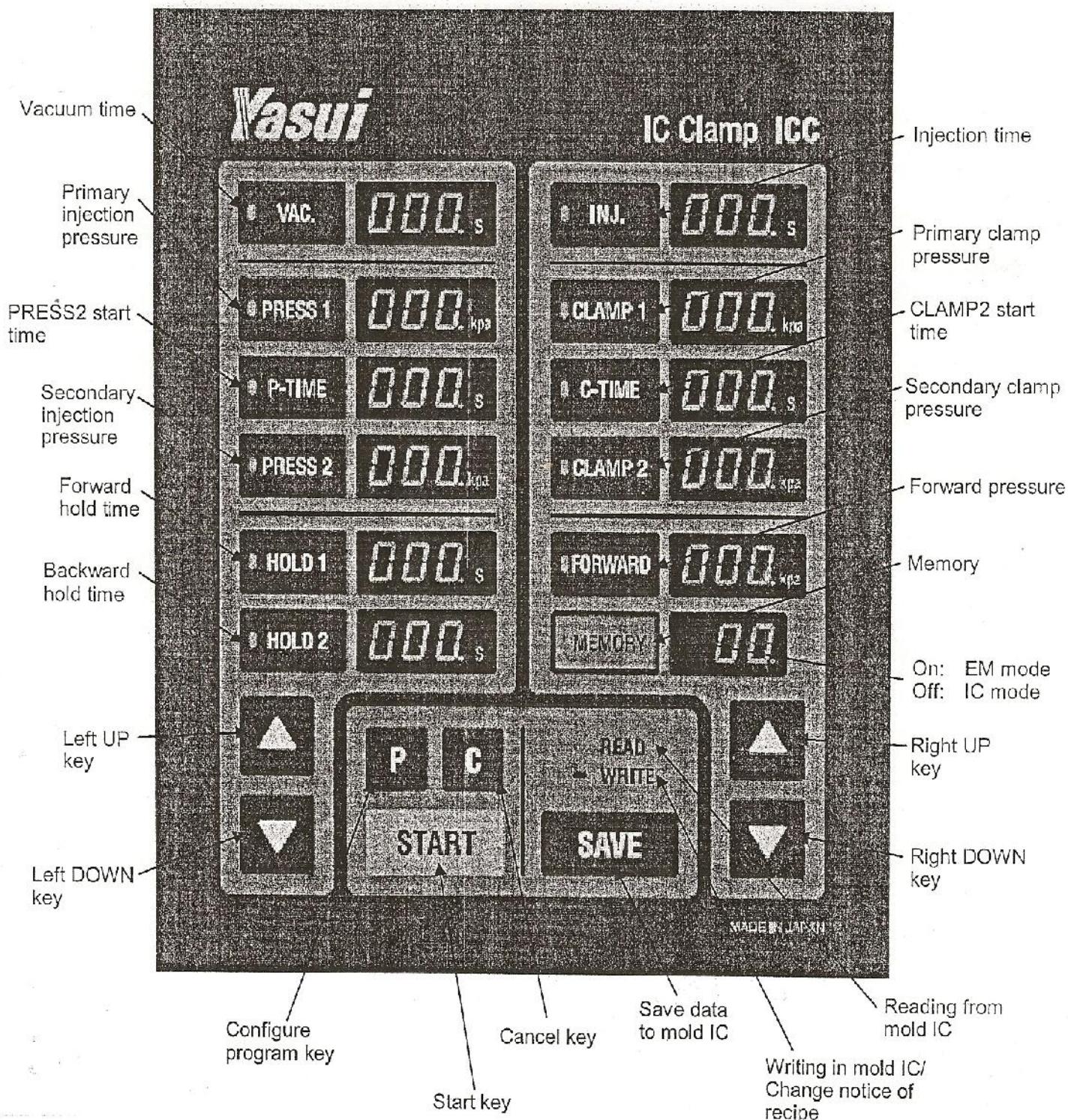


5. OPERATION

5-1. OPERATION PANEL

ROMANOFF
INTERNATIONAL SUPPLY CORPORATION



Romanoff International Supply Corporation
9 Deforest Street
Amityville, NY 11701
USA
www.Romanoff.com

5-2. MENU KEYS

(1) VAC. Vacuum time

Vacuum time of the (Digital) Vacuum Wax Injector.

Set 'VACUUM SEC.' (vacuum time) of the Yasui Digital Vacuum Wax Injector DVWI to 99.9 seconds.

Turn the vacuum timer knob of the Yasui Vacuum Wax Injector to its maximum value graduation.

(2) INJ. Injection time

Injection time of the (Digital) Vacuum Wax Injector.

Set 'INJECTION SEC.' (injection time) of the Yasui Digital Vacuum Wax Injector DVWI to 99.9 seconds.

Turn the injection timer knob of the Yasui Vacuum Wax Injector to its maximum value graduation.

(3) PRESS1 Primary injection pressure

This pressure means injection pressure of wax after the 'START' switch is pressed for automatic operation.

(4) PRESS2, P-TIME Secondary injection pressure and its starting time

After wax injection by primary injection pressure and then after elapse of preset time, pressure for injection is changed and pressurization is performed again by increased or decreased pressure. This is effective to avoid wax shrinkage and fin formation.

<Example 1>

PRESS1	50 (kPa)
P-TIME	0.2 (sec)
PRESS2	100 (kPa)

Wax is injected into the rubber mold by primary injection pressure 50 kPa, and then after 0.2 seconds later pressurization is again started to achieve secondary injection pressure 100 kPa. If secondary injection pressure has been achieved during the injection time, that pressure is maintained.

<Example 2>

PRESS1	70 (kPa)
P-TIME	0.1 (sec)
PRESS2	30 (kPa)

Wax is injected into the rubber mold by primary injection pressure 70 kPa, and then after 0.1 second later pressurization is again started to achieve secondary injection pressure 30 kPa. If secondary injection pressure has been achieved during the injection time, that pressure is maintained.

IMPORTANT:

If you will not perform secondary injection, set 'P-TIME' to 0 (zero). 'P-TIME' and 'PRESS2' windows on the operation panel are set to the state of non-display, and primary injection only will become possible.

(5) CLAMP1 Primary clamp pressure

Pressure of clamping the mold by the clamp unit is set after the 'START' switch is turned on. In the case of mold of large size or hard material, set strong pressure. In the case of mold of small size or soft material, set weak pressure.

(6) CLAMP2, C-TIME Secondary clamp pressure and its starting time

After wax injection by primary clamp and then after elapse of preset time (C-TIME), pressure for clamp is changed and pressurization is performed again by increased or decreased pressure.

<Example 1>

CLAMP1	50 (kPa)
C-TIME	0.2 (sec)
CLAMP2	100 (kPa)

The rubber mold is clamped by primary clamp pressure 50 kPa, and then after 0.2 seconds later pressurization is again started to achieve secondary clamp pressure 100 kPa. If secondary clamp pressure has been achieved during the injection time, that pressure is maintained.

<Example 2>

CLAMP1	70 (kPa)
C-TIME	0.1 (sec)
CLAMP2	30 (kPa)

The rubber mold is clamped by primary clamp pressure 70 kPa, and then after 0.1 seconds later pressurization is again started to achieve secondary clamp pressure 30 kPa. If secondary clamp pressure has been achieved during the injection time, that pressure is maintained.

IMPORTANT:

If you will not perform secondary clamp, set 'C-TIME' to 0 (zero). 'C-TIME' and 'CLAMP2' windows on the operation panel are set to the state of non-display, and primary clamp only will become possible.

(7) HOLD1 Time of clamping the mold at forward position

After finish of injection, the mold is kept clamped for a preset time at forward position (the rubber mold is contacting the nozzle of (Digital) Vacuum Wax Injector). When volume of wax is large and it takes time to harden wax, set this time long.

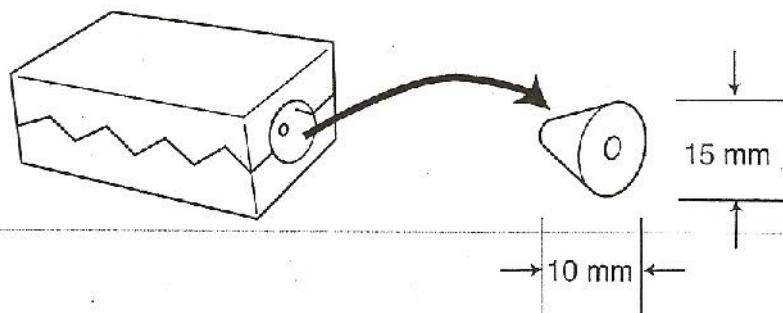
(8) HOLD2 Time of clamping the mold at backward position

After finish of injection, the mold is kept clamped for a preset time at backward position (the rubber mold is retracted from the nozzle of (Digital) Vacuum Wax Injector).

(9) FORWARD Forward pressure of clamp unit

Pressure of forward pressure of mold against the nozzle of the (Digital) Vacuum Wax Injector. Select proper value, so that wax will not leak between the mold and nozzle.

The size described in the below figure is recommended to avoid wax leakage.



(10) MEMORY Memory number

In the case of the IC MODE, the number of Reference Recipes is displayed. In the case of the EM MODE, the number of customer's recipes is displayed.

<SET VALUE NON-DISPLAY FUNCTION >

If one of menu keys (except VAC. and INJ.) is pressed and held for 3 seconds, the set value of the pressed key is set to a non-display state.

If ". . ." is displayed in the value window, its set value is other than 0 and is set to a non-display state.

5-3. 'START' KEY

When you press this key, automatic wax injection starts.

The function of this key is same to that of the start button (blue) on the clamp unit body.

5-4. LEFT SIDE 'UP' 'DOWN' (ARROW) KEYS

These keys are used for changing recipe parameters of the menu items arranged in the left side column.

If the key is pressed and held, parameters change fast.

5-5. RIGHT SIDE 'UP' 'DOWN' (ARROW) KEYS

These keys are used for changing recipe parameters of the menu items arranged in the right side column.

If the key is pressed and held, parameters change fast.

5-6. 'P' PRESET KEY

The IC MODE/EM MODE is changed to the CONFIGURE MODE by pressing this key for more than 3 seconds.

5-7. 'C' CANCEL KEY

Injection is cancelled.

5-8. 'SAVE' KEY

Recipe is saved in the IC tag.

5-9. 'READ' LAMP

The lamp is lit when recipe data in IC tag is recognized.

5-10. 'WRITE' LAMP

The lamp is lit when recipe data is being written in IC tag.

The lamp is flashing, when recipe data is changed in the IC MODE.

6. CONFIGURE MODE

6-1. WHAT IS CONFIGURE MODE

The following operations are possible in the CONFIGURE MODE.

- Version number information
- Switching IC MODE/EM MODE
- Setting display options in IC MODE
- Setting display options in EM MODE
- Setting reference recipe memory in IC MODE
- Initializing Reference Recipe Values in IC MODE
- Initializing Reference Recipe Values in EM MODE
- Releasing air pressure from wax tank
- Measuring balance wax in tank
- Zero-adjustment of pressure sensor
- Write permission in IC tag

6-2. COMMON PROCEDURES IN CONFIGURE MODE

- (1) The IC MODE/EM MODE/ERROR MODE can be switched to the CONFIGURE MODE by the below procedures.

Press the 'P' key for 3 seconds.

--> The pilot lamps of 'P' and 'VAC' keys are lit, and [P00] is displayed in the 'VAC' window.

- (2) Program number can be changed by the below procedures.

Press the left 'UP' or 'DOWN' key.

--> Current CONFIGURE program number is displayed in the 'VAC' window.

- (3) The CONFIGURE MODE can be switched to IC MODE/EM MODE by the below procedures.

Press the 'P' key.

--> [PPP] is displayed in the 'VAC' window.

Then, the pilot lamp of 'P' key is turned off and the switched mode is displayed.

6-3. VERSION NUMBER INFORMATION [P00]

Set the display of 'VAC' window to [P00] by the left 'UP' or 'DOWN' key.

--> Version number is displayed in the 'INJ' window.

6-4. SWITCHING IC MODE / EM MODE [P01]

For details of the IC MODE and EM MODE, see the Chapters "7. IC MODE" and "8. EM MODE".

- (1) Set the display of 'VAC' window to [P01] by the left 'UP' or 'DOWN' key.

--> Current mode is displayed in the 'INJ' window, and its pilot lamp is lit.

IC MODE: [I]

EM MODE: [E]

- (2) Press the right 'UP' or 'DOWN' key.

--> When [I] is displayed in the 'INJ' window, the IC MODE is on.

When [E] is displayed in the 'INJ' window, the EM MODE is on.

6-5. SETTING DISPLAY OPTION IN IC MODE [P02]

- (1) Set the display of 'VAC' window to [P02] by the left 'UP' or 'DOWN' key.

--> Current ON/OFF status of machine priority is displayed in the 'INJ' window, and its pilot lamp is turned on.

Machine priority ON: [on]

Machine priority OFF (IC tag priority ON): [OFF]

- (2) Press the right 'UP' or 'DOWN' key.

--> When [on] is displayed in the 'INJ' window, the machine takes priority.

When [OFF] is displayed in the 'INJ' window, the IC tag takes priority.

- (3) When display of the IC MODE is set to machine priority, display setting of PRESS1 can be changed by the following procedures.

- 1) When [888] is displayed in the 'PRESS1' window, press the 'PRESS1' key.

--> Display in the 'PRESS1' window is turned off, then PRESS1 is set to a non-display state.

- 2) When the 'PRESS1' window is set to a non-display state, press the 'PRESS1' key.

--> Display in the 'PRESS1' window is changed to [888], then PRESS1 is set to a display state.

The above procedures can be applied in the same way to P-TIME, PRESS2, HOLD1, HOLD2, CLAMP1, C-TIME, CLAMP2 and FORWARD.

6-6. SETTING DISPLAY OPTION IN EM MODE [P03]

- (1) Set the display of 'VAC' window to [P03] by the left 'UP' or 'DOWN' key.

- (2) Display setting of PRESS1 can be changed by the following procedures.

- 1) When [888] is displayed in the 'PRESS1' window, press the 'PRESS1' key.

--> Display in the 'PRESS1' window is turned off, then PRESS1 is set to a non-display state.

- 2) When the 'PRESS1' window is set to a non-display state, press the 'PRESS1' key.

--> Indication in the 'PRESS1' window is changed to [888], then PRESS1 is set to a display state.

The above procedures can be applied in the same way to P-TIME, PRESS2, HOLD1, HOLD2, CLAMP1, C-TIME, CLAMP2 and FORWARD.

6-7. SETTING REFERENCE RECIPE MEMORY IN IC MODE [P04]

- (1) Set the display of 'VAC' window to [P04] by the left 'UP' or 'DOWN' key.
 - > Current set value (lower limit) is displayed in the 'INJ' window. Its pilot lamp is lit.
 - > Current set value (upper limit) is displayed in the 'CLAMP1' window.
- (2) Lower limit of reference recipe memory in the IC MODE can be set by the below procedures.
 - 1) Press the 'INJ' key. Its pilot lamp is lit.
 - 2) Change the set value by the right 'UP' or 'DOWN' key.

NOTE: It is not possible to set a value over the current set value of upper limit value of reference recipe memory in the IC MODE (shown in the 'CLAMP1' window).
- (3) Upper limit of reference recipe memory in the IC MODE can be set by the below procedures.
 - 1) Press the 'CLAMP' key. Its pilot lamp is lit.
 - 2) Change the set value by the right 'UP' or 'DOWN' key.

NOTE: It is not possible to set a value less than the current set value of lower limit value of reference recipe memory in the IC MODE (shown in the 'INJ' window).

6-8. INITIALIZING REFERENCE RECIPES IN IC MODE [P05]

- (1) Set the display of 'VAC' window to [P05] by the left 'UP' or 'DOWN' key.
- (2) Reference Recipe values in the IC MODE can be initialized by the below procedures.

Press the right 'UP' key.

 - > [1] is displayed in the 'INJ' window and initialization of Reference Recipe values in the IC MODE is reserved.
 - > Actual initialization is performed when other settings etc. are finished and the 'P' key is finally pressed.
- (3) Initialization of Reference Recipe values in the IC MODE can be cancelled by the below procedures.

Press the right 'DOWN' key.

 - > [0] is displayed in the 'INJ' window and reservation of initialization of Reference Recipe Values in the IC MODE is cancelled.

6-9. INITIALIZING REFERENCE RECIPES IN EM MODE [P06]

- (1) Set the display of 'VAC' window to [P06] by the left 'UP' or 'DOWN' key.
- (2) Reference Recipe Values in the EM MODE can be initialized by the below procedures.

Press the right 'UP' key.

 - > [1] is displayed in the 'INJ' window and initialization of Reference Recipe values in the EM MODE is reserved.
 - > Actual initialization is performed when other settings etc. are finished, and the 'P' key is finally pressed.
- (3) Initialization of Reference Recipe values in the EM MODE can be cancelled by the below procedures.

Press the right 'DOWN' key.

 - > [0] is displayed in the 'INJ' window and reservation of initialization of Reference Recipe values in the EM MODE is cancelled.

6-10. RELEASING AIR PRESSURE FROM WAX TANK [P08]

CAUTION

Always release air before opening the wax tank lid to perform maintenance, cleaning or replenishing of wax.

- (1) Set the display of 'VAC' window to [P08] by the left 'UP' or 'DOWN' key.
- (2) Press the 'START' key.
 - Release of remained air pressure starts. During air release, current tank pressure is displayed in the 'PRESS1' window, current clamp pressure is displayed in the 'CLAMP1' window and current forward pressure is displayed in the 'FORWARD' window.
- (3) When release of air is finished, or when release of air is suspended by pressing the 'C' key;
 - The mode is changed back to the CONFIGURE MODE.

6-11. MEASURING BALANCE WAX IN TANK [P09]

- (1) Set the display of 'VAC' window to [P09] by the left 'UP' or 'DOWN' key.
- (2) Press the 'START' key.
 - Measurement of balance wax in the tank is started automatically as the below 1) to 4). During measurement, current tank pressure is displayed in the 'PRESS1' window.
 - 1) Tank pressure is adjusted to 110kPa.
 - 2) Tank pressure is released.
 - 3) Pressurization to 115 kPa is performed.
 - 4) Balance wax amount (0 to 100%) is calculated based on time required from the above 2) to 3), and is displayed as a percentage in the 'CLAMP 1' window.
- (3) When measurement is finished, or when measurement is suspended by pressing the 'C' key;
 - The mode is changed back to the CONFIGURE MODE.

6-12. ZERO-ADJUSTMENT OF PRESSURE SENSOR

After long time use of the machine, set values of PRESS 1, PRESS 2, CLAMP 1, CLAMP 2 and FORWARD might become deviated slightly. To rectify that deviation, the following "zero-adjustment" is effective.

Follow the below procedures to perform zero-adjustment.

- (1) Air pressure in the wax tank is released.
- (2) Turn off the power switch of control box.
- (3) Set the air supply pressure to 0 (zero.) Remove all the air tubes from port No. 1 to No. 5, so that pressure is not loaded in the machine body.
- (4) While pressing and holding the 'VAC' key, turn on the power switch of control box.
 - [000] is displayed in all windows for 3 seconds. Then, the mode is changed to the IC MODE/EM MODE automatically.
- (5) Turn off the power switch of control box.
- (6) Connect the air tubes which were removed by the above procedure (3), then turn on the power switch of control box.

6-13. ADMINISTRATOR LOCK

In the IC MODE, writing of data in the IC tag becomes possible.

While pressing and holding the 'MEMORY' and 'SAVE' keys simultaneously, turn on the power switch.

--> A beep is sounded when power is turned on.

7. IC MODE

7-1. WHAT IS IC MODE

In this mode, recipe data stored in the IC tag is read out, and wax injection is performed. The following operations are possible in the IC MODE.

- Display of recipe value by IC tag and operation of wax injector.
- Maximum 100 sets of "Reference Recipes" to be used as standard values can be stored, and it is possible to display and edit those recipes.
- Saving Reference Recipe values in the IC tag.

7-2. OPERATING WAX INJECTOR BY RECIPE VALUES IN IC TAG

- (1) Hold the rubber mold over the IC Tag Reader.
 - > Recipe values are displayed.
 - > To change the recipe values, see "7-7. EDITING RECIPE VALUES IN IC TAG".
- (2) Set the rubber mold to the clamp unit.
- (3) Press the 'START' key.
- (4) To suspend the Wax Injector, press the 'C' key. Then, automatic operation is suspended.

7-3. SAVING REFERENCE RECIPE IN IC TAG

- (1) Hold the IC tag, where recipe in the machine is to be saved, over the IC Tag Reader.
- (2) Press the 'MEMORY' key.
 - > The Reference Recipe display screen is shown.
- (3) Recipe number can be changed by the right 'UP' or 'DOWN' key. Recipe number is displayed in the 'MEMORY' window.
- (4) To save the recipe values in the IC tag;
 - > Press the 'SAVE' key for 3 seconds.
 - > The recipe values are saved and a beep is sounded.
 - > After the recipe values have been saved, IC tag reading screen is shown.

7-4. DISPLAYING REFERENCE RECIPE

- (1) To change to the recipe display screen;
 - > Press the 'MEMORY' key. Its pilot lamp is lit.
- (2) To change recipe number of Reference Recipe;
 - > Press the right 'UP' or 'DOWN' key.
 - > Current recipe number is displayed in the 'MEMORY' window.
 - > Selectable recipe numbers depend on the limit setting of "reference recipe memory in IC MODE"(P.23).
- (3) To finish display of Reference Recipe;
 - > Press the 'C' key.
 - > The screen is changed back to the IC tag reading screen.

7-5. EDITING REFERENCE RECIPE VALUES

- (1) To edit Reference Recipe values;
 - 1) Press the 'SAVE' and 'MEMORY' keys simultaneously for 3 seconds in the Reference Recipe display screen.
 - > The pilot lamp of 'MEMORY' key flashes.
 - 2) Press a key that corresponds to the menu item you wish to edit.
 - > The pilot lamp of corresponding key is lit.
 - 3) To edit the items in the left column (VAC, PRESS1, P-TIME, PRESS2, HOLD1, HOLD2);
 - > Press the left 'UP' or 'DOWN' key.To edit the items in the right column (INJ, CLAMP1, C-TIME, CLAMP2, FORWARD);
 - > Press the right 'UP' or 'DOWN' key.
- (2) To change recipe number of Reference Recipe to be edited;
 - > 1) Press the 'MEMORY' key.
 - > 2) Press the right 'UP' or 'DOWN' key.
- (3) To cancel change of recipe values during edit;
 - > Press the 'C' key.
 - > Change of values is cancelled, and former values before change are displayed.

7-6. SAVING REFERENCE RECIPE VALUES

- (1) To save the changed recipe values (to renew Reference Recipe values);
 - > Press the 'SAVE' key for 3 seconds.
 - > Reference Recipe values are renewed by the changed recipe values.
- (2) To return to the recipe display screen;
 - > Press the 'C' key for 3 seconds.
 - > The screen is changed back to the recipe value display screen.
 - > Values not saved are deleted.

7-7. EDITING RECIPE VALUES IN IC TAG

- (1) To edit recipe values in an IC tag;
 - > Hold an IC tag, whose recipe is to be edited, over the IC Tag Reader.
 - > Recipe values are displayed.
- (2) Press a key that corresponds to the menu item you wish to edit.
 - > The pilot lamp of corresponding key is lit.
 - 1) To edit the items in the left column (VAC, PRESS1, P-TIME, PRESS2, HOLD1, HOLD2);
 - > Press the left 'UP' or 'DOWN' key.
 - 2) To edit the items in the right column (INJ, CLAMP1, C-TIME, CLAMP2, FORWARD);
 - > Press the right 'UP' or 'DOWN' key.

7-8. SAVING RECIPE VALUES IN IC TAG

Press the 'SAVE' key for 3 seconds.

- > Recipe values are saved and a beep is sounded.
- > After recipe values are saved, the IC tag reading screen is shown.

7-9. CHECKING INDEPENDENT ACTION OF CLAMP UNIT IN IC MODE

- (1) Independent action of clamp (the platen moves downward)
 - While pressing and holding the CLAMP1 key, press the right 'DOWN' key.
- (2) Independent action of releasing clamp (the platen moves upward)
 - While pressing and holding the CLAMP1 key, press the right 'UP' key.
- (3) Independent action of forward movement of clamp unit
 - While pressing and holding the FORWARD key, press the right 'UP' key.
- (4) Independent action of backward movement of clamp unit
 - While pressing and holding the FORWARD key, press the right 'DOWN' key.

If you press 'START' key after checking clamp and forward actions by the above procedure, wax injection process is immediately started.

8. EM MODE

8-1. WHAT IS EM MODE

This mode is for wax injection using the recipe stored in the built-in control board without using the IC tag.

The following operations are possible in the EM MODE.

- Automatic operation by displayed recipe values (IC tag is not necessary).
- 30 sets of recipes to be used as standard values are stored, and it is possible to display and edit those recipe values.

8-2. TO START AUTOMATIC OPERATION

- (1) Seeing "7-4. DISPLAYING REFERENCE RECIPE", select a recipe to be used.
- (2) Set the rubber mold to the clamp unit.
- (3) Press the 'START' key.
- (4) To suspend automatic operation, press the 'C' key. Automatic operation is suspended.

8-3. DISPLAYING RECIPE MEMORY

To change recipe number;

- > Press the right 'UP' or 'DOWN' key.
- > Current recipe number is displayed in the 'MEMORY' window.

8-4. EDITING RECIPE MEMORY

- (1) To edit recipe values;
 - > Press the key that corresponds to the menu item you wish to edit.
 - > The pilot lamp of corresponding key is lit.
- (2) To edit an item in the left column (VAC, PRESS1, P-TIME, PRESS2, HOLD1, HOLD2);
 - > Press the left 'UP' or 'DOWN' key.
- (3) To edit an item in the right column (INJ, CLAMP1, C-TIME, CLAMP2, FORWARD);
 - > Press the right 'UP' or 'DOWN' key.
- (4) To save the changed recipe values;
 - > Changed recipe values are saved by performing either of the below procedures.
 - The machine is not operated for 5 seconds.
 - The mode is changed to the CONFIGURE MODE.
 - Recipe number of Recipe Memory is changed.
- (5) To cancel all of the changed recipe values;
 - > Press the 'C' key.
 - > If 5 seconds elapsed without operation, changed recipe values are automatically saved and thereafter cancellation becomes impossible.
 - > Recipe values of displayed recipe number will go back to the previous values.

8-5. CHECKING INDEPENDENT ACTION OF CLAMP UNIT IN EM MODE

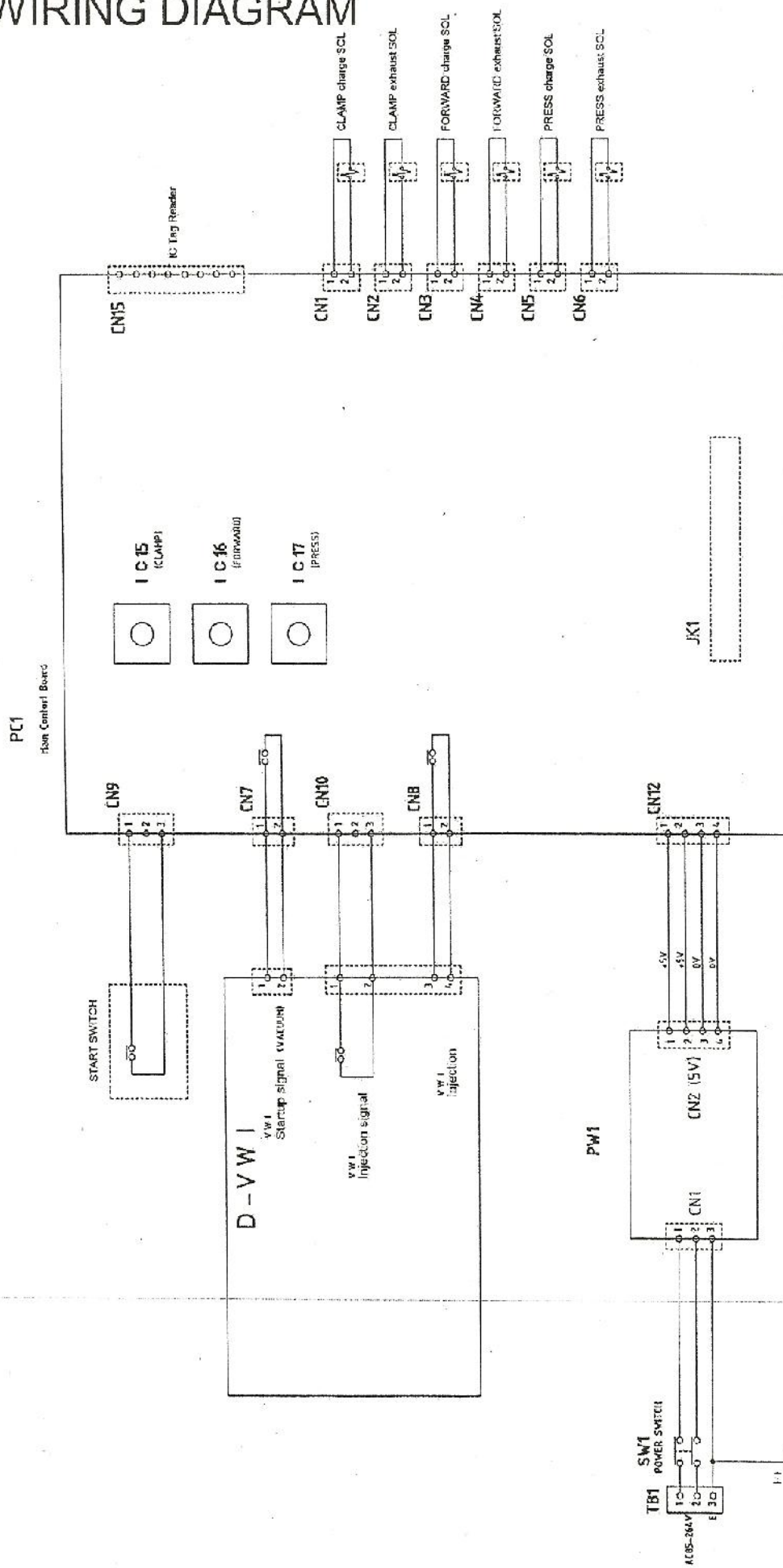
See the Chapter for IC MODE "7-9. CHECKING INDEPENDENT ACTION OF CLAMP UNIT IN IC MODE".

9. ERROR CODE

When a malfunction happens, error code is shown in the 'VAC' window as follows.

Error Code	Error Description
E01	Timeout of PRESS setting has occurred.
E02	Timeout of CLAMP setting has occurred.
E03	Timeout of FORWARD setting has occurred.
E04	The START switch is short-circuited.
E05	P-TIME setting is abnormal. P-TIME is longer than INJ. set time.
E06	C-TIME setting is abnormal. C-TIME is longer than HOLD2 set time.
E07	Timeout of communication with the IC Tag Reader Writer has occurred.
E08	IC tag is not formatted.
E09	The rubber mold for data saving is not set in position.
E10	No write permission in the IC tag.

10. WIRING DIAGRAM



11. SPECIFICATIONS

Power supply AC100-240V, 50/60Hz, single phase

Power consumption 50 VA (max)

Compressed air supply: 0.25 to 0.30 MPa

Pressure sensor display range -5 to +240 kPa

Reference Recipe Memory Number 0 to 99 (IC MODE)

Recipe Memory Number 0 to 29 (EM MODE)

Setting range of recipe

Recipe name	Minimum	Maximum	Increment
VAC	0	0.99	0.01
	1.0	29.9	0.1
	30	99	1
INJ	0	0.99	0.01
	1.0	29.9	0.1
	30	99	1
	100	990	5
PRESS1	10	220	1
P-TIME	0.0	29.9	0.1
	30	99	1
	100	500	5
PRESS2	10	220	1
CLAMP1	10	235	1
C-TIME	0	29.9	0.1
	30	99	1
	100	500	5
CLAMP2	10	235	1
HOLD1	0	300	1
HOLD2	0	300	1
FORWARD	30	235	1