IMO *iSmart*

Operation Manual v1.0

IMO Precision Controls Ltd

Safety Precaution

Precaution for Installation:

Never install the product in an environment beyond the specifications in this manual, such as high temperature, humidity, dust, corrosive gas, vibration, impact condition resulting in the risk of inductive electricity, fire and error in operation.

Please comply exactly with the installation instructions in this user manual, or undesired operation errors and accidents may occur.

Pay close attention to cables and other conductors accidentally falling into the module to avoid fire, operation errors and incorrect switching actions.

Precaution for Wiring:

Connect Class 3 grounding in accordance with the Electricity Engineering Regulations. NO grounding or improper grounding might lead to troubles such as electric shock and error in operation.

Apply the rated power supply and specified cables. The wrong power supply could result in damage to the unit.

Wiring shall be carried out by a certified electrician pursuant to the provisions set forth in the Electricity Engineering Regulations.

Improper wiring would lead to fire, errors in operation and induction electricity.

Precaution for Operation:

When the power is on, never contact the terminal to avert electrical induction.

It is strongly recommended to add safety protections such as an emergency stop and an external interlock circuit to prevent the iSmart from operational errors and mechanical damage.

Run the iSmart after safety confirmation. Operational error may result in mechanical damage or personal harm.

Please pay attention to the power linkage procedure. Wrong process flow would lead to mechanical damage or other hazards.

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Chapter 1 General

iSmart is a tiny intelligent relay / PLC having a 44 I/O point system that uses ladder graphic and FBD programs for application in small-scale automation systems. iSmart can expand up to 3 groups of 4-input-4-output modules. The mobility and supremacy the iSmart is of greatest assistance to the user in considerably saving both time and cost in operation. The special features of iSmart are presented below:

Feature 1

Complete product line:

(1) Dimension for the standard 10/12/20 points

a) 10/12 points variant：72 x 90 x 57.3 (mm)

b) 20 points variant：126 x 90 x57.3 (mm)

(2) Max. 3 group I/O Expansive Module: 38×90×57.3 (mm)

(3) Versatile RTC and analog input (10 bits)

(4) Low price variant without LCD/Keypad and blind variant (without up cover)

Feature 2

Selective input and output

(1) Input: AC 85 – 264V or DC 21.6 – 26.4V

(2) Output: Relay or Transistor

Feature 3

Easy to learn and to operate

(1) Built-in 12 x 4 LCD display and 8 keys for creating ladder programs

(2) Computer Programming Software in Windows 95/98/ME/NT/2000/XP compatible.

(3) Seven languages: English, French, Spanish, Italian, German, Portuguese and Simplified Chinese

Feature 4

Ease installation and maintenance

(1) Screw installation

(2) DIN rail installation

(3) Spare program cartridge SMT-PM04 (optional)

(4) LCD display shows on line input and output in operation

Feature 5

(1) Multiple outputs: Relay output Max. 8A per point with resistive load. Transistor output 0.5A/Point

(2) It can directly drive a 1/3 HP motor.

(3) Sufficient program memory and abundant command instructions

① Max. 200 ladder step instructions

② Many built-in application instructions:

- Timer
- Counter
- Time comparison
- Analog comparison
- Upper and lower differentiation

◎ PWM Function
◎ DATALINK Function
◎ REMOTE I/O Function
◎ HMI Function

(4) Internationally certified by:

① CE mark

② cUL/UL

Chapter 2 Operation Precaution

(1) Installation Environment

IMO recommend that you do not install iSmart in the following conditions:

- In direct sunlight or when the ambient temperature is beyond 0-55 Deg C.
- The relative humidity exceeds 90% or the temperature is subject to rapid change, susceptible to condensation.
- The installation area contains inflammable or corrosive gases

(2) Installation

- Firmly fasten the cable with lock screws to ensure proper contact.

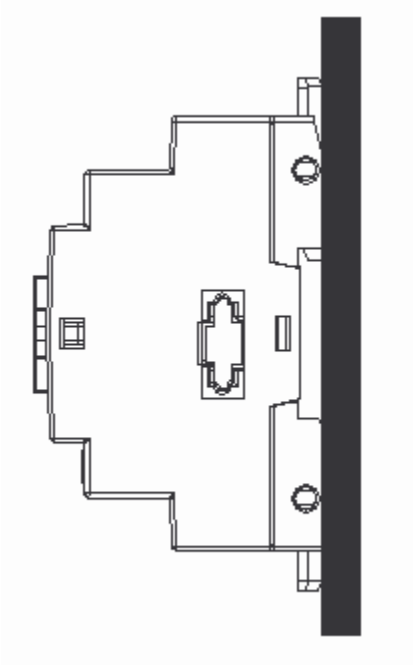


Figure 2.1. Installation drawing

(3) Wiring

- The I/O signal cables should not be routed parallel to the power cable, high current cable or in the same high current cable trays to avoid signal interference and improper switching.

(4) Static Electricity

- In extreme arid areas, the humans' body is susceptible to the generation of static electricity. Avoid touching the **iSmart** with hands your to avoid static damage to the unit.

(5) Cleanness

Use an clean and dry cloth to wipe the surface of the **iSmart**. It is prohibited to clean the **iSmart** with water or a volatile solvent as this prevents structure deformation and discoloration.

(6) Storage

- The time memory of **iSmart** RTC uses a super capacitor which is susceptible to high temperature and humidity. The **iSmart** RTC should be kept away from such conditions.

(7) Over-current Protection

- The **iSmart** does not incorporated a protective fuse at the output terminals. To avoid a short circuit on the load side, it is recommended to wire a fuse between each output terminal and its respective load.

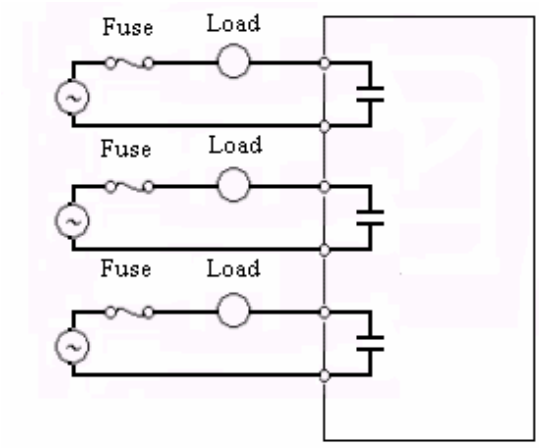
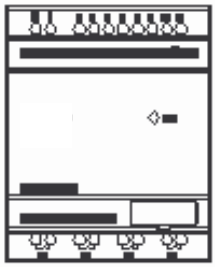
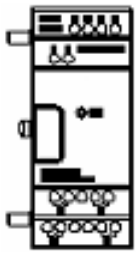


Figure 2.2. Over-current Protection

Chapter 3 System Configuration

3-1 Basic System Configuration

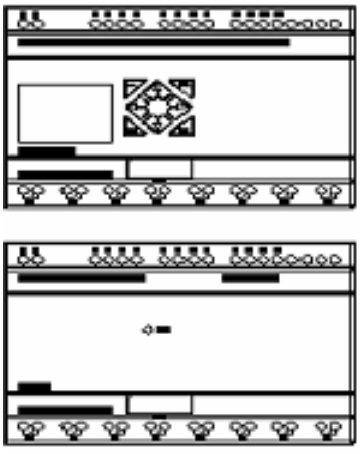




iSmart 10 points：

Expansion variant
- SMT-EA-R10
- SMT-ED-R12
- SMT-ED-T12

Blind variant
- SMT-BA-R10
- SMT-BD-R12
- SMT-BD-T12

iSmart expand 8points：
- SMT-MA-R8
- SMT-MD-R8
- SMT-MD-T8

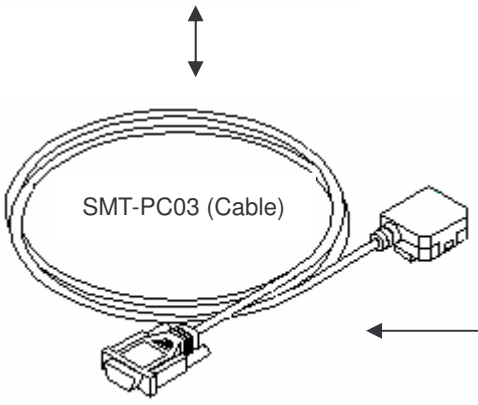


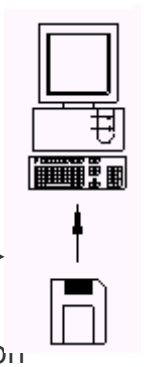
iSmart 20 points：

Blind variant
- SMT-BA-R20
- SMT-BD-R20
- SMT-BD-T20

High-Speed variant
- SMT-CD-R20
- SMT-CD-T20

Expansion variant
- SMT-EA-R20
- SMT-ED-R20
- SMT-ED-T20





Computer

Client software

(SMT-CONFIGURTOR)

Figure 3.1 Basic System Configuration

3-2 Configuration for Computer Connection and Spare Program Cartridge

(1) Link the computer and **iSmart** with the SMT-PC03 cable. Through the SMT-CONFIURATOR (software), the computer is ready to read and write the programs contained in **iSmart** and oversee on line operation in **iSmart**. (See the figure below)

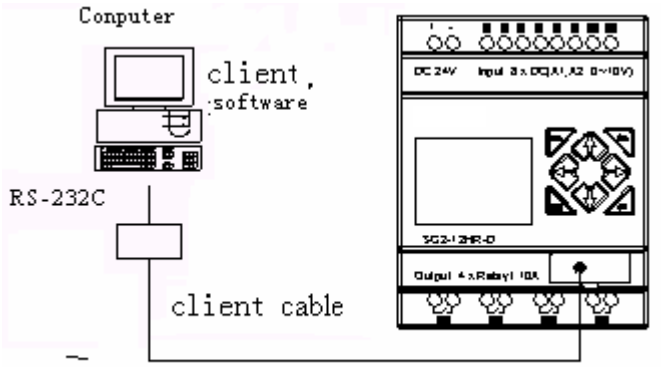


Figure 3.2.1 Computer Connection

(2) Plug SMT-PM04 into the **iSmart** which is able to load and recover the programs from the SMT-PM04 (See the figure below)

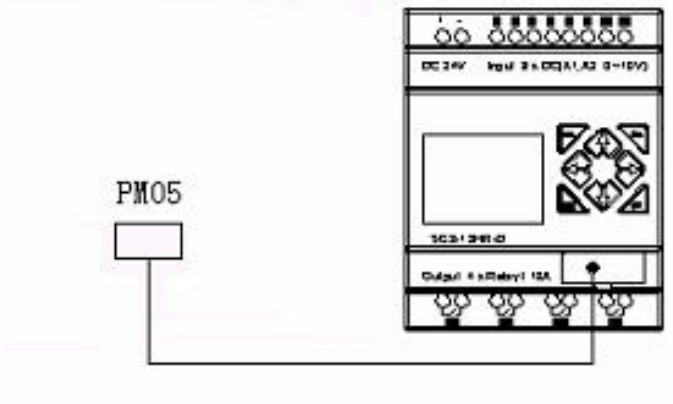


Figure 3.2.2 Spare Program Cartridge Connection

Chapter 4 Installation

4.1 Installation Environment

It is not recommended to install the **iSmart** in the following conditions and environments:

- If the ambient temperature is beyond the 0-55Deg C range.
- If the relative humidity exceeds the 5-90% range.
- Area has excessive dust, salt and/or iron powder.
- Exposure to direct sunlight.
- If the environment is subject to frequent vibration and impact.
- If the area contains corrosive and inflammable gases susceptible to fire.
- If the area has an abundance of volatile oil gas, organic solvents, ammonia or electrolytic gas.
- Poor ventilation or is close to a heating source.

4.2 Direct Installation

Use M4×15mm screw to directly install the **iSmart** on the tray as shown below.

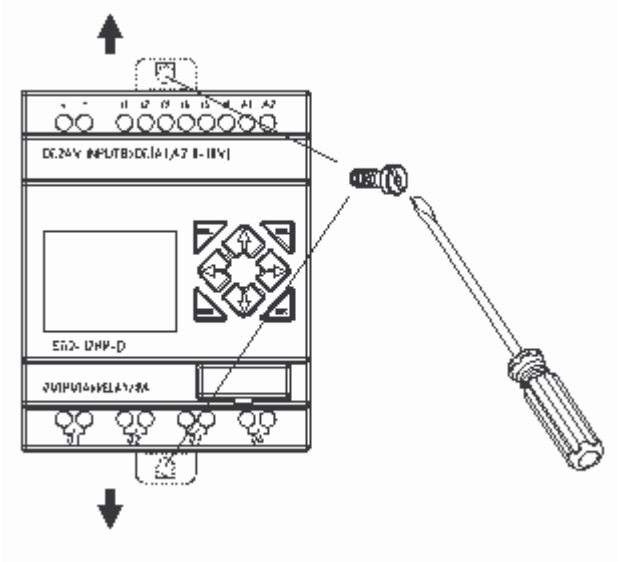


Figure 4.1. Direct Installation

◎ If the expansion module is to be installed, plug the module into the Master after the Master is fixed. Install with M4×15mm Screw. (Operate Action (2) while simultaneously pressing the indicated PRESS-BUTTON)

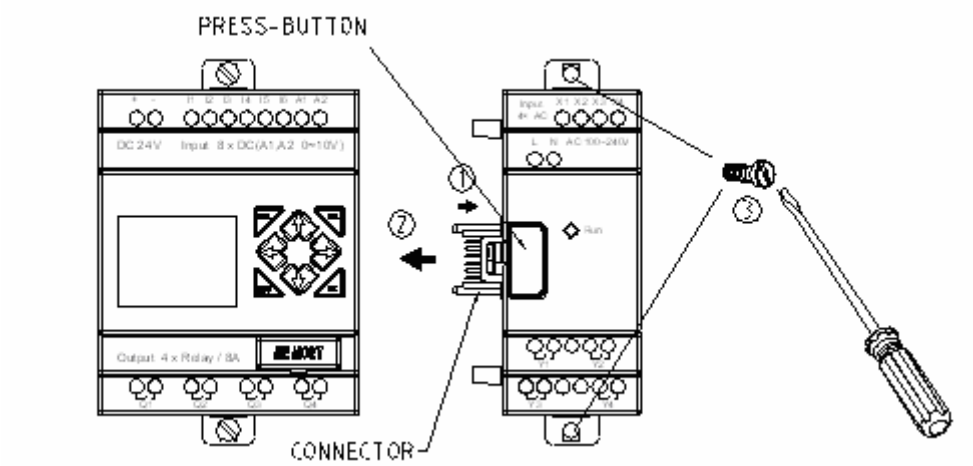
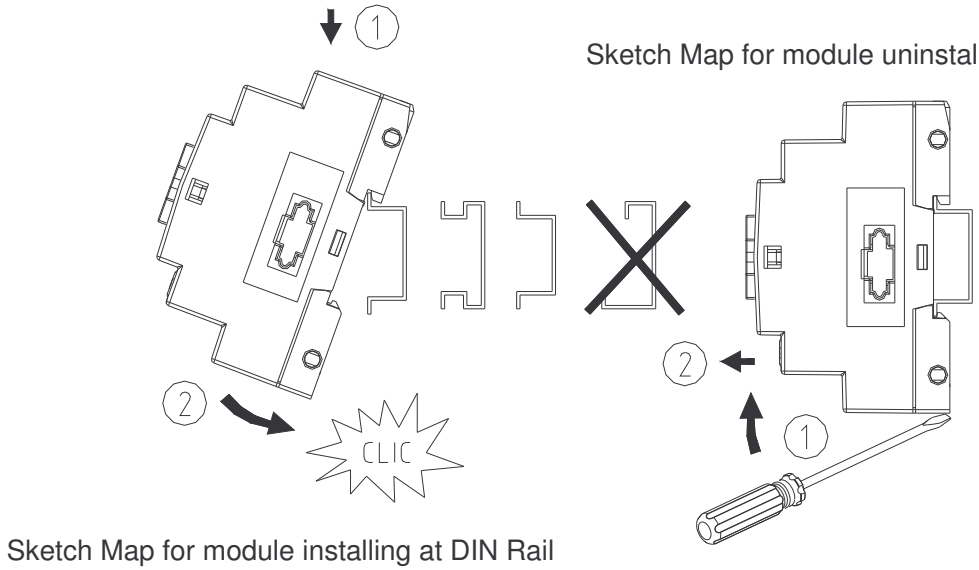


Figure 4.2. Expansion installation

◎ Uninstall process is the other way around.

First loosen the expansion screw, then press expansion button to disconnect the module from the master. Finally, loosen the master screw to uninstall the master.

4-3 DIN Rail Installation



Sketch Map for module uninstalling from DIN

Sketch Map for module installing at DIN Rail

Figure 4.3. DIN Rail Installation

- To install

  Press the slots on the back of the **iSmart** and expansion module plug CONNECTOR onto the rail until the elastic clamps hold the rails in place. Then connect the expansion module and CONNECTOR with the Master (press the PRESS-BUTTON simultaneously)

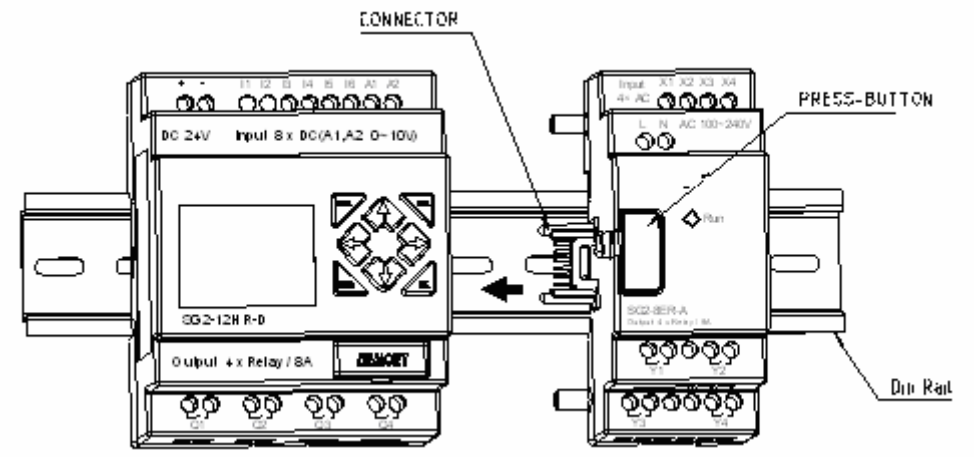


Figure 4.4. DIN Rail Expansion Installation

- To uninstall

  Press the expansion button and pull off the clamp, pull the **iSmart** upward till the unit free from the rail.

- Note: It is recommended to apply a DIN Rail clamp to hold the **iSmart** in place.

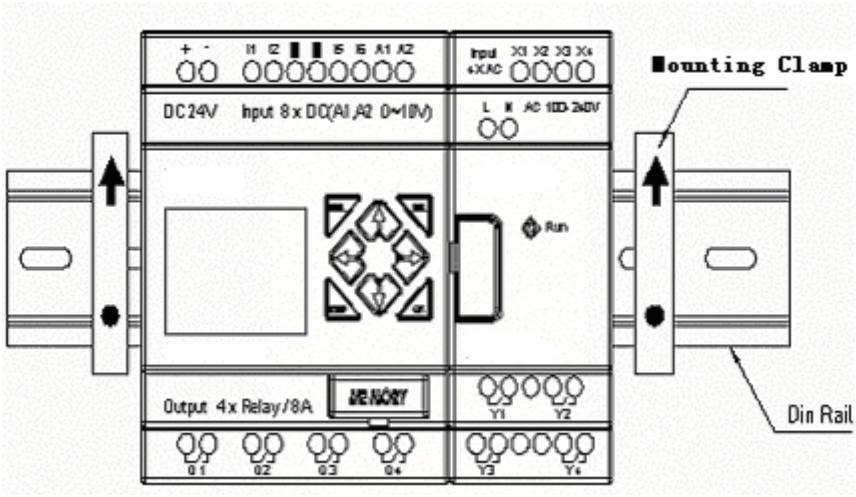


Figure 4.5. Recommended DIN Rail clamping

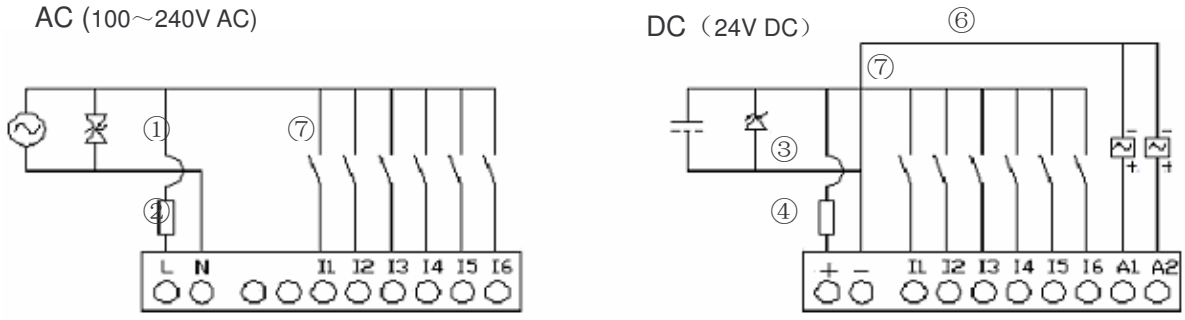
Chapter 5 Wiring

5.1 Precaution for Wiring

- The I/O signal wires should not be routed in parallel to the power wires or placed in the same tray.
- Adopt 0.75-3.5mm^2 cable as the external wire.
- Apply 4~6kgf.cm torques to tighten the lock screws.

5-2 10/12 Point Variant

（1） Power Supply and Input Terminal



（2）Output Terminal

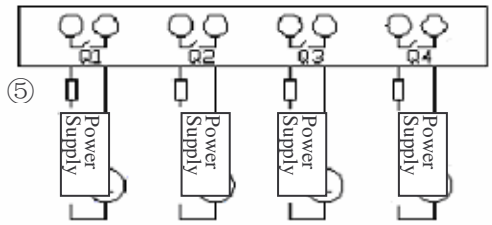


Figure 5.1. 10/12 point variant wiring

5-3 20 Point Variant

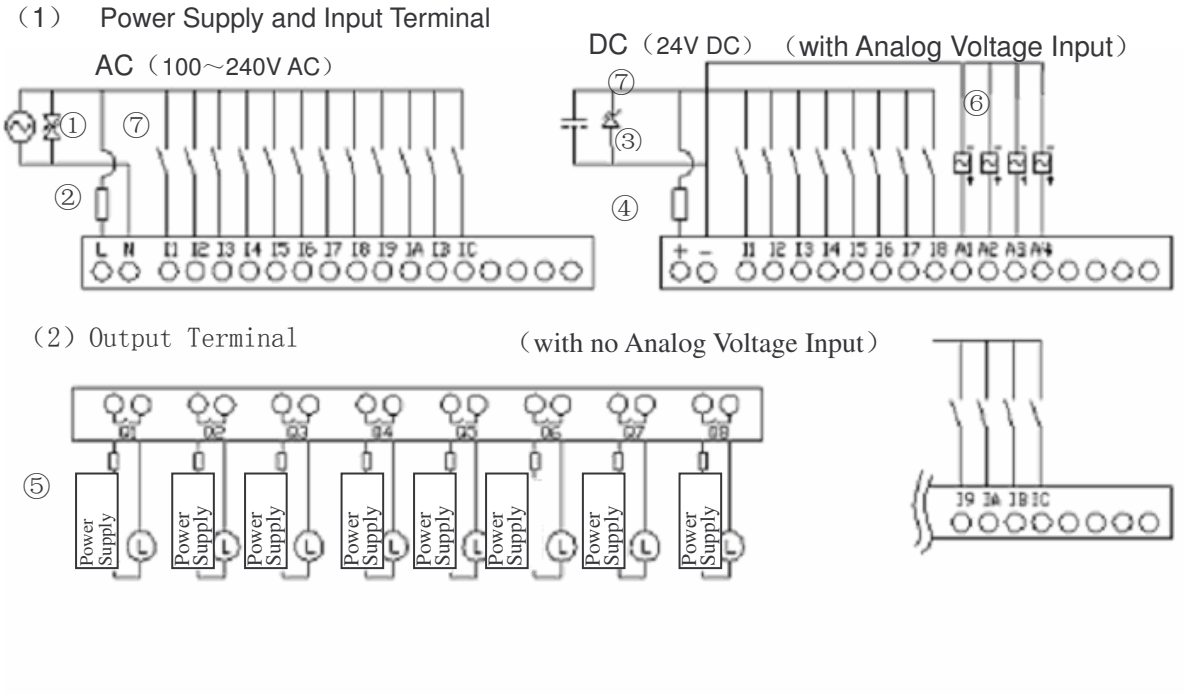


Figure 5.2. 20 point variant wiring

(3) Data link or Remote I/O link

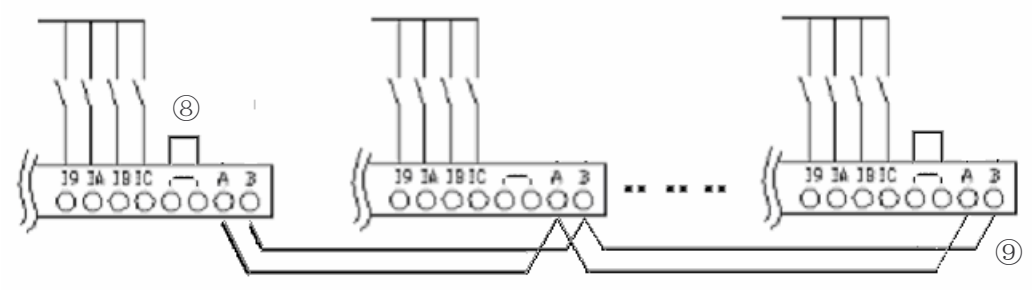


Figure 5.3. Data Link or Remote I/O Link

It is imperative to provide an external surge absorber and fuse to protect the power supply and output circuit.

(1) Surge absorber (400V AC)

(2) Fuse (2A)

(3) Surge absorber (36V DC)

(4) Fuse (2A)

(6) AC output: Fuse or short circuit Protective Device

DC output: Fuse

(6) Common terminal (5) for analog voltage input should be connected with the same ground terminal of DC power supply.

(7) The power supply and the input shall share the same power source.

(9) In accordance to EIA RS-485 standard, the DATA LINK can connect Max.8 Modules (ID:1~8) and the REMOTE I/O can connect 2 modules（MASTER & SLAVE）. Please refer to main menu SET Item.

5-4 Relay Lifespan

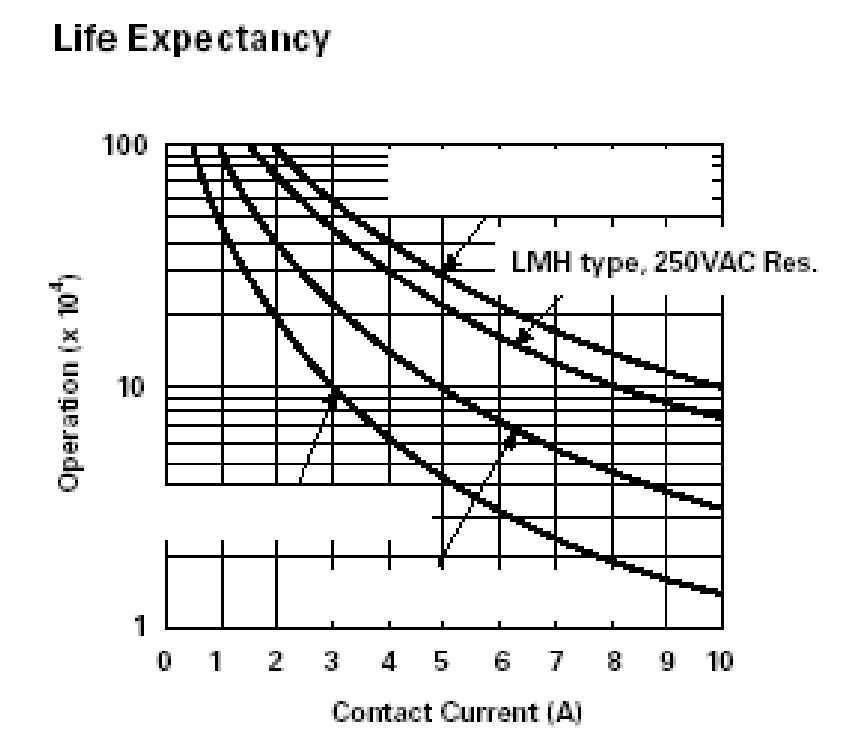


Figure 5.4. Relay Lifespan curves

Note 1: The values illustrated in the above graph are standard ones. The service life of the relay will be adversely affected by the ambient temperature.

Note 2: When the current is kept less than 2A, the service life of the relay is about 100,000 times.

Chapter 6 Operation Flow

6.1 After Power Supply Connection

(1) Initialization of Data Memory

- After the power supply is connected, initial data will appear in the data memory. Before the elapse of the first scan cycle, the input relay will update the execution data in accordance with ON/OFF conditions, the output relay and the input relay will carry out the operations according to the operator program.

(2) Transfer Programs from ROM -> RAM

- After the power is on, the stored program in EEPROM will be transferred to RAM.

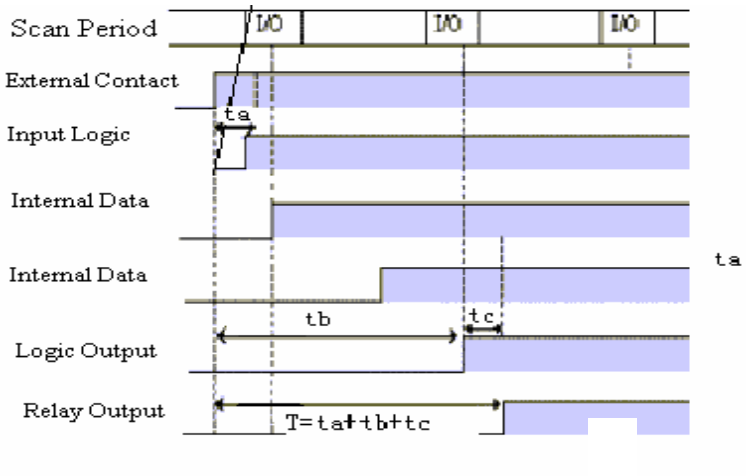
(3) Scan Time

- The scan time covers the time for processing the input and output data and the process time the operator program takes to obtain an execution result.
- The scan time is related to the amount of stored instructions in the unit.

  Under Ladder mode: **5~20mS**

  Under FBD: **2~10mS**

(4) Overall Response Time for **iSmart**



ta: Input OFF -> ON response time

tb: one scan time

tc: Output OFF-> ON response time

Figure 6.1. Overall Response Time for iSmart

Chapter 7 Description for LADDER Instruction

7-1 **Basic Instructions**

	(	⮝	⮟	P	⊣ ⊢	⊣/⊢	NO. / NC
Input Instruction					I	i	I1~IC / i1~iC
Output Instruction	Q	Q	Q	Q	Q	q	Q1~Q8 / q1~q8
Auxiliary Instruction	M	M	M	M	M	m	M1~MF / m1~mF
RTC Instruction	R				R	r	R1~RF / r1~rF
Counter Instruction	C				C	c	C1~CF / c1~cF
Timer Instruction	T			T	T	t	T1~TF / t1~tF
Analog Comparing Instruction	G				G	g	G1~GF / g1~gF
HMI Instruction	H						H1~HF
PWM Instruction	P						P1
DATALINK	L						L1~L8

	Upper differential	**Lower differential**	**Other Instruction Symbol**
Differential Instruction	D	d	
SET Instruction			⮝
RESET Instruction			⮟
P Instruction			P

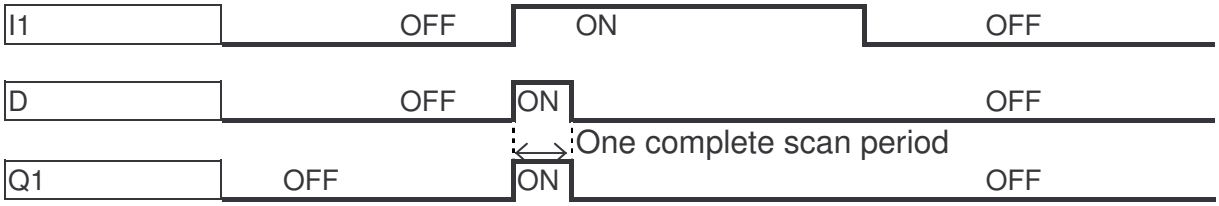
Open Circuit	“ ”	
Short Circuit	“--”	

Link Symbol	**Description**
─	Connecting left and right Components
┴	Connecting left, right and upper Components
┼	Connecting left, right, upper and lower Components
┬	Connecting left, right and lower Components

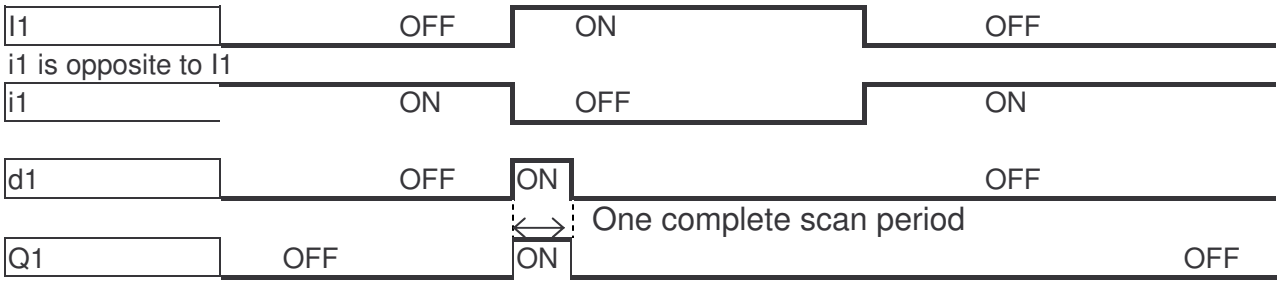
7-2 Function of Basic Instruction

- **Function D (d) Instruction**

Example 1： I1—D ——[Q1

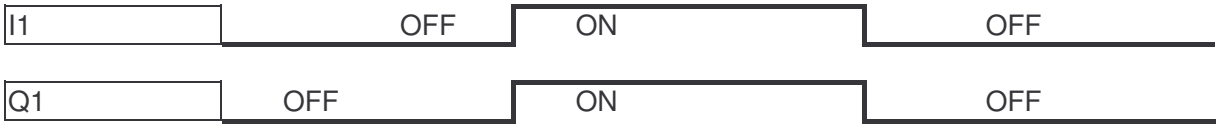


Example 2： i1—d——[Q1



- **NORMAL(-[）output**

I1——[Q1



- **SET**（ ）output

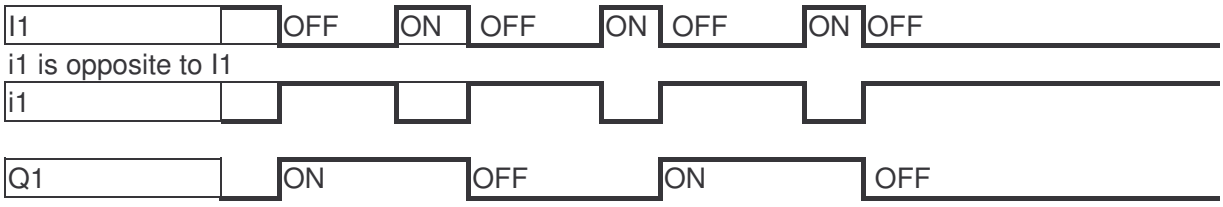
I1—— Q1

- **RESET**（ ）output

I1—— Q1

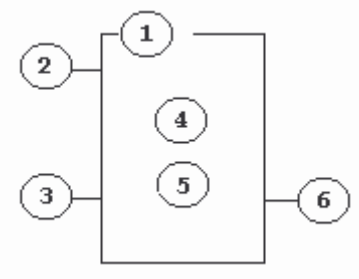
● **P** output

i1——**P**Q1



7-3 Application Instruction

● **General Counter**

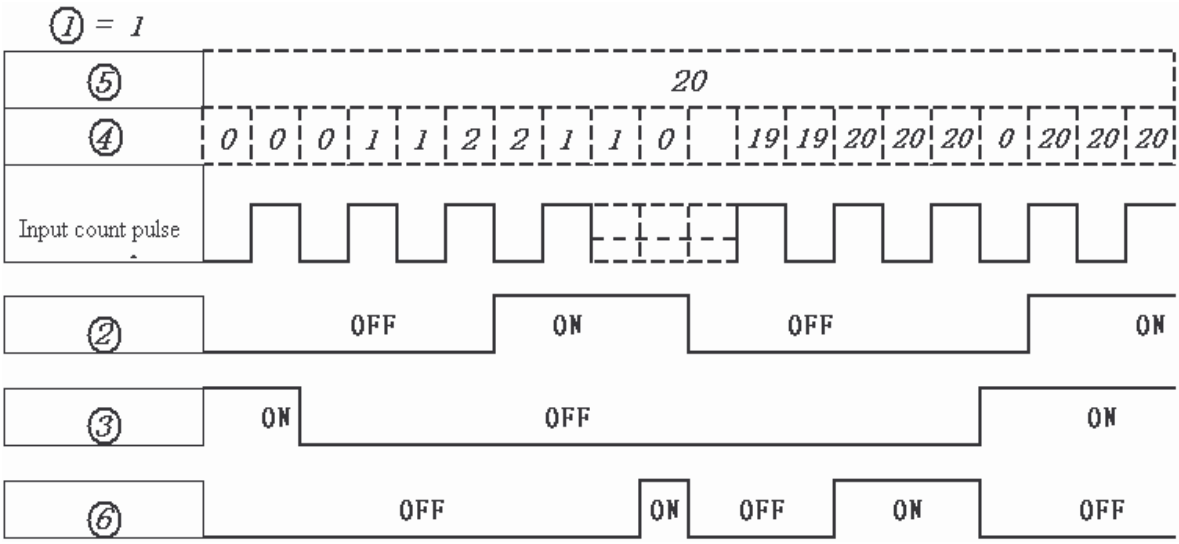


Symbol	Description
①	Counting Mode (1-6)
②	Use (I1 ~ gF) to set counting up or counting down OFF: counting up (0, 1, 2, 3, 4….) ON: counting down (….3, 2, 1, 0)
③	Use (I1 ~ gF) to RESET the counting value ON: the counter reset to zero and □ OFF OFF: the counter continues to count
④	Present Counting Value, range:0~999999
⑤	Target (Setting) Value, range:0~999999
⑥	Code of the counter (C1 ~ CF total: 15 groups).

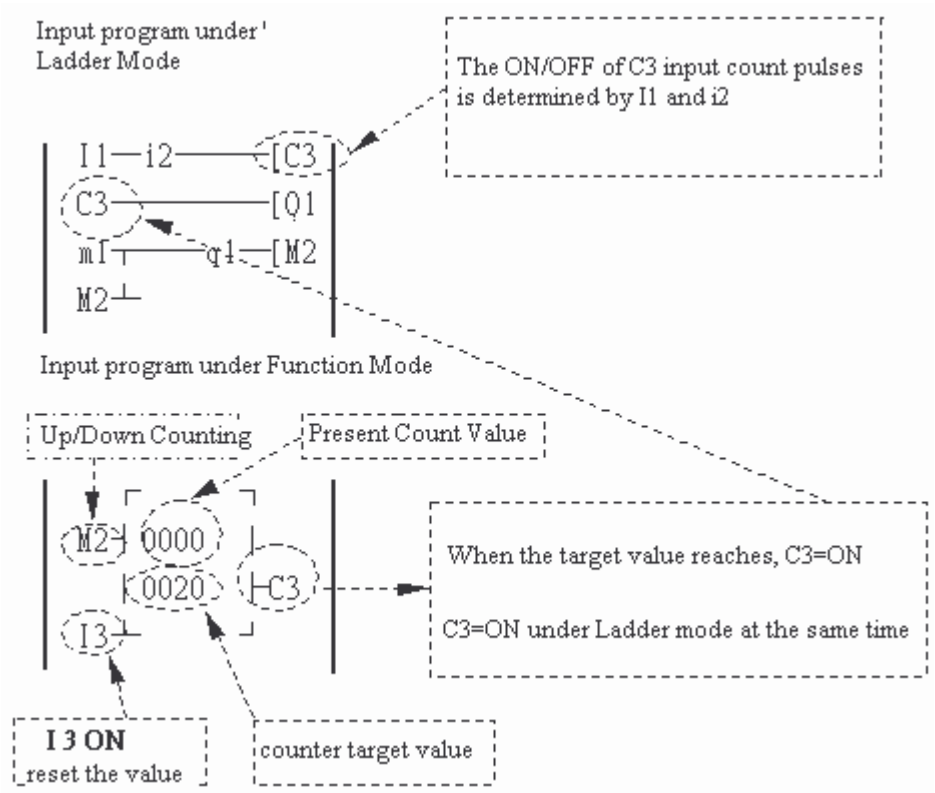
Note：The set value of the counter could be a constant or the present value of another timer, counter or analog input A1~A4. The upper case (I1) is Contact 'ON' (a) while the lower (i1) case is Contact 'OFF' (b).

- Input terminals I1~IC (I1~I12)
- Output terminal: Q1~Q8,
- Expansion Input Terminal X1~XC (X1~X12)
- Expansion Output Terminal: Y1~YF (Y1~Y12)
- Counter: C1~CF (C1~C15), Timer: T1~TF (T1~T15).
- RTC Comparator: R1~RF (R1~R15)
- Analog Comparator: G1~GF (G1~G15),
- Auxiliary Terminal:M1~MF（M1~M15）.

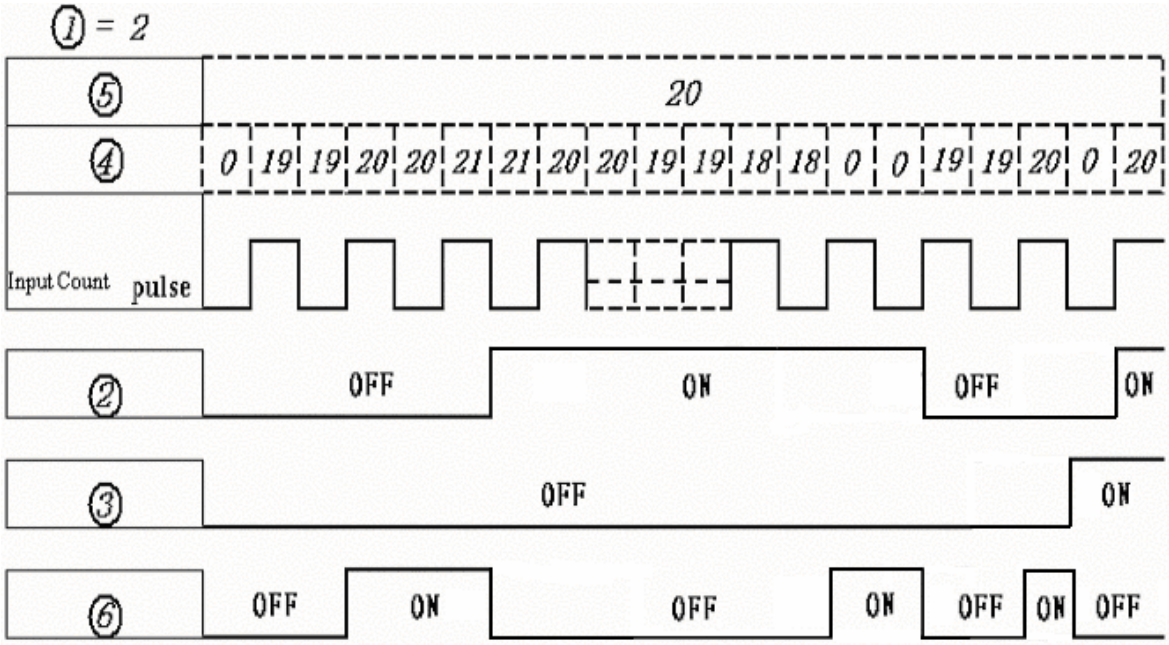
(1) Counter Mode 1



Example：



(2) Counter Mode 2



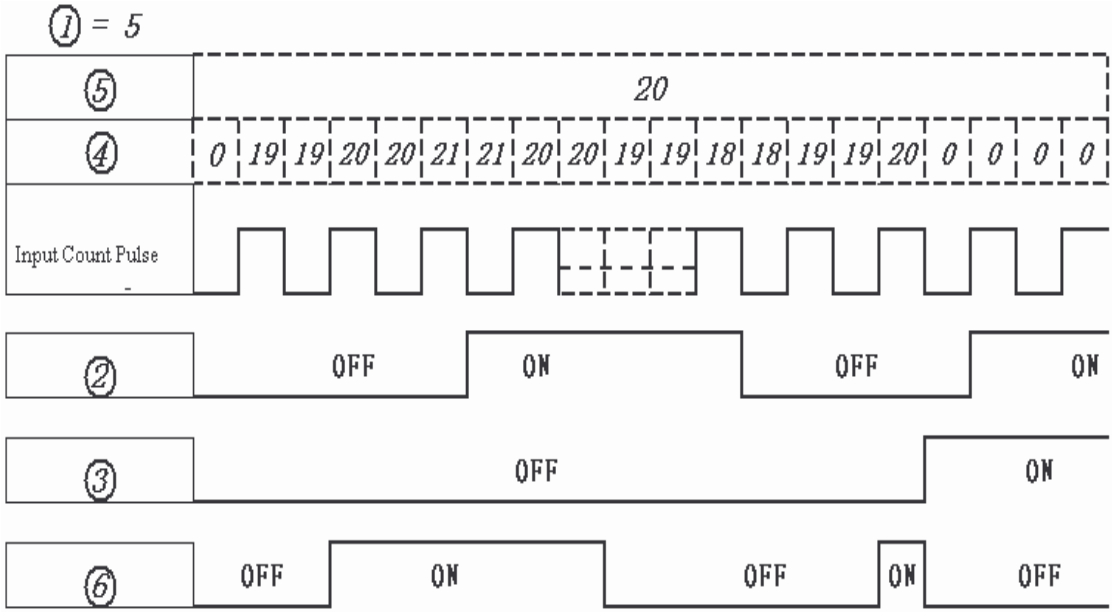
Note:

- Under this Mode, the counting present value appeared will be greater than 20, unlike in Mode 1 in which the value is locked at 20.

(3) The counter Mode 3 is similar to the counter Mode 1 except that the former can remember the recorded value after the power is cut off and continue counting when the power is turned on again.

(4) The counter Mode 4 is similar to the counter Mode 2 except that the former can remember the recorded value after the power is cut off and continue counting when the power is turned on again.

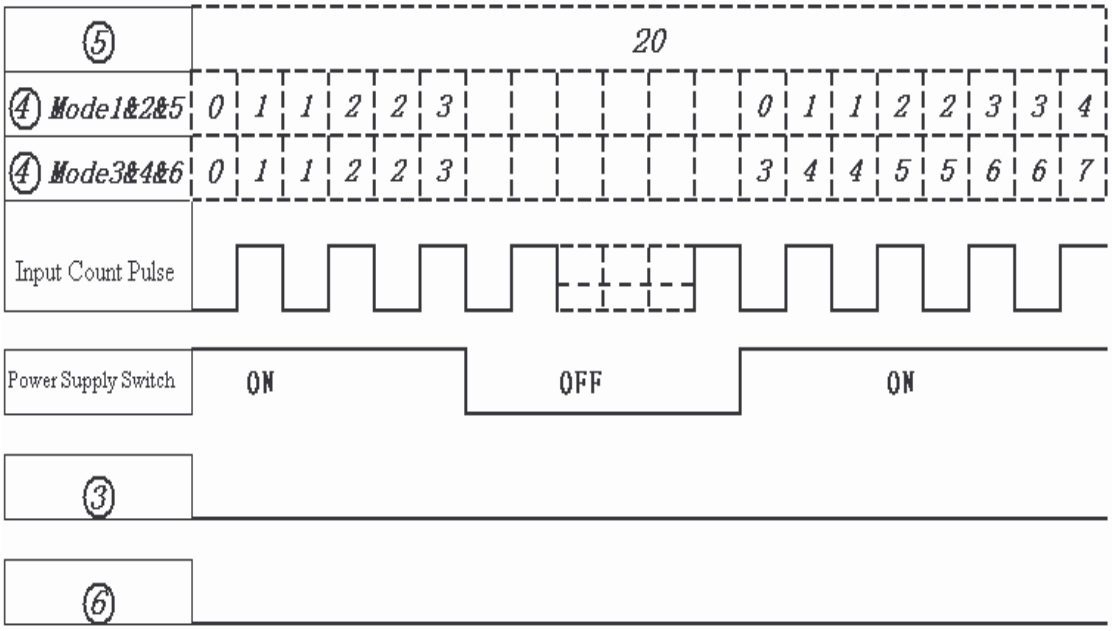
(5) Counter Mode 5



Note:

Under this Mode, the counting present value appeared will be greater than 20, unlike the Mode 1 in which the value is locked at 20. If reset is available, the present value will reset to 0, unrelated with the counting direction.

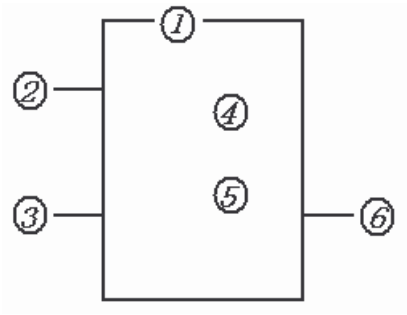
(6) The counter Mode 6 is similar to the counter Mode 5, except that the former can remember the recorded value after the power is cut off and continued counting when the power is turned on at the next time.



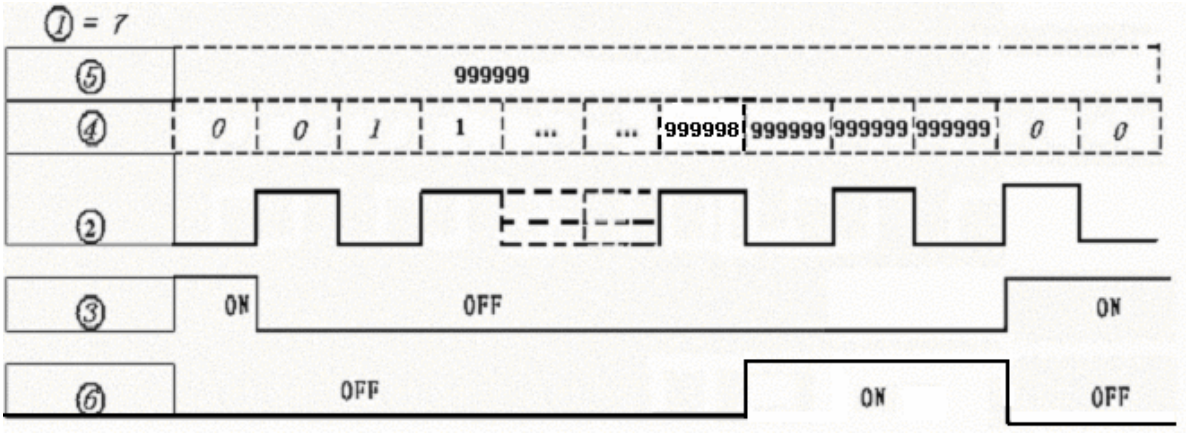
● High Speed Counter (Only Provided with DC Power Supply Type Units)

DC power supply variant has two 1 KHz High speed input terminals, I1 and I2. Two groups of high-speed counting function is available with these two timers.

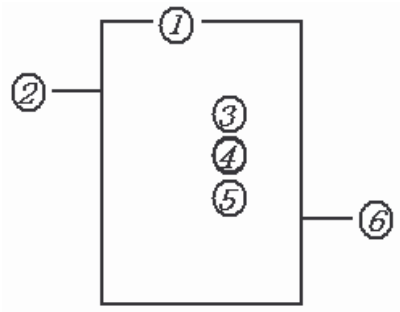
(7) Counter Mode 7



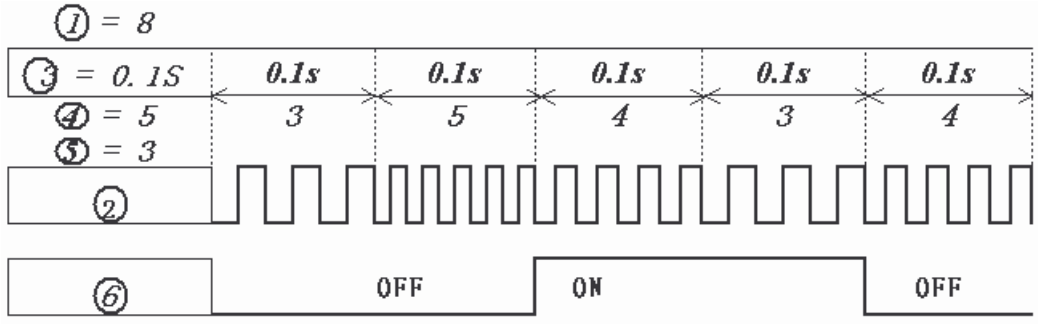
Symbol	Description
①	Counting mode(7)—high speed counting
②	High speed counting input terminal: only I1, I2 available.
③	Use I1~gF to reset counting value. ON: counter is reset to zero and ⑥OFF OFF: counter continues to count.
④	Counter present value: 0~999999
⑤	Counter target value: 0~999999
⑥	Code of Counter (C1~CF, Total: 15Groups)



(8) Counter mode 8

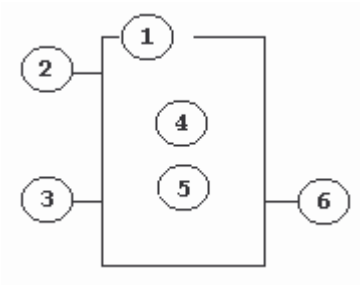


Symbol	Description
①	Counting Mode(8)—Frequency Comparison
②	High speed counting input terminal: only I1, I2 available.
③	Counting interval time:(0~99.99S)
④	Counter 'on' target value (000000~999999)
⑤	Counter 'off' target value (000000~999999)
⑥	Code of Counter (C1~CF Total :15Group)



Note：As show in the diagram, the output will be delayed for one interval.

- **Timer**



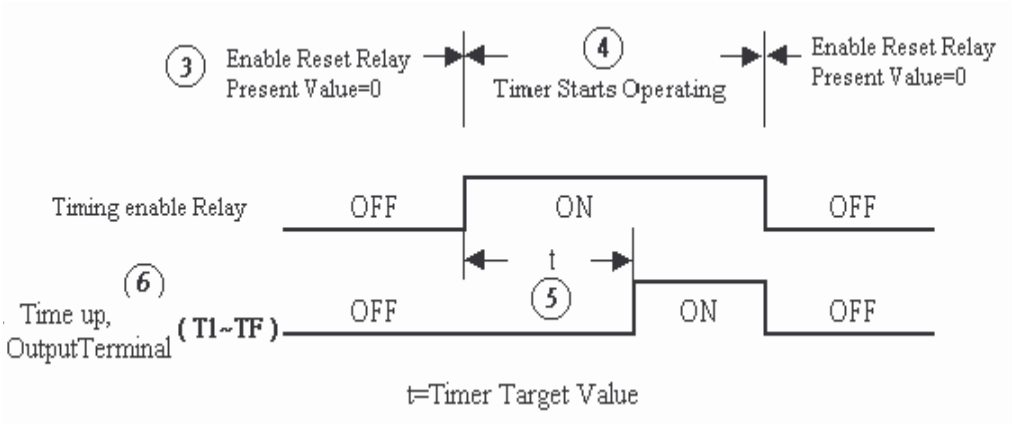
Symbol	Description
①	Timer Mode (1-7)
②	Timer Unit：1：0.00~99.99s 2：0.0~999.9s 3：0~9999s 4：0~9999m
③	Use I1~gF to reset the timer value. ON ：timer value is reset to Zero and ⑥ OFF OFF ：timer continues to timing
④	Timer present value
⑤	Timer target value
⑥	Code of timer (T1~TF total: 15Group)

Note：The setting value of the timer could be constant, or the present value of the timer, counter or analog input of A1~A4.

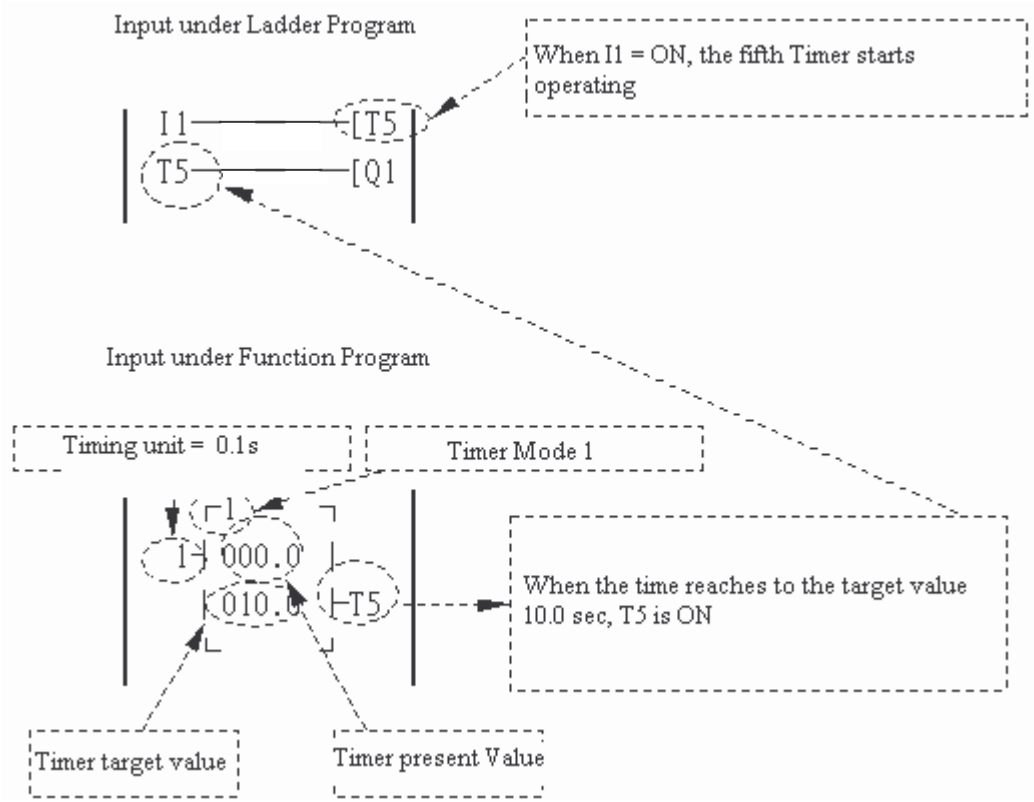
- For I1~gF, input terminal:I1~IC(I1~I12),
- Output terminal: Q1~Q8
- Expansion input terminal:X1~XC(X1~X12)
- Expansion output terminal:Y1~YF(Y1~Y12)
- Counter :C1~CF(C1~C15)
- Timer :T1~TF(T1~T15)
- RTC Comparator:R1~RF(R1~R15)
- Analog Comparator: G1~GF(G1~G15)
- Auxiliary terminal:M1~MF（M1~M15）

The upper case (I1) is Contact ‘ON’ (type a) while the lower (i1) case is Contact ‘OFF’ (type b).

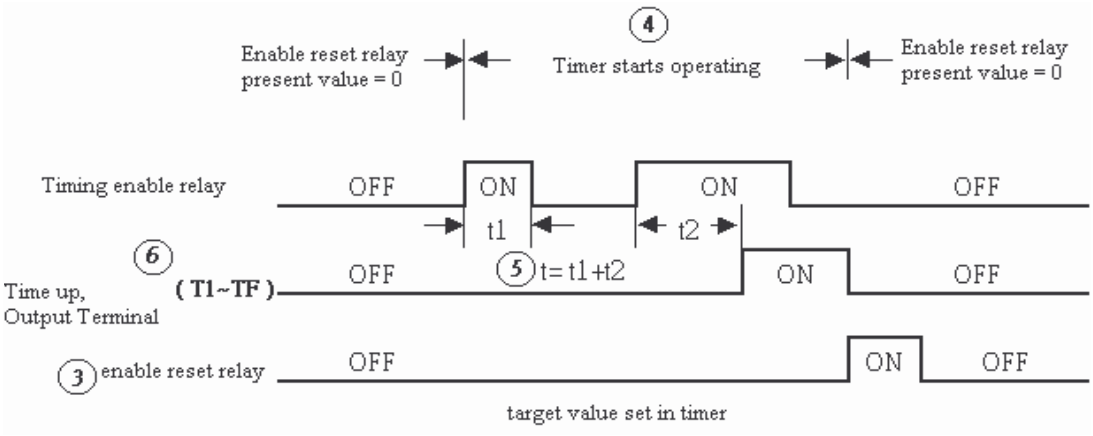
(1) Timer Mode 1 (ON-Delay A mode)



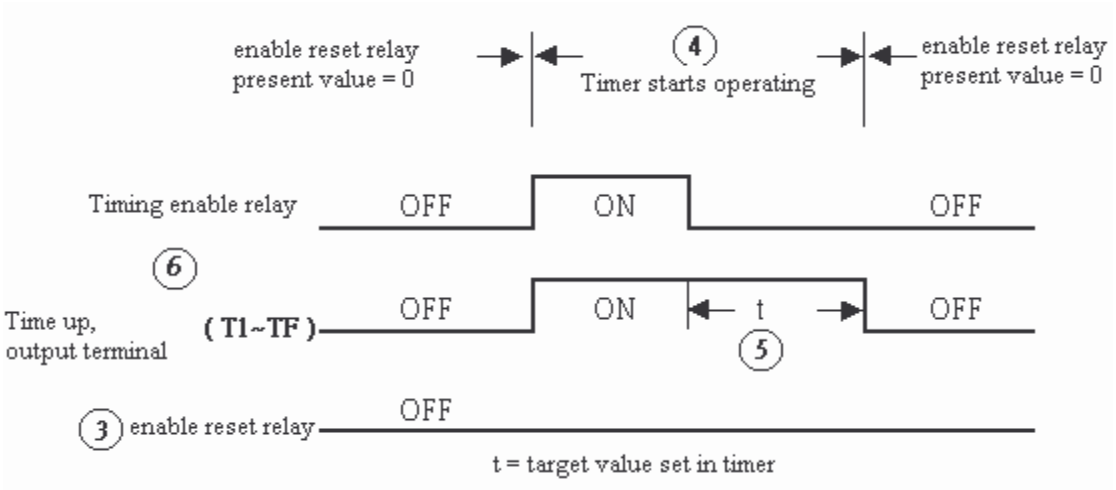
Sample:

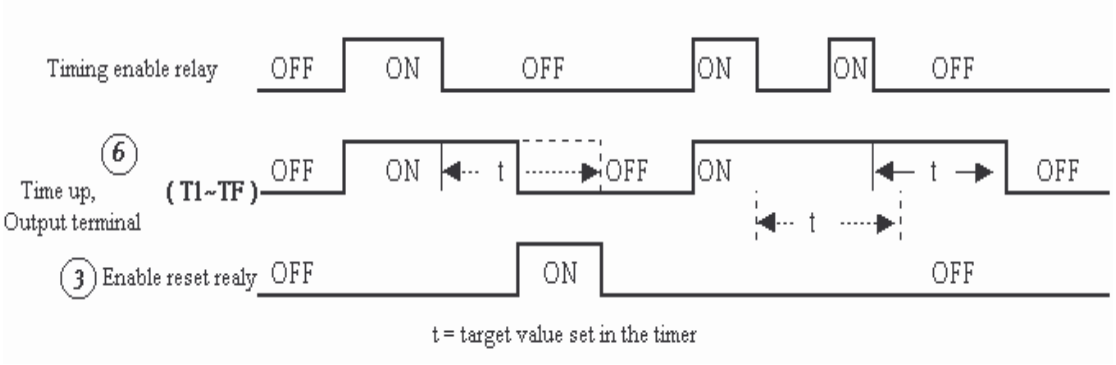


(2) Timer mode 2 (ON-Delay B mode)

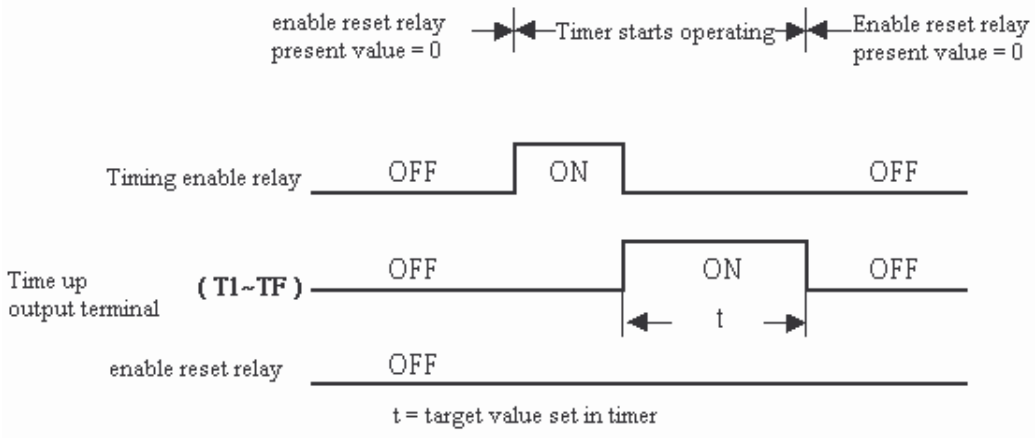


(3) Timer Mode 3(OFF-Delay A Mode)

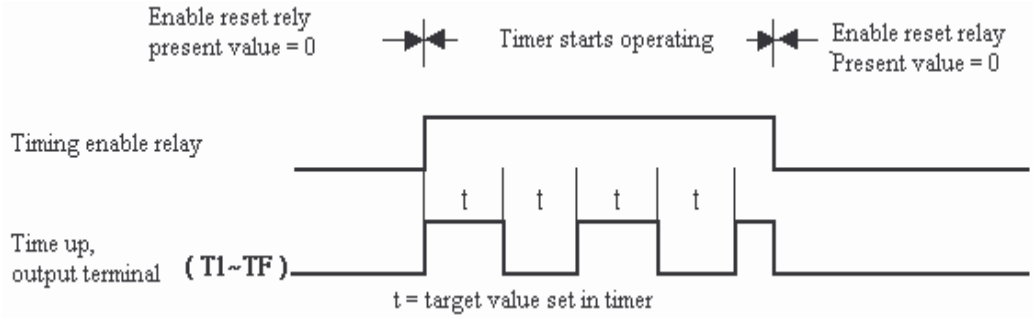




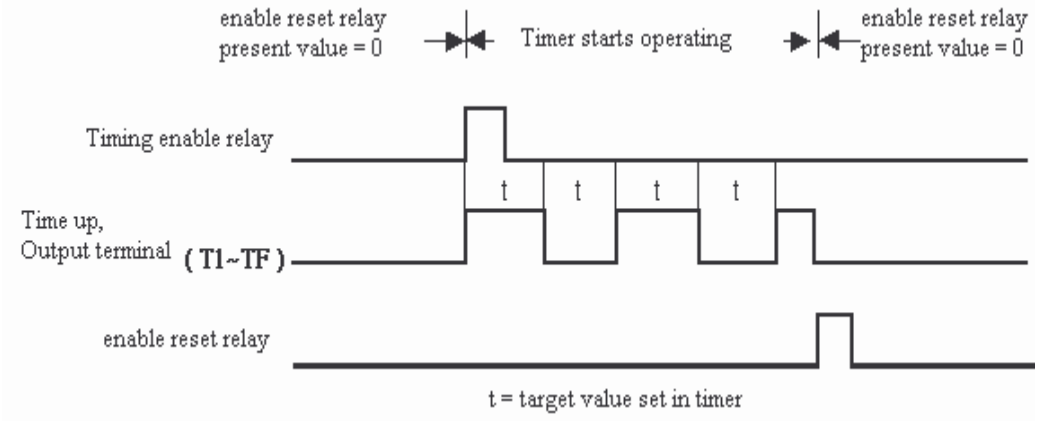
(4) Timer Mode 4(OFF-Delay B Mode)



(5) Timer Mode 5(FLASH A Mode)



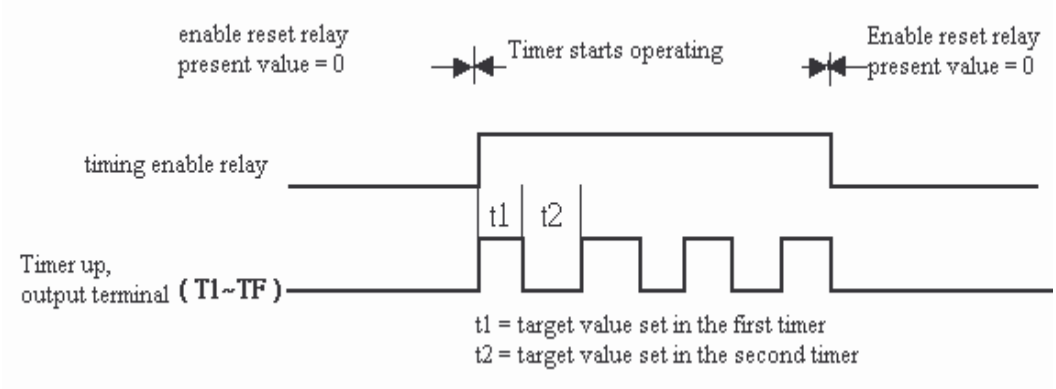
(6) Timer Mode 6(FLASH B Mode)



(7) Timer Mode 7(FLASH C Mode)

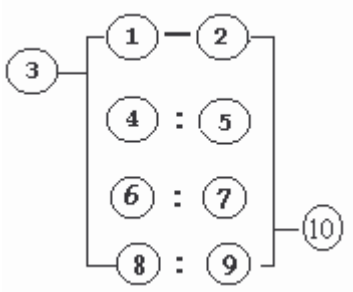
Note: This is a special Mode which series connects two timer, t1 and t2. In addition, add PTn, where n=1, 2, 3, 4, ……. Tn + 1 Timer can not be used for other purpose.

Sample : I1--------PT1 , t1=T1 Target value；t2=T2 Target value.



● RTC Instruction

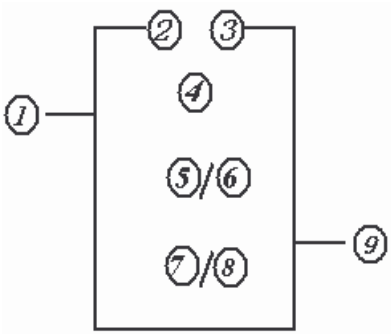
- Weekly Mode



Symbol	Description
①	Input the first week to RTC
②	Input the second week to RTC
③	RTC mode(1~2) 1:daily ,2:consecutive days
④	RTC displays the hour of present time.
⑤	RTC displays the minute of present time
⑥	Set RTC hour ON
⑦	Set RTC Minute ON
⑧	Set RTC Hour OFF
⑨	Set RTC Minute OFF
(10)	Code of RTC (R1~RF Total: 15Group)

Description for Week Code：Monday ~Sunday=MO , TU , WE , TH , FR , SA , SU

- Year-Month-Day Mode

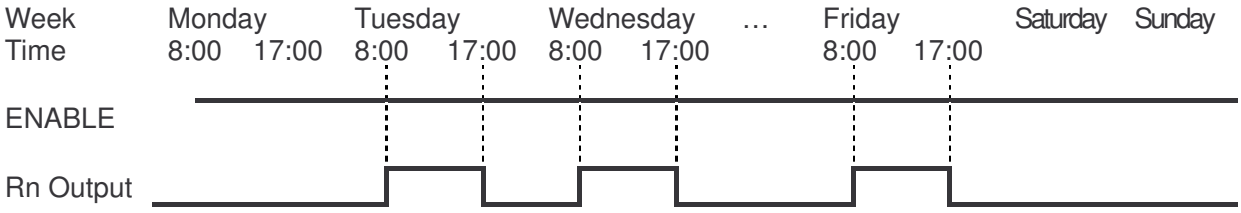


Symbol	Description
①	RTC mode 3, Year-Month-Day
②	Setting RTC Year ON
③	Setting RTC Year OFF
④	Display RTC Present time: Year-Month-Day
⑤	Setting RTC month ON
⑥	Setting RTC Day ON
⑦	Setting RTC month OFF
⑧	Setting RTC Day OFF
⑨	RTC Code (R1~RF, total 15 group)

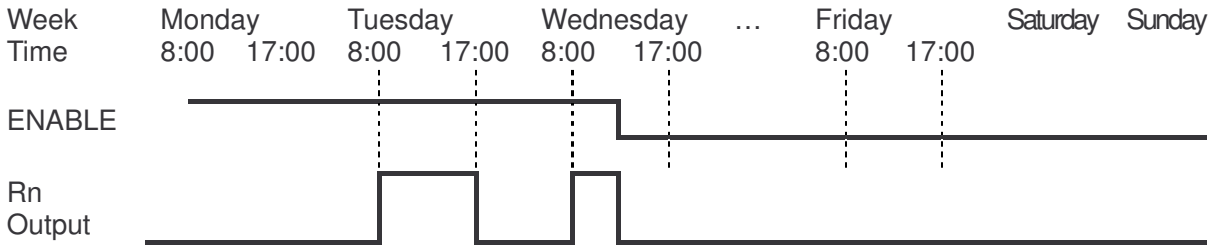
(1) RTC Mode 1

Sample 1：

③	1
① ：②	TU-FR
⑥ ：⑦	08:00
⑧ ：⑨	17:00

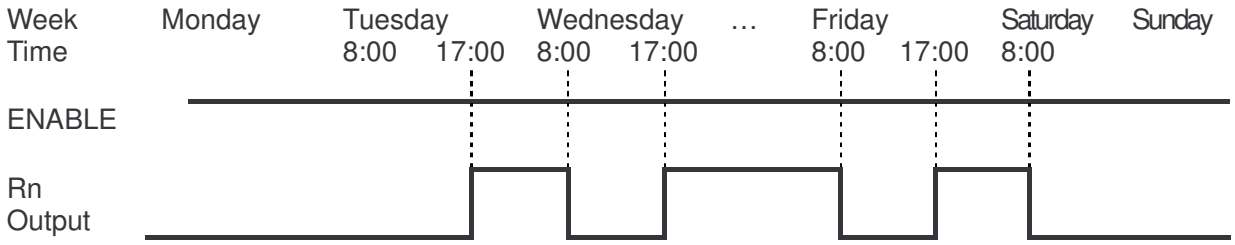


** Note：If ENABLE fails, output is OFF.



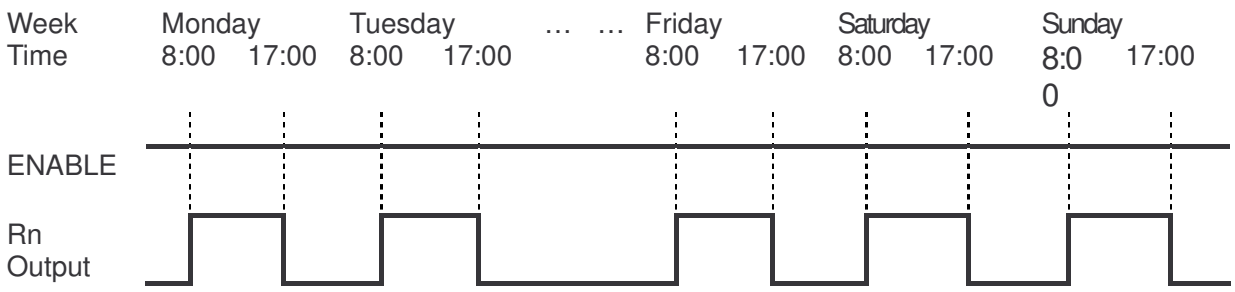
Sample 2：

③	1
① ：②	TU-FR
⑥ ：⑦	17:00
⑧ ：⑨	8:00



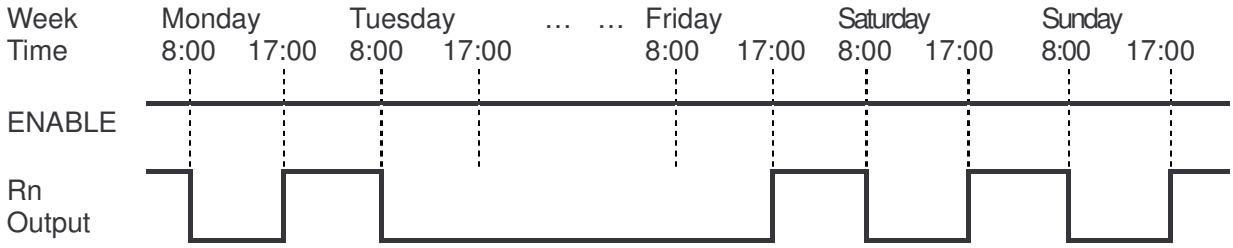
Sample 3：

③	1
① ：②	FR-TU
⑥ ：⑦	08:00
⑧ ：⑨	17:00



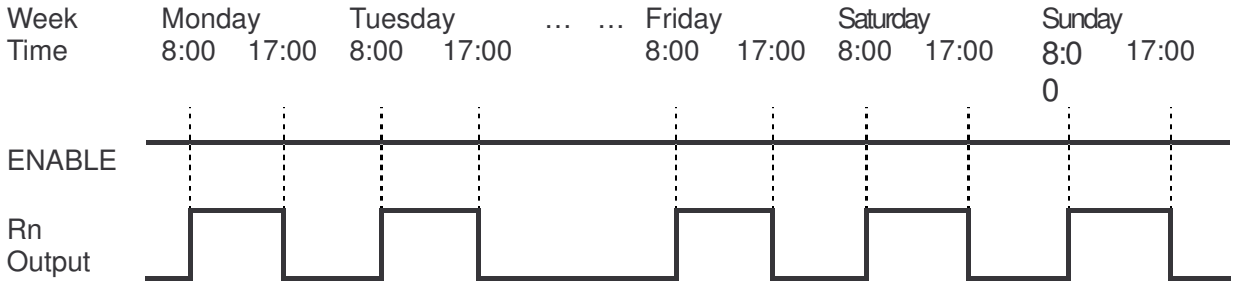
Sample 4：

③	1
① ：②	FR-MO
⑥ ：⑦	17:00
⑧ ：⑨	8:00



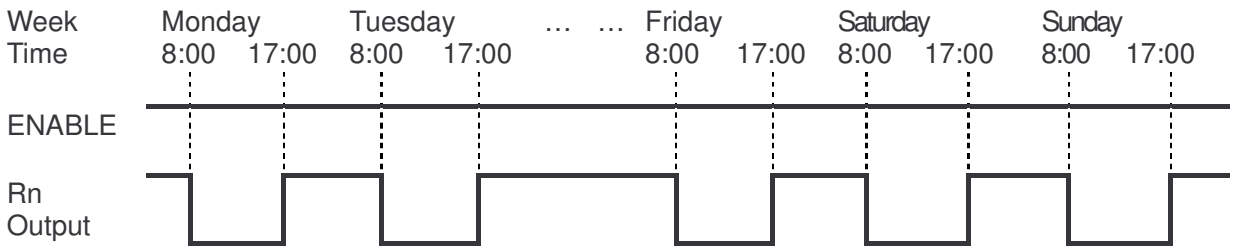
Example 5：

③	1
① ： ②	SU-SU
⑥ ： ⑦	08:00
⑧ ： ⑨	17:00



Example 6:

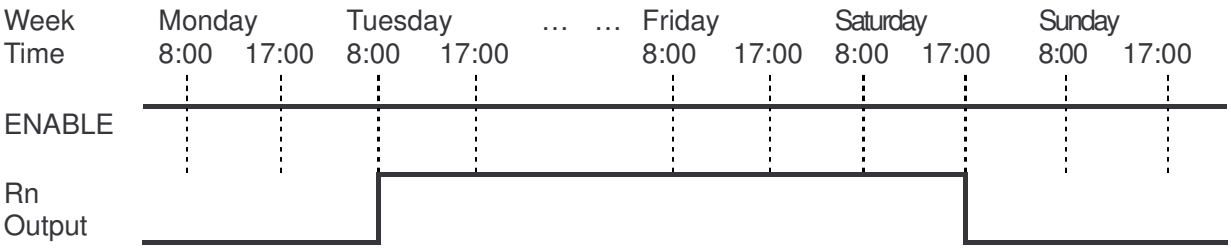
③	1
① ： ②	SU-SU
⑥ ： ⑦	17:00
⑧ ： ⑨	8:00



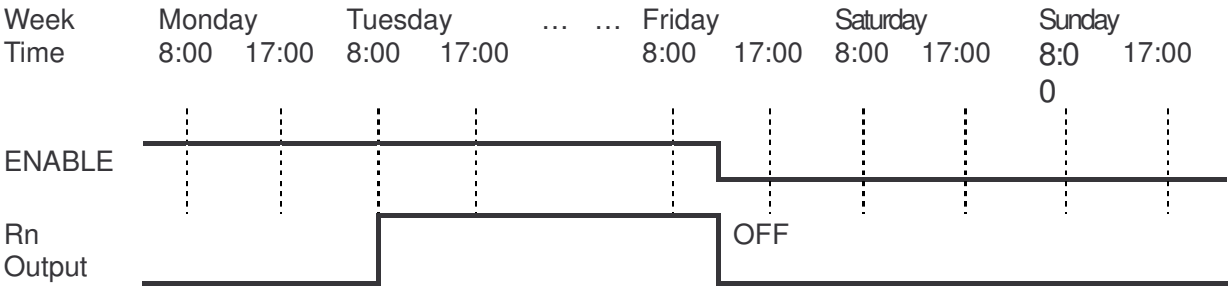
(2) RTC Mode 2

Example 1：

③	2
① ： ②	TU-SA
⑥ ： ⑦	08:00
⑧ ： ⑨	17:00

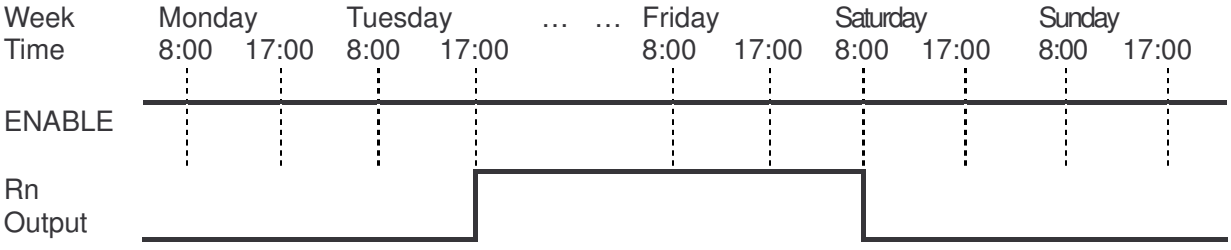


** Note: When ENABLE is unavailable, the output is OFF.



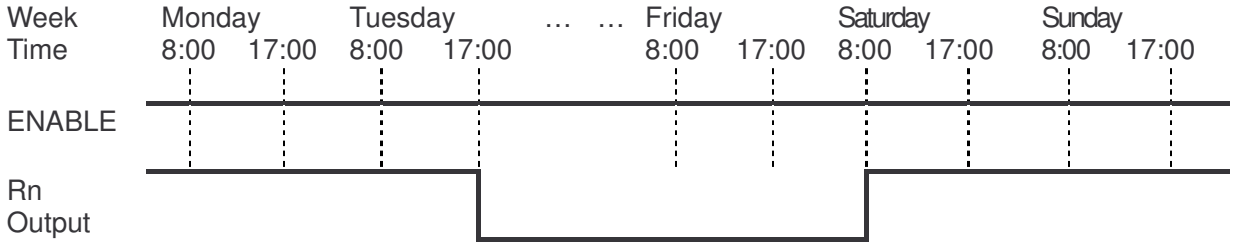
Example 2：

③	2
① ： ②	TU-SA
⑥ ： ⑦	17:00
⑧ ： ⑨	08:00



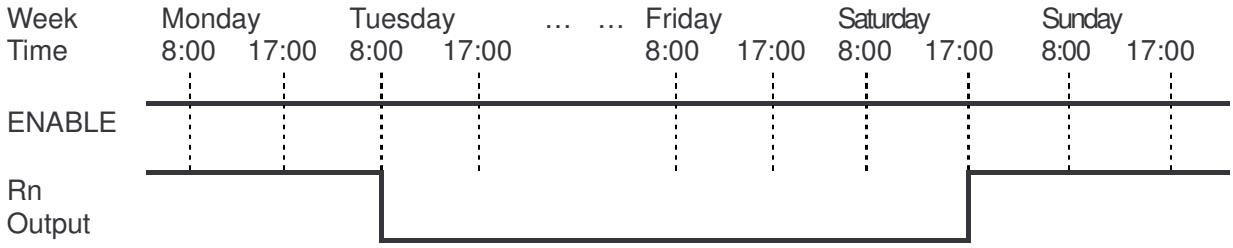
Example 3：

③	2
① ： ②	SA-TU
⑥ ： ⑦	08:00
⑧ ： ⑨	17:00



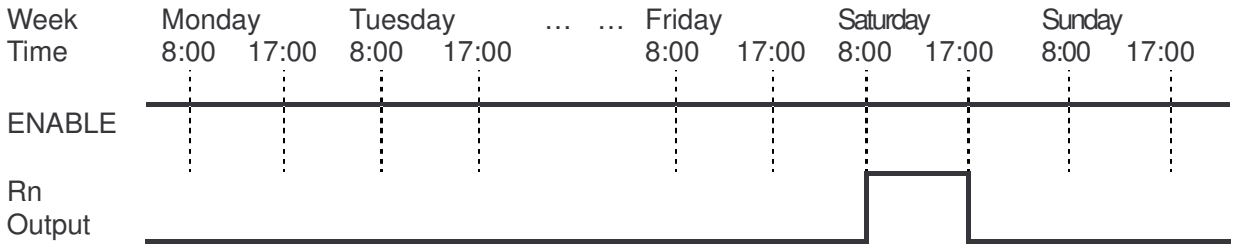
Example 4：

③	2
① ： ②	SA-TU
⑥ ： ⑦	17:00
⑧ ： ⑨	08:00



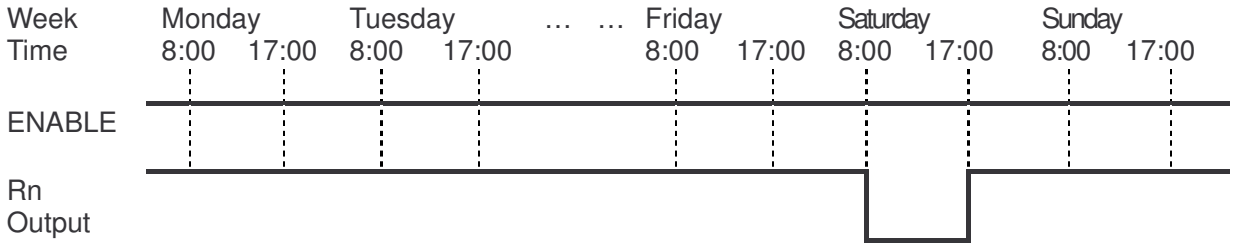
Sample 5：

③	2
① ：②	SA-SA
⑥ ：⑦	08:00
⑧ ：⑨	17:00



Sample 6：

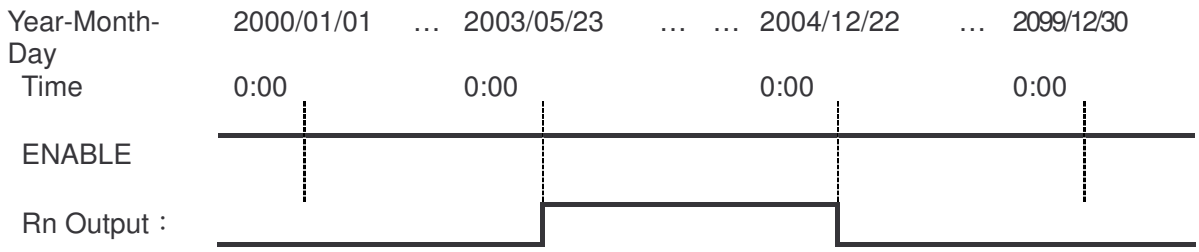
③	2
① ：②	SA-SA
⑥ ：⑦	17:00
⑧ ：⑨	08:00



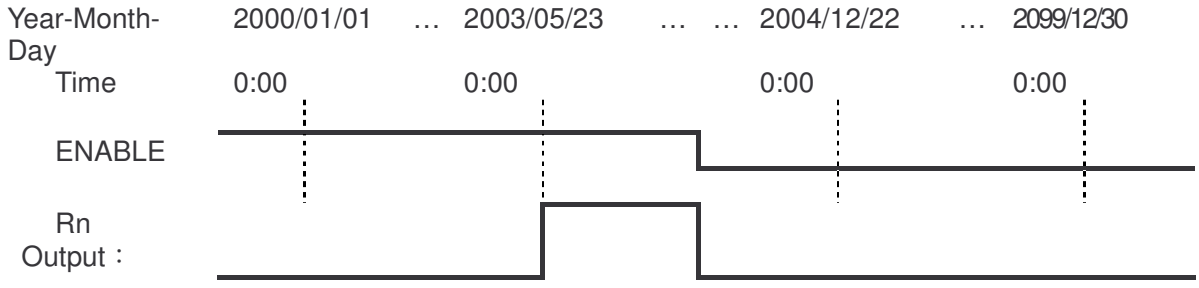
(3) RTC Mode 3

Sample 1：

①	3
② / ⑤ / ⑥	03/05/23
③ / ⑦ / ⑧	04/12/22

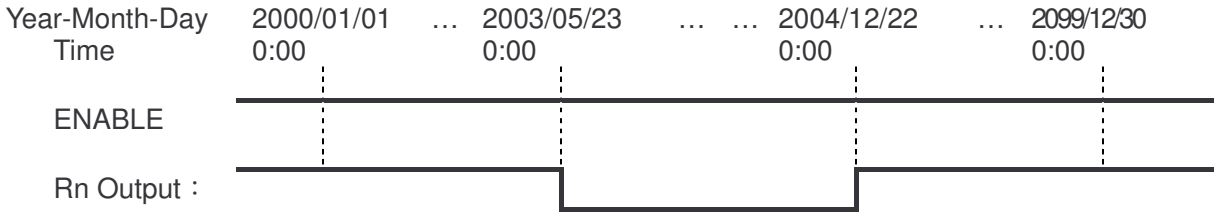


** Note：If ENABLE is fails, the output is OFF.



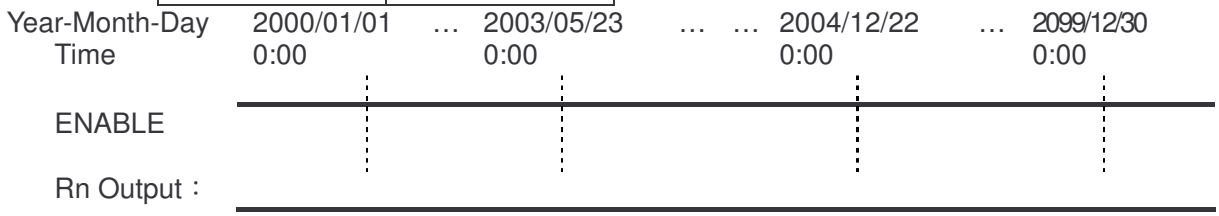
Sample 2：

①	3
② / ⑤ / ⑥	04/12/22
③ / ⑦ / ⑧	03/05/23

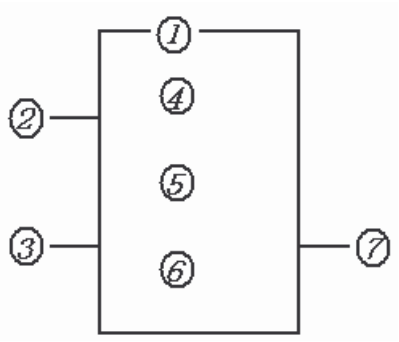


Sample 3：

①	3
② / ⑤ / ⑥	03/05/23
③ / ⑦ / ⑧	03/05/23



● Analog Comparator



Symbol	Description
①	Analog Comparison Mode(1~5)
②	A_X analog input (A1~A4), or the present value of the timer, counter.
③	A_Y analog input (A1~A4), or the present value of the timer, counter.
④	A_X analog input value(0.00~9.99)
⑤	A_Y analog input value (0.00~9.99)
⑥	Set reference comparative value: could be constant, or the present value of the timer, counter and analog input.
⑦	Output terminal(G1~GF)

●The ON or Off of analog output terminals (G1~GF) is determined by the comparison of the analog inputs of Ax and Ay.

When the relay of analog comparator is ON, there are 5 modes occurred described below:

(1) Analog Comparator mode 1 (A_Y - ⑥ ≤ A_X≤ A_Y +⑥， ⑦ ON)

(2) Analog Comparator mode 2 ($A_X \leq A_Y$， ⑦ ON)

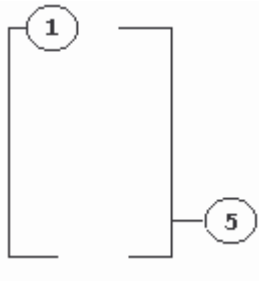
(3) Analog Comparator mode 3 ($A_X \geq A_Y$， ⑦ ON)

(4) Analog Comparator mode 4 (⑥ ≥ A_X， ⑦ ON)

(5) Analog Comparator mode 5 (⑥ ≤ A_X， ⑦ ON)

● HMI File

This function block ,12×4 can display the information as word information, present value and target value counter, timer, RTC and Analog comparator. Under running mode, modifying the target value of a timer, counter and analog comparator via HMI is available. The HMI can also display the status of input terminal (I, X) and Auxiliary relay.



Symbol	Description
①	Display mode（1~2）
⑤	HMI character output terminal (H1~H8)

(1) Display mode could be changed via the keys, page displays =1, page doesn't display = 2.

(2) HMI screen information can be only input by means of SMT-CONFIGURATOR.

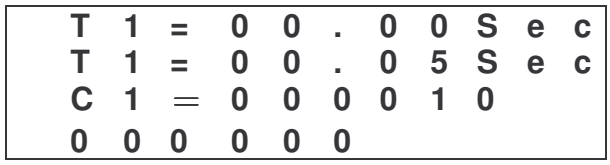
(3) For HMI setting and creation, please refer to SMT-CONFIGURATOR HELP file. The following example covers howto modify the preset value of C1 under running mode.

To modify the preset value 000010 of the counter Mode 7 as present value of T2 in HMI.

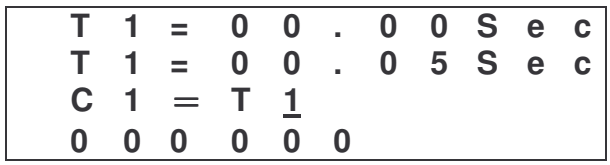
Step1：In HMI screen, to press 'SEL', the cursor blinks in the following location.

```
T 1 = 0 0 . 0 0 S e c
T 1 = 0 0 . 0 5 S e c
C 1 = 0 0 0 0 1 0
0 0 0 0 0 0
```

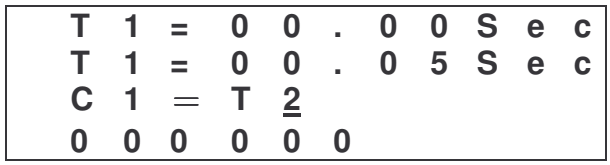
Step2：Press ‘DOWN’ and the cursor skips to C1 preset value position.



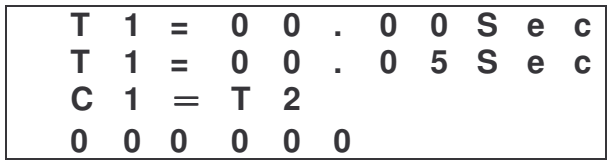
Step3：Press ‘SEL’ for three times, the preset value changes from 000000, A1, T1 in turn.



Step3：Press ‘UP’

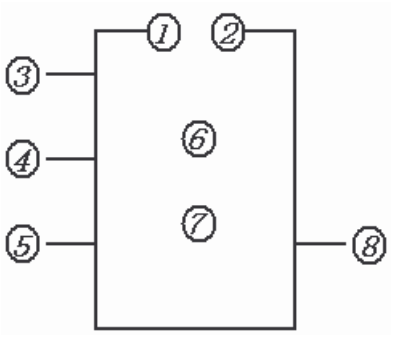


Step4：Press ‘OK’ to save the setting.



- **PWM Output Function（only provided for transistor output variant.）**

The transistor output variant has a PWM output terminal 'Q1', which can output 8-stage PWM waveforms.



Symbol	Description
①	Set display stages (1~8)
②	Display the present stage as operation(0~8)
③	Input Selected Stage 1(I1~gF)
④	Input Selected Stage 2(I1~gF)
⑤	Input Selected Stage 3(I1~gF)
⑥	Set PWM pulse width (0~32768ms)
⑦	Set PWM Period(1~32768ms)
⑧	PWM output terminal P1

Note：

- For I1~gF, input terminal: I1~IC(I1~I12),
  Output terminal: Q1~Q8,
  Expansion input terminal: X1~XC (X1~X12),
  Expansion output terminal: Y1~YF (Y1~Y12)
  Counter: C1~CF (C1~C15),
  Timer: T1~TF (T1~T15),
  RTC Comparator: R1~RF (R1~R15),
  Analog Comparator: G1~GF (G1~G15),
  Auxiliary terminal: M1~MF（M1~M15）.

The upper case (I1) is Contact 'ON' (type a) while the lower (i1) case is Contact 'OFF' (type b).

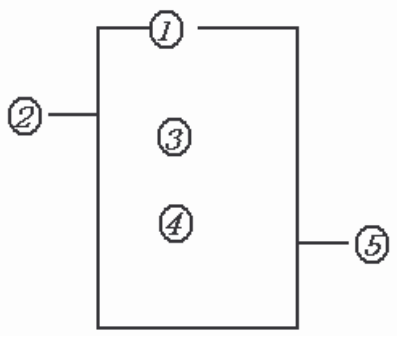
- The output waveform of output terminal 'P1-⑧' is determined by the preset waveform of input terminal 1-③, 2-④, 3-⑤ and PWM Enable.

Enable	⑤	④	③	②	⑧Output PWM
OFF	X	X	X	0	OFF
ON	OFF	OFF	OFF	1	Set stage 1
ON	OFF	OFF	ON	2	Set stage 2
ON	OFF	ON	OFF	3	Set stage 3

ON	OFF	ON	ON	4	Set stage 4
ON	ON	OFF	OFF	5	Set stage 5
ON	ON	OFF	ON	6	Set stage 6
ON	ON	ON	OFF	7	Set stage 7
ON	ON	ON	ON	8	Set stage 8

Note：X indicated ON/OFF input terminal is idle.

- **DATALINK Function（only provided for SMT-C Variant）**



Symbol	Description
①	Mode setting (1,2) 1:sending 2:receiving
②	Set the send/receive points(1~8)
③	Set the send/receive points
④	Send/receive memory list location
⑤	Data link output terminal (L1~L8)

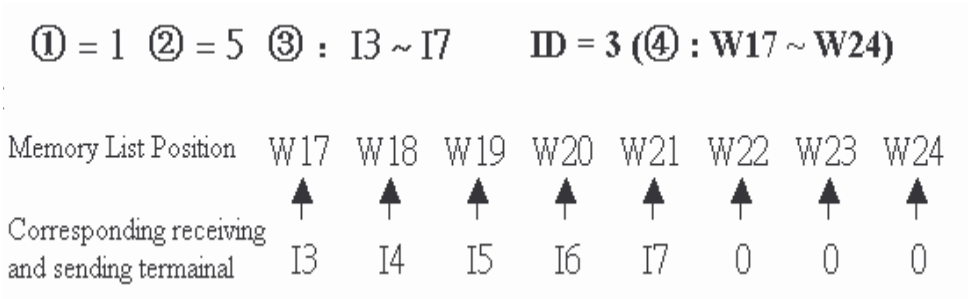
Note:

- Only one sending mode can be set among L1~L8, others are for receiving mode.
- Select input points: I1~IC(I1~I12), output points: Q1~Q8, expansion input points: X1~XC(X1~X12), expansion output points: Y1~YF(Y1~Y12), auxiliary points: M1~MF（M1~M15）.
- Receiving mode is determined by the controller ID which can not be changed, as the left list shows. The receiving mode can be selected as W1,W9,W17,W25,W33,W41,W49 and W57.

ID	Memory List Location
0	W1~W8
1	W9~W16
2	W17~W24
3	W25~W32
4	W33~W40
5	W41~W48
6	W49~W56
7	W57~W64

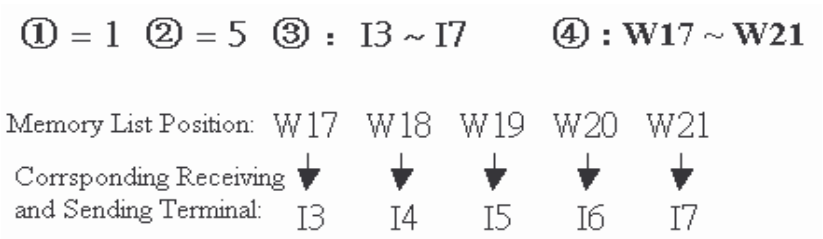
Sample 1 DATALINK Mode 1

Set ① = 1, ② = 5, set ③ as start from I3, the state of actual sending terminal I3~I7 is sent to memory list; the controller ID = 3, the state of corresponding memory list position W17~W24-④ and relationship of sending terminal is as below:



Sample 2: DATALINK mode 2

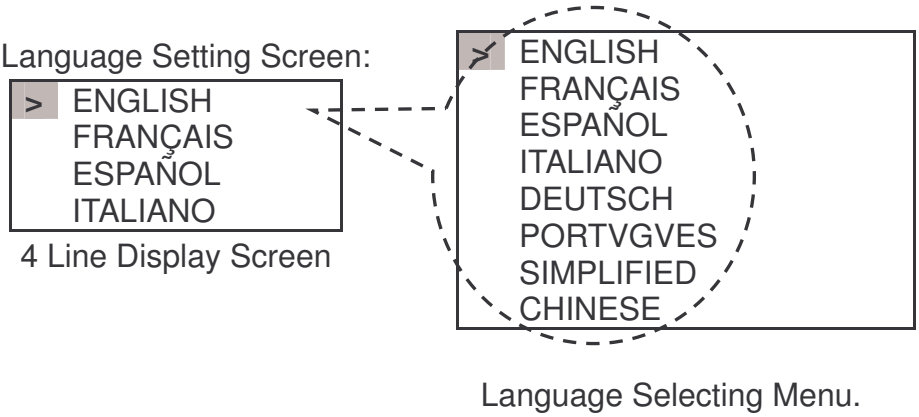
Set ① = 1, ② = 5, set ③ as start from I3, set ④ as start from W17, when enabling the Datalink, the state 'ON/OFF' of I3~I7 is controlled by the state of memory list position W17~W21-④, which is irrelative to the actual state of input terminal.



7-4 **Operation Method**

● The Original Screen as Power is ON.

(1) Language Setting Screen:



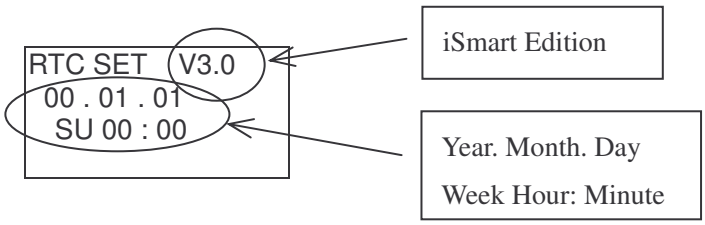
4 Line Display Screen

Language Selecting Menu.

Press the buttons：

↑ ↓	Move the Cursor
OK	Enter the selected language, and display the screen for time setting.

(2) Present Time Setting Screen

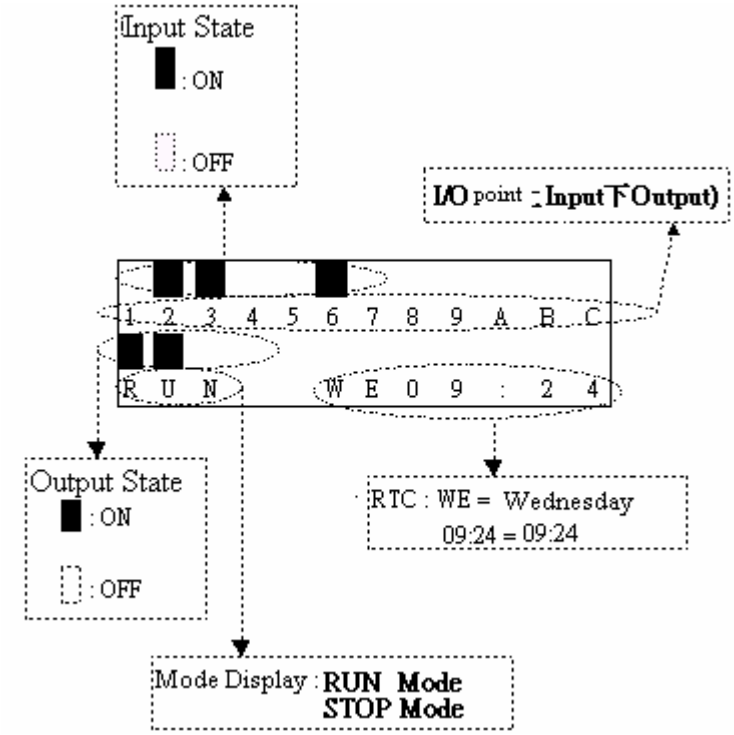


Press the button:

SEL	Begin to input the value
SEL + ←/ →	Move the Cursor
SEL + ↑ / ↓	1. Year = 00~99,Month = 01~12,Day = 01~31 2.Week ⇔TU⇔WE⇔TH⇔FR⇔SA⇔SU⇔MO 3. Hour = 00~23 or Minute = 00~59
OK	Save the RTC Time, Finish the original screen setting, then Display power Start Screen.

Note：The default method is LADDER Edit Mode as the original screen is set.

● Original Screen as the power is on.

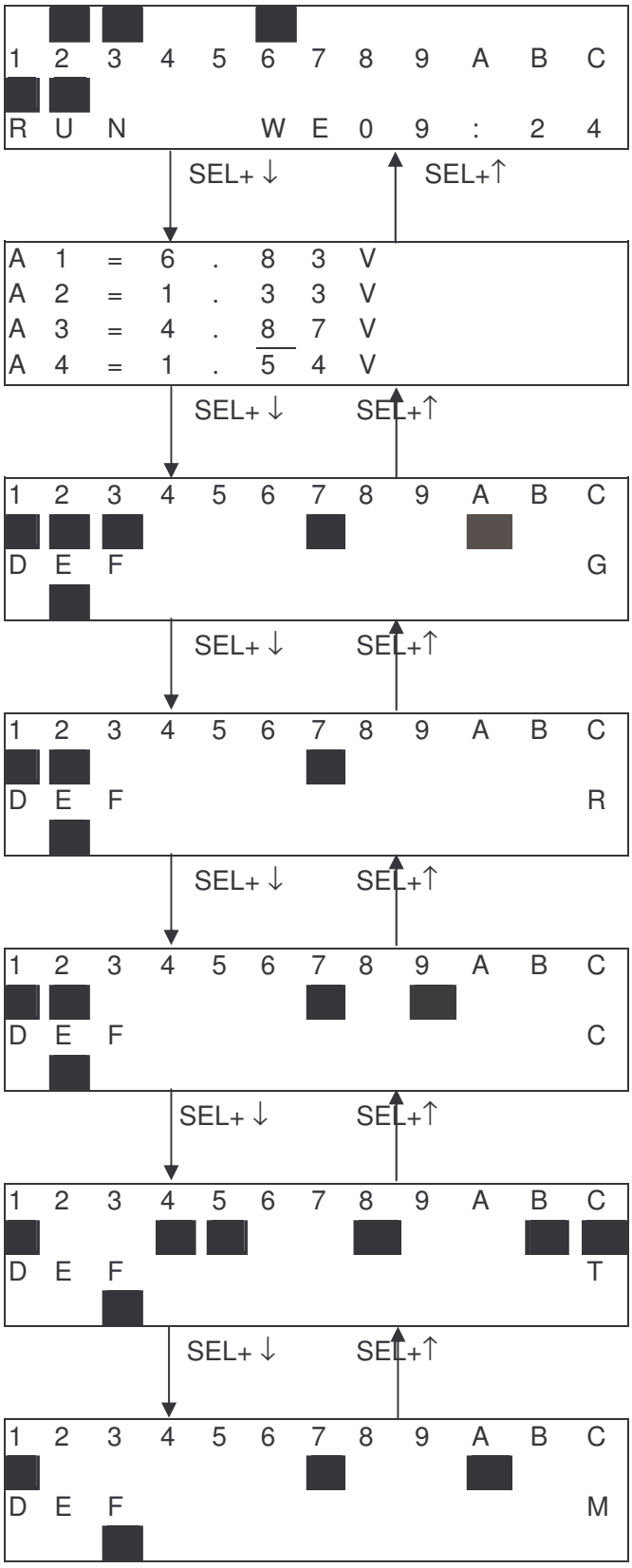


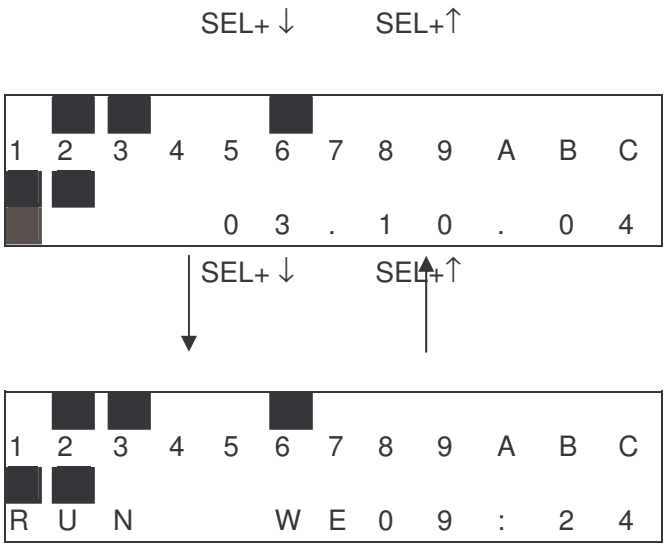
Press the button:

ESC	Back to Main Menu
SEL+↑ ↓	Under LADDER Edit Mode, display the state of other relays(expansion X&Y⇔M ⇔ T ⇔ C ⇔ R ⇔ G⇔A) ⇔ Original Screen
SEL	H Function will be displayed as the button is pressed for 3 seconds. If Mode 2 is selected for HMI, the H Function will not be displayed.

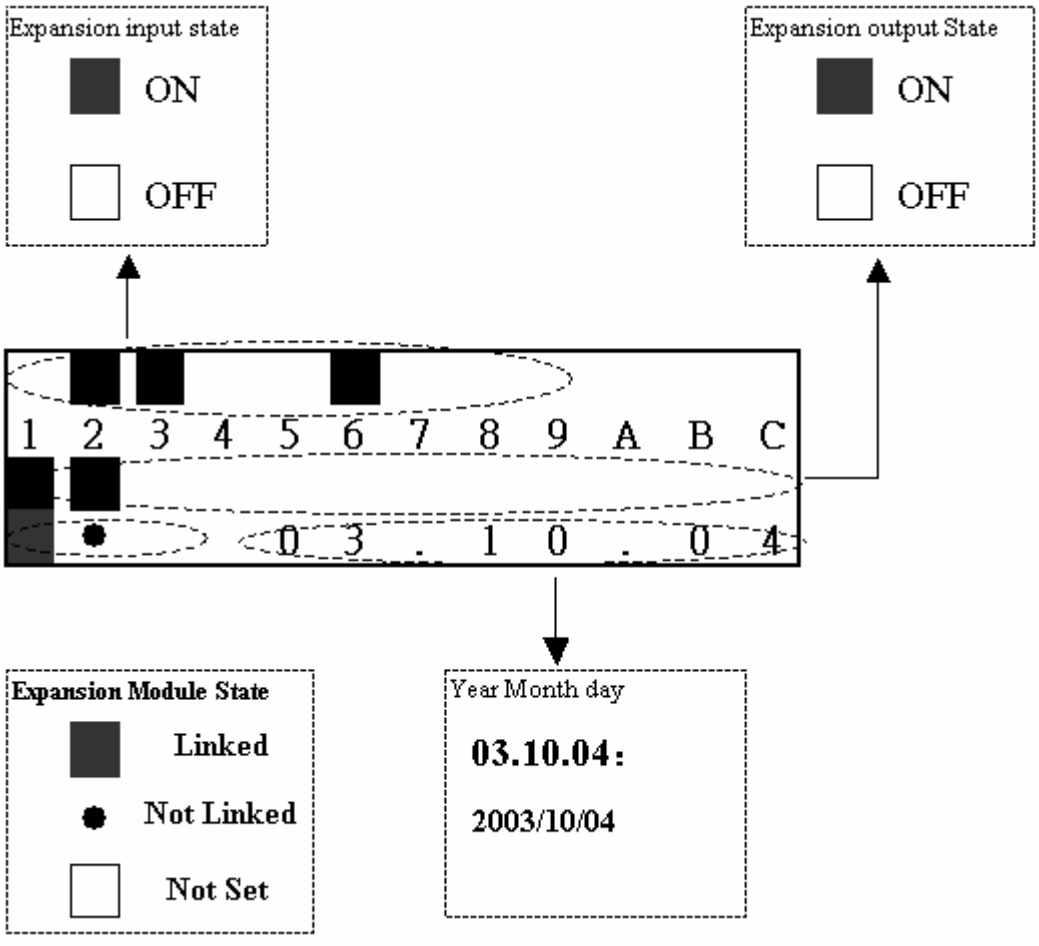
Sample:

a) Display other relay operation:

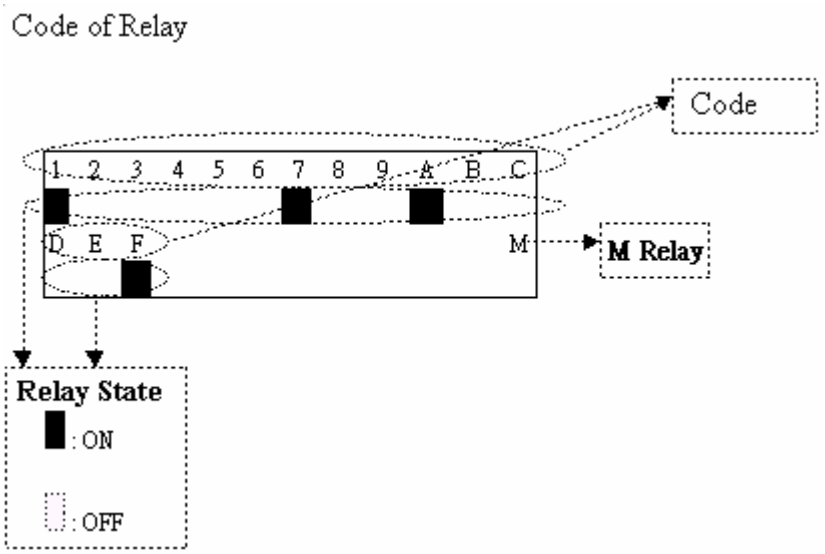




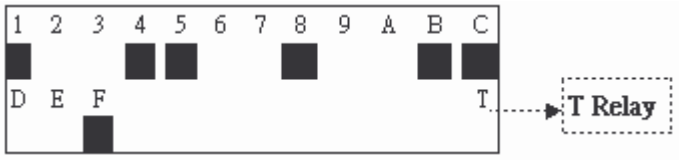
(1) Expansion display State



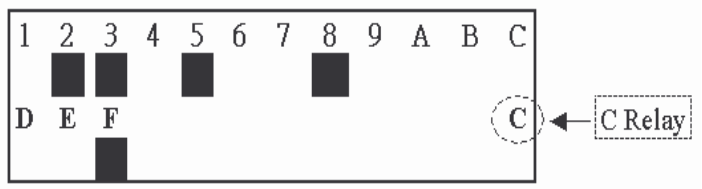
(2) M Display Status:



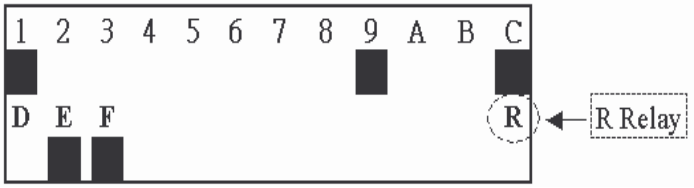
(3) T Display State:



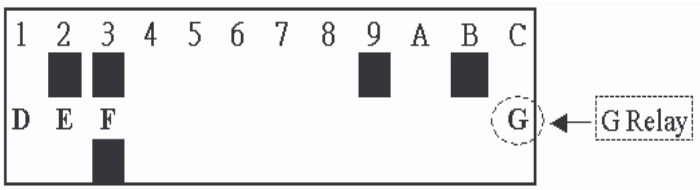
(4) C Display State:



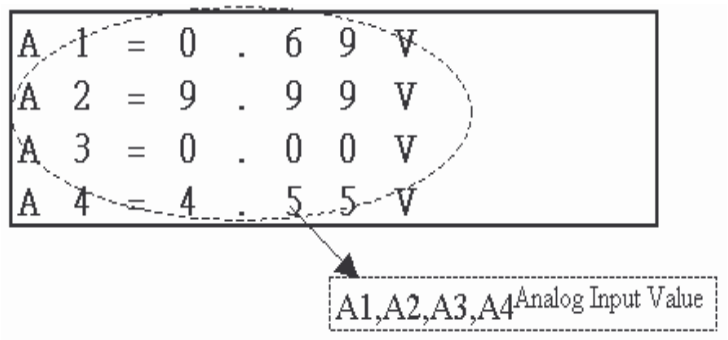
(5) R Display State:



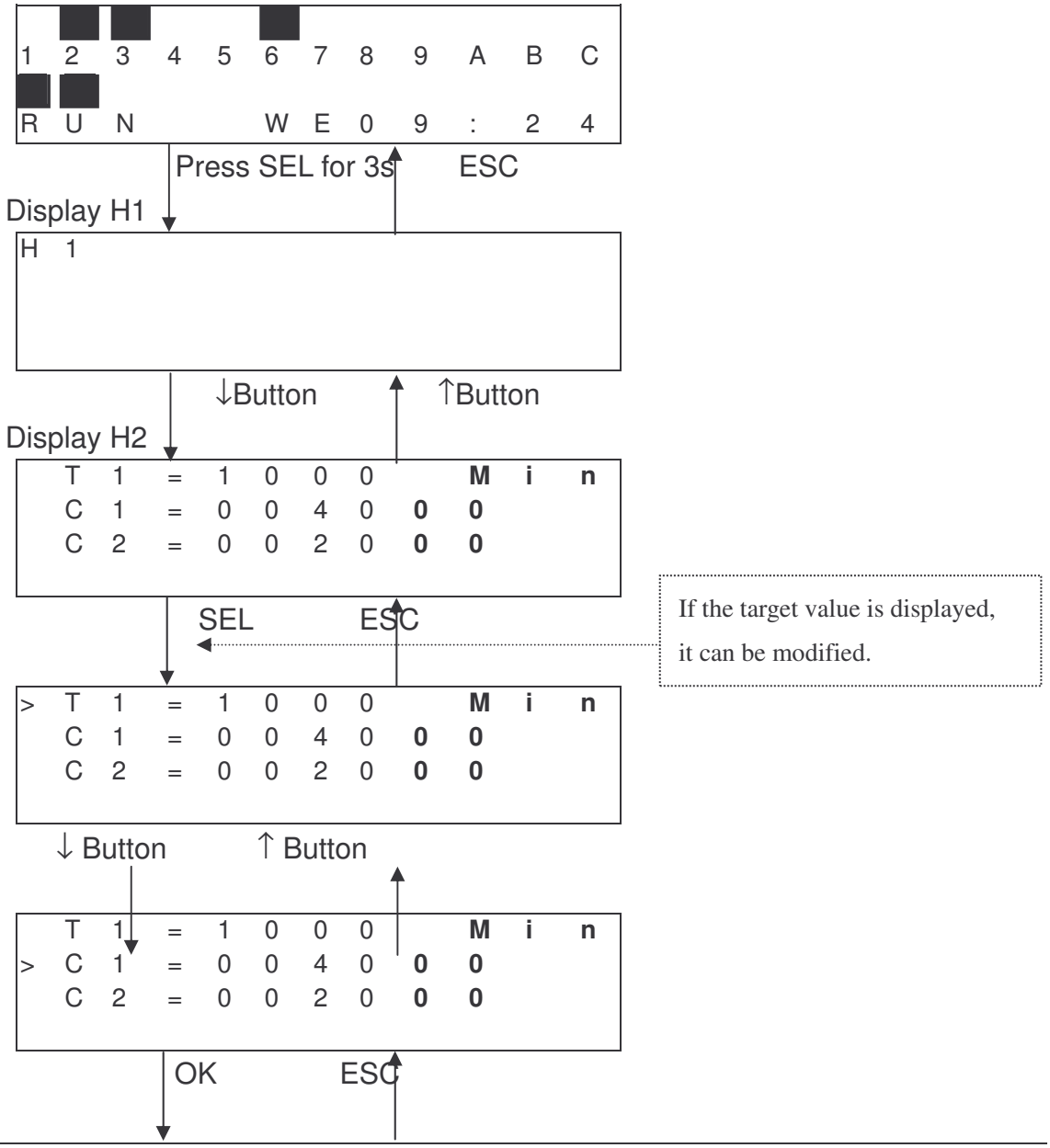
(6) G Display State:

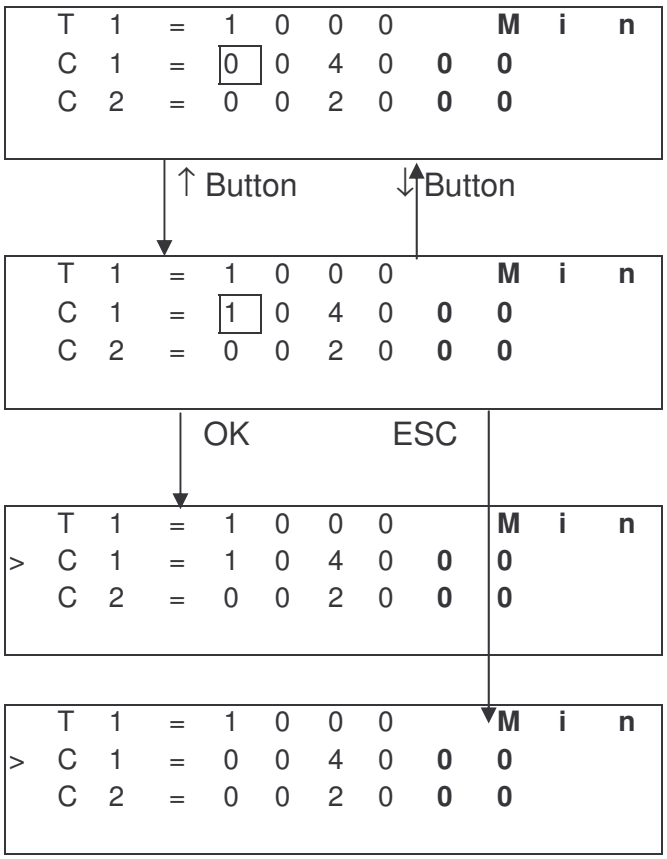


(7) Analog Input Value:



b) Operation to Display H Function:





●Main Menu

LCD displays 4-line Main Menu

(1) The Main Menu as iSmart under 'STOP' Mode.

>	LADDER	
	FUN.BLOCK	
	RUN	
	CLEAR	→ Clear the user program and the password
	PROG.	
	WRITE	→ Save user program to PM04
	READ	→ Read user Program from PM04
	SET	
	RTC SET	
	ANALOG SET	
	PASSWORD	
	LANGUAGE	→ Select the language
	INITIAL	→ initially set Edit method

(2) The Main Menu as **iSmart** under 'RUN' Mode.

```
> LADDER
  FUN.BLOCK
  STOP
  WRITE
  RTC SET
  WRITE
  PASSWORD
  LANGUAGE
```

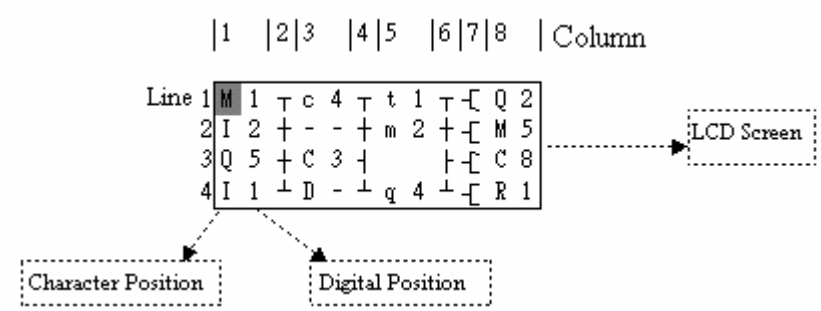
Press the Button

↑ ↓	Move the Cursor to select Main Menu
OK	Confirm the selected Function
ESC	Skip to Initial Screen

● **iSmart** can be modified, edited, cleared and read user program only when it is under STOP Mode.

● As the program is modified, **iSmart** will automatically backup it to EEPROM.(not PM04)

1.Main Menu LADDER

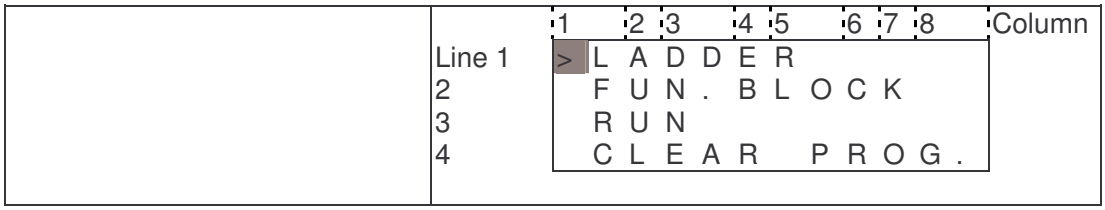


Press the Button

Button	Description
SEL	1. Ix ⇒ ix ⇒ — ⇒ space ⇒ Ix (only for digital and character position of 1,3,5 column.) 2. Qx ⇒ space ⇒ Qx (only for digital and character position of 8 column.). 3. ⊥⊤ ⇒ space ⇒ ⊤⊥ (all available but the 2,4,6 column of the first line) x : Digital: 1~F
SEL +↑/ ↓	1. 1...F, – (When the cursor locates the digital position, the range of digital is restricted by the relay type. 2. I ⇔ X ⇔ Q ⇔ Y⇔ M ⇔ D ⇔ T ⇔ C ⇔ R ⇔ G ⇔ I (When the cursor located at 1,3,5 Column).

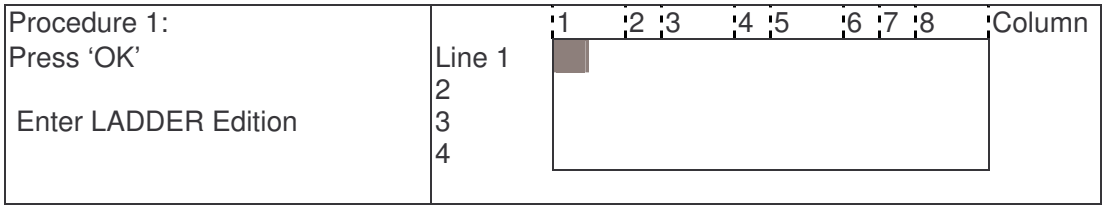
	3. Q ⇔ Y ⇔ M ⇔ T ⇔ C ⇔ R ⇔ G ⇔H ⇔ L ⇔P ⇔ Q (When the cursor located at 8 Column) 4. **(** ⇔ ⇔ ⇔ P ⇔ **(** (When the cursor located at 7 Column, and the 8 Column is set as Q,Y,M) 5. **(** ⇔ P ⇔ **(** ((When the cursor located at 7 Column, and the 8 Column is set as T)
SEL + ←/→	Confirm the input data and move the cursor
↑/ ↓	Vertically move the cursor
←/ →	Horizontally move the cursor
DEL	Delete an instruction
ESC	1. Cancel the Instruction or action under Edition. 2. Back to Main Menu after query the program.
OK	1. Confirm the data and automatically save, the cursor moves to next input position. 2. When the cursor is on Column 8, Press the button to automatically enter the function block and set the parameters(such as T/C)。
SEL+DEL	Delete a Line of Instruction.
SEL+ESC	Display the number of the Lines and operation state of **iSmart** (RUN/STOP)。
SEL+↑/ ↓	Skip up/ down every 4-line program.
SEL+OK	Insert a space line

Operation Sample：



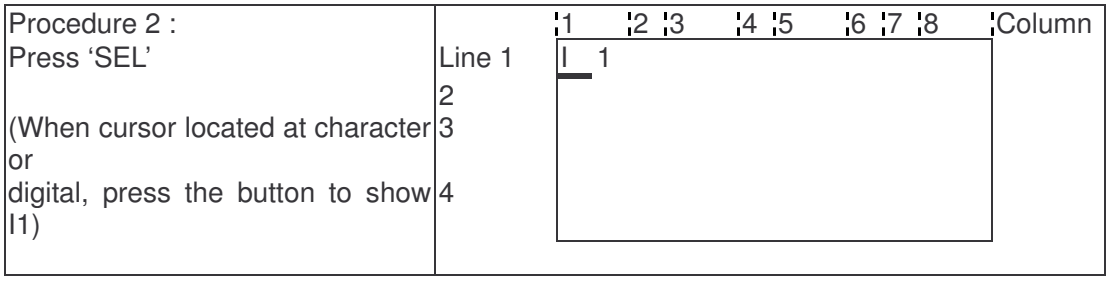
Procedure 1:
Press ‘OK’

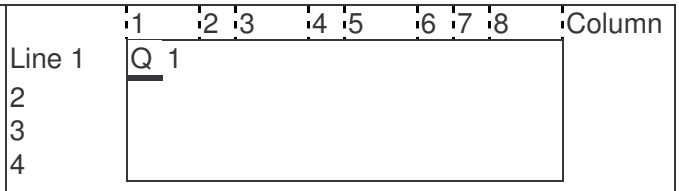
Enter LADDER Edition

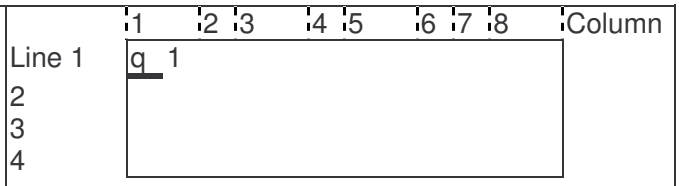


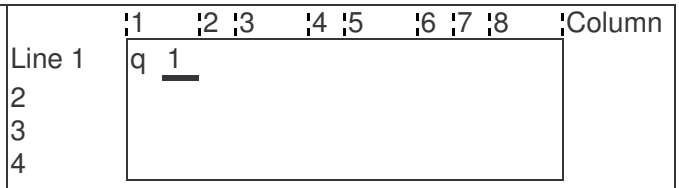
Procedure 2 :
Press ‘SEL’

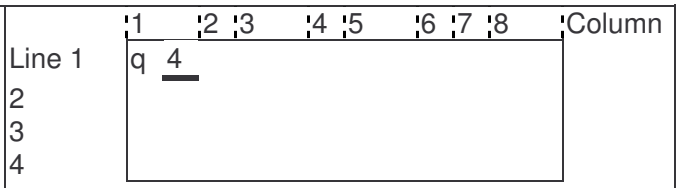
(When cursor located at character or digital, press the button to show I1)

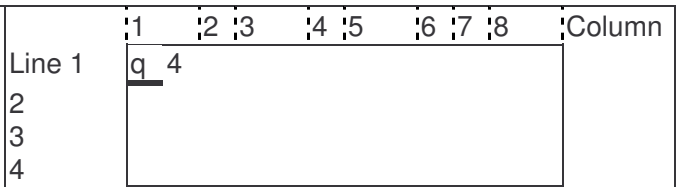


Procedure 3 : Press '↑' twice. (Press 'SEL' + '↑ ↓', and the digital cursor located will change from I to Q).	

Procedure 4 : Press 'SEL' (start /end modifying parameter)	

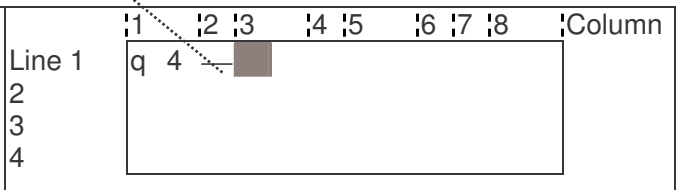
Procedure 5 : Press '→' ("Press 'SEL' + '← →', the cursor located in digital)	

Procedure 6 : Press '↑' for 3 times ("Press 'SEL' + '↑ ↓' the digital the cursor located will change from 1 to 4)	

Procedure 7 : Press '←' (Press 'SEL' + '← →' to move the cursor to the position Required revision.	

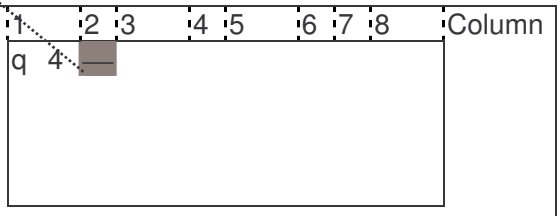
Automatically Link

OR

Procedure 7 : Press 'OK' (Move the cursor to character in column 3)	

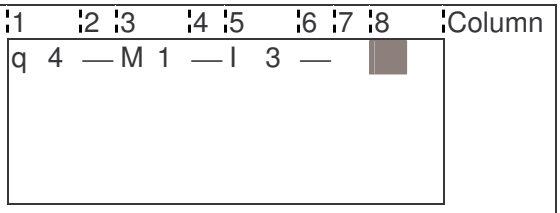
OR

Procedure 7 : Press '→' (move the cursor to the link location in column 2)	Line 1 2 3 4

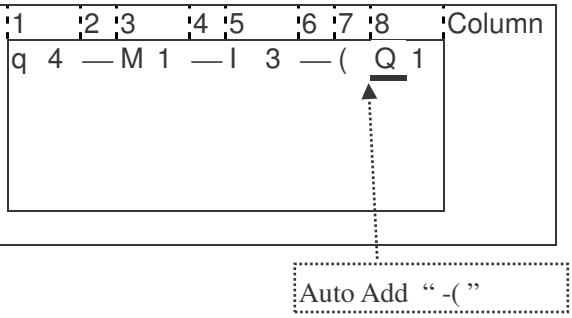


Repeat the step1~7, and input M1, I3 Instruction to column 3, 5.

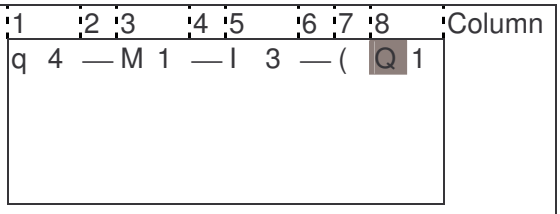
Procedure 8 : Press 'OK' in Column 5 (move the cursor to the character in column 8)	Line 1 2 3 4



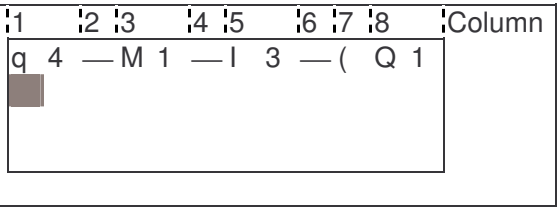
Procedure 9 : Press 'SEL' (when the cursor located at character and digital, press 'SEL' to show ' –(Q1')	Line 1 2 3 4

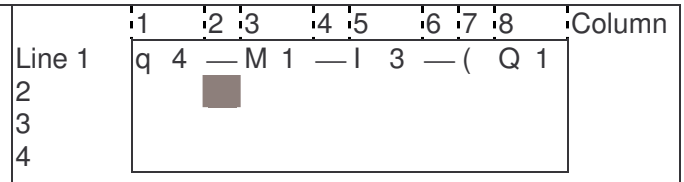


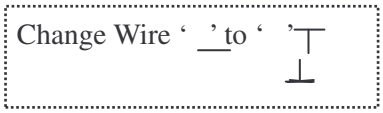
Procedure 10 : Press 'OK' Save the input program data, the position of the cursor will not move.	Line 1 2 3 4

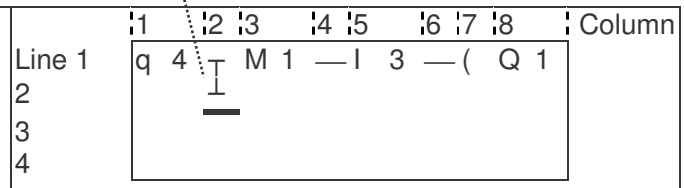


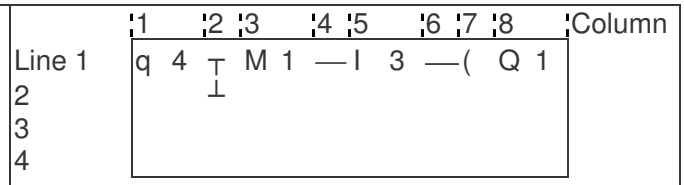
Procedure 11 : Press '→' twice (move the cursor to column 1 and Line 2.)	Line 1 2 3 4



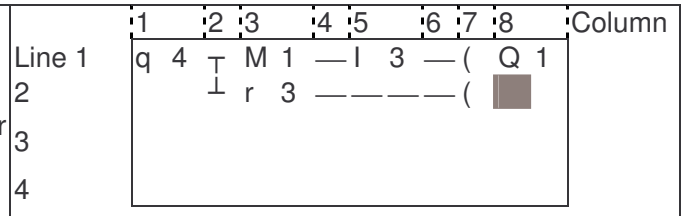
Procedure 12 : Press '→' twice (move the cursor to column 2) Note: never press 'SEL' before hand	

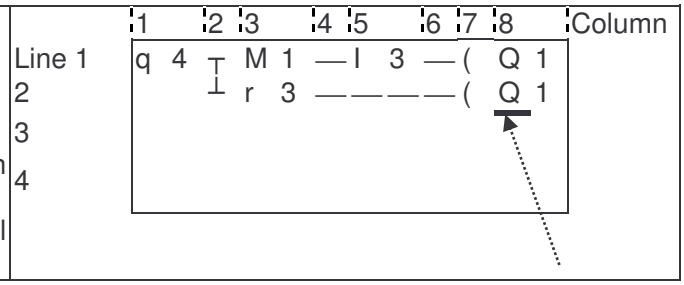


Procedure 13 : Press 'SEL' (A vertical line emerges)	

Procedure 14 : Press 'OK' (Move the cursor to character in column 3.)	

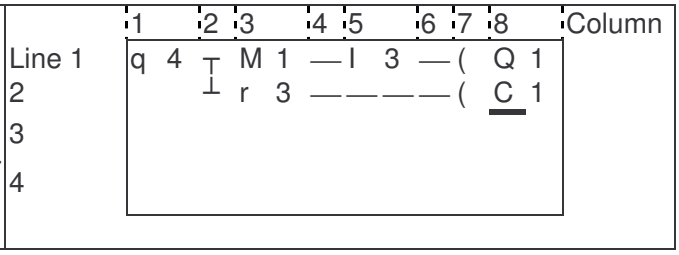
Repeat the step 1~7 and key in 'r 3' , —" at Line 2 and column 3~6.

Procedure 15 : Press 'OK' in column 5 (move the cursor to the character in Column 8)	

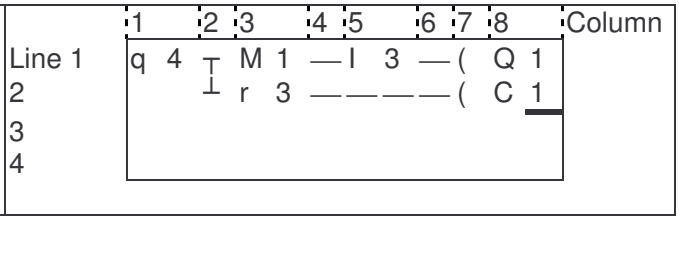
Procedure 16 : Press 'SEL' (When the cursor located in digital or character, press 'SEL', 'Q1' will emerges)	

Procedure 17 :
Press '↑' for 4 times

(Press 'SEL' + '↑ ↓'
(The character Q the cursor locating
will change to C.)

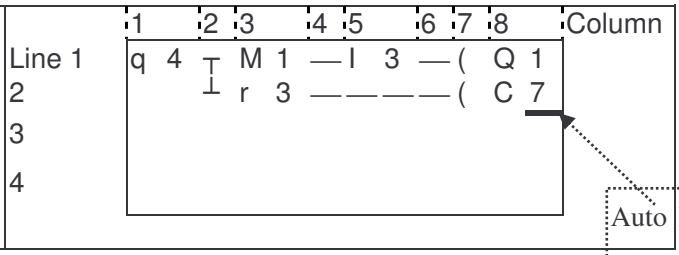


Procedure 18 :
Press '→'



Procedure 19 :
Press '↑' for 7 times

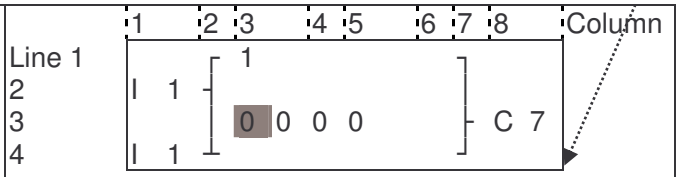
(Press 'SEL' + '↑ ↓'
The digital 1 the cursor locating will change to 7)



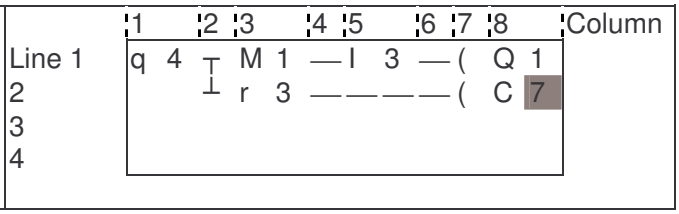
Auto Enter Function Block Edition

Procedure 20 :
Press 'OK'

(Auto shift to FUNCTION BLOCK and the counter input parameter)

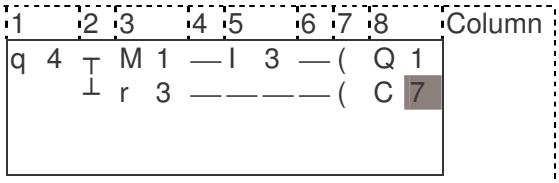


Procedure 21 :
Press 'ESC' back to LADDER edition screen

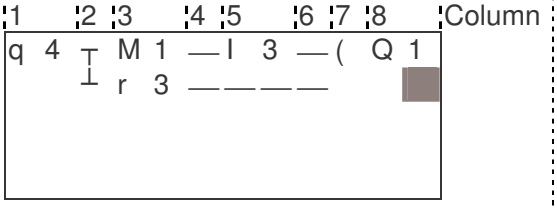


Delete the Program Element

	Line 1 2 3 4

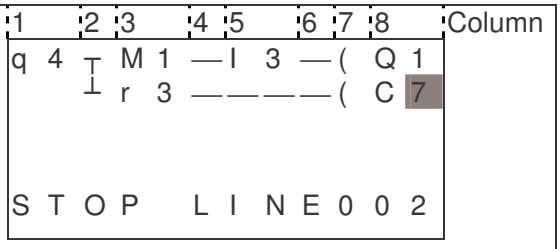


Procedure : Press ‘DEL’ (to delete the element C7 the cursor locating)	Line 1 2 3 4



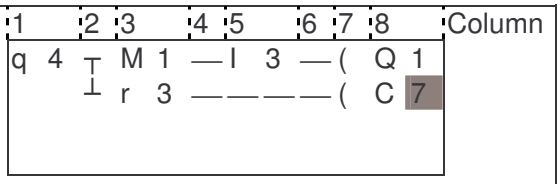
Display the present Line the cursor locating and operation state of SG2.

Procedure : Press ‘SEL+ESC’ (simultaneously) (The Line 4 displays where the cursor locating and operation state of **iSmart**)	Line 1 2 3 4

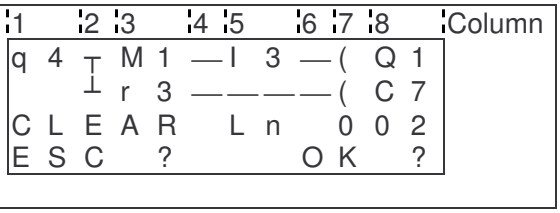


Delete the whole Line

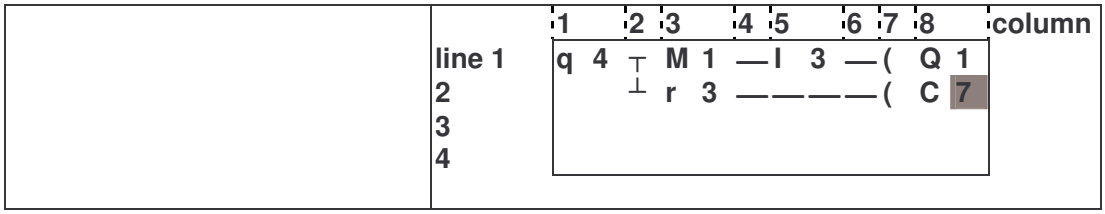
	Line 1 2 3 4

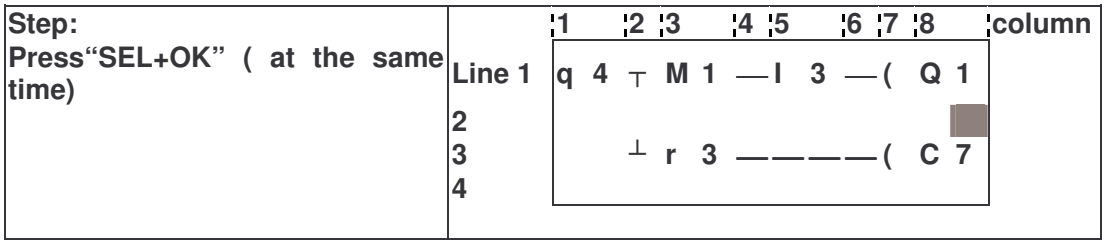


Procedure : Press ‘SEL+DEL’ (Simultaneously) (‘ESC’ Cancel , ‘OK’ Execute)	Line 1 2 3 4

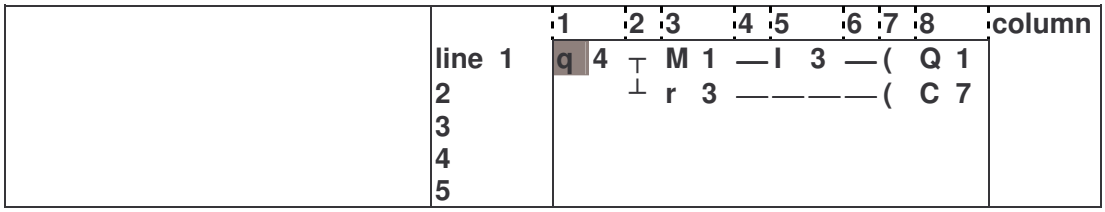


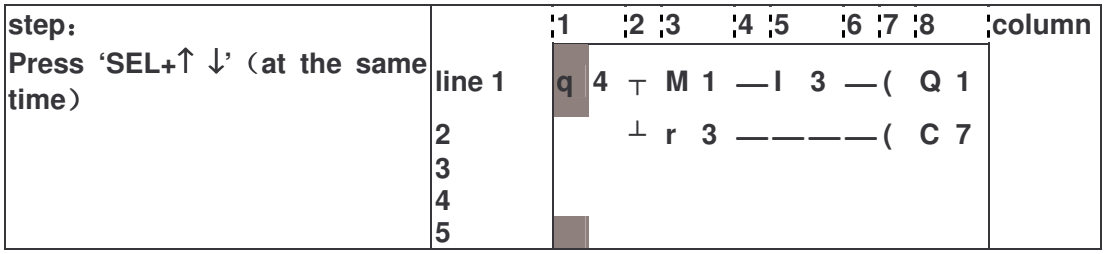
Insert a whole line.:



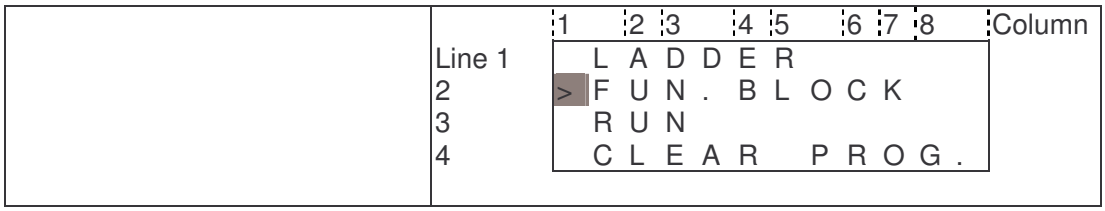


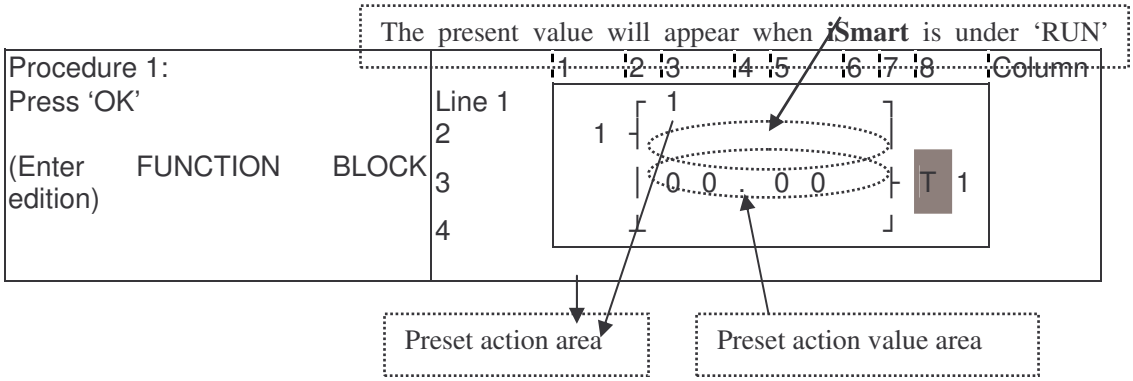
Turnpage (move upward/ downward 4 lines program.）：

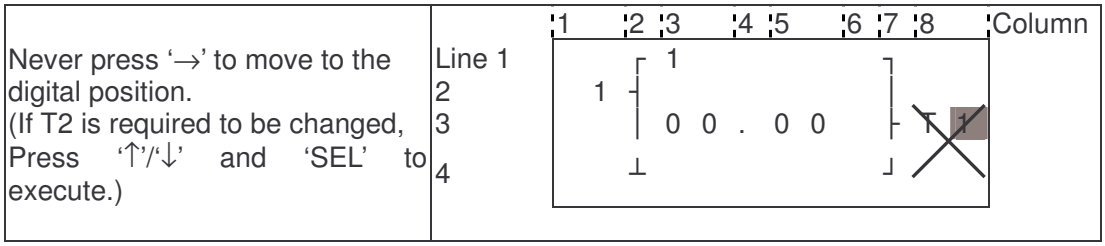




2. FUNCTION BLOCK program input

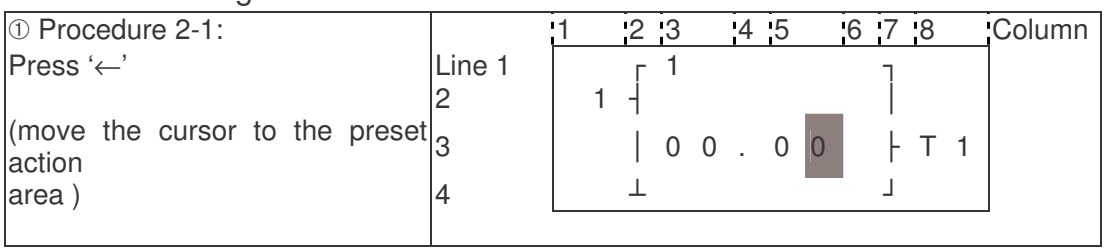






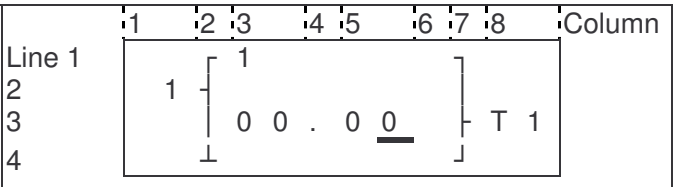
Step 2: modify ① preset target value ②preset the action relay

① Preset the target value



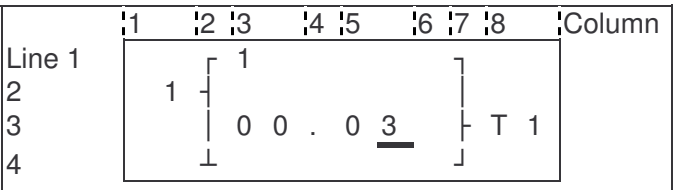
① Procedure 2-2:
Press 'SEL'

(begin input the target value)



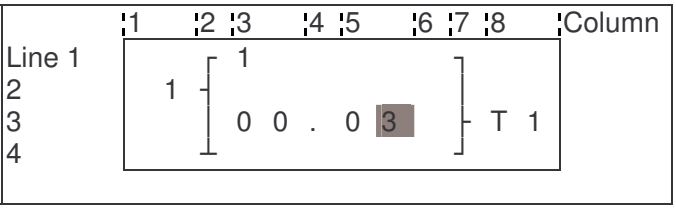
① Procedure 2-3:
Press '↑' for 3 times

(Press 'SEL' and followed by '↑,↓'
The digital '0' is changed to '3')

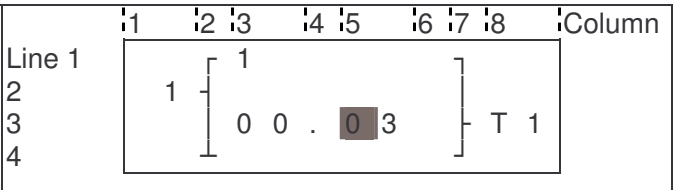


① Procedure 2-4:
Press 'OK'

(Save the input data)

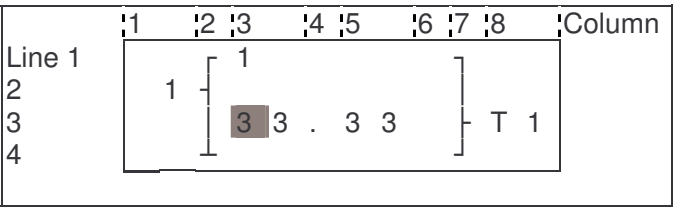


① Procedure 2-5:
Press '←'



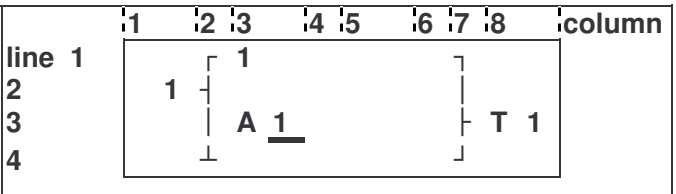
Repeat Step 2-2 ~ step 2-4 for 3 times, to enter the following screen:

① Procedure 2-6:

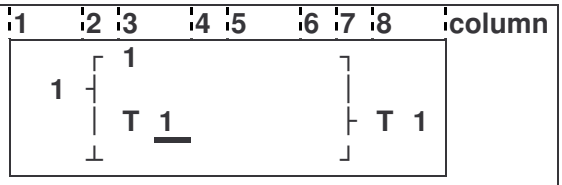


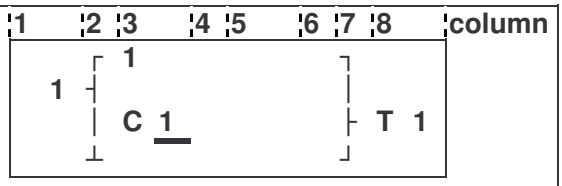
As the preset value of the timer, counter and analog comparator is set as the present value of them. Next to the step 2-2, to execute the following operation:

① Step2-3A:
Press 'SEL'

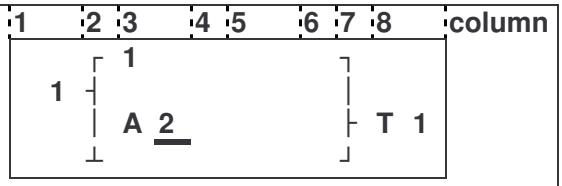


Repeat the step 2—3A, the following screen will be shown in turn:

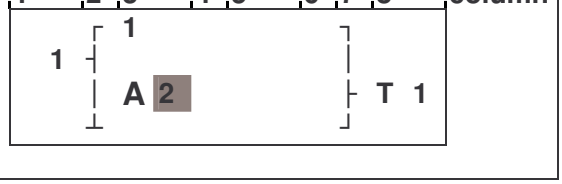
① step 2-3B: **press 'SEL'**	**line 1** **2** **3** **4** 

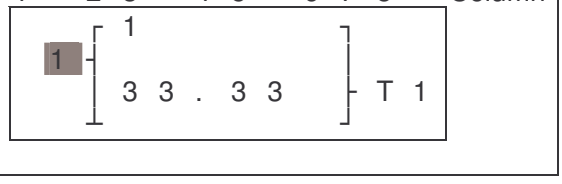
① step 2-3C: **Press 'SEL'**	**line 1** **2** **3** **4** 

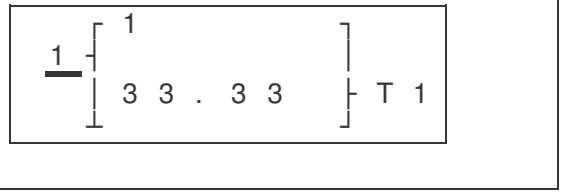
Next to step 2—3A, then '↑' , the following screen will be shown.

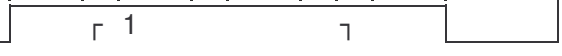
① step 2-4A: **Press '↑'**	**line 1** **2** **3** **4** 

Repeat step 2—4A (press '↓' is also available), the preset value of A1~A4 will be periodically changed. The other function blocks (time, counter) present value is set as preset value, to repeat the step to select T1~TF, C1~CF.

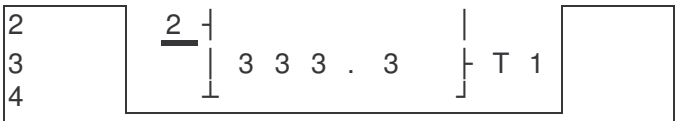
① step 2-5A: **press 'OK'** **Save the present data.**	**line 1** **2** **3** **4** 

① Procedure 2-7: Press '↑'	Line 1 2 3 4 

② Procedure 2-8: Press 'SEL' (begin to edit data)	Line 1 2 3 4 

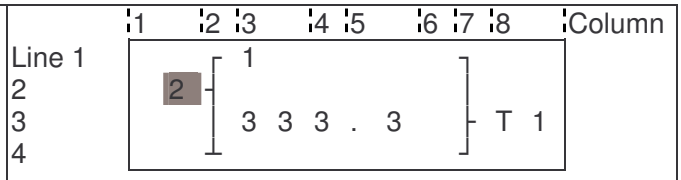
② Procedure 2-9: Press '↑'	Line 1 

(Press 'SEL' + ' ↑, ↓'
to change1' to ' 2')



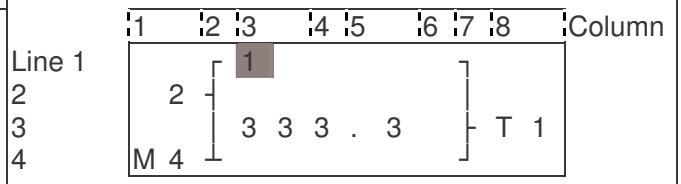
② Procedure 2-10:
Press 'OK'

(save the input data)



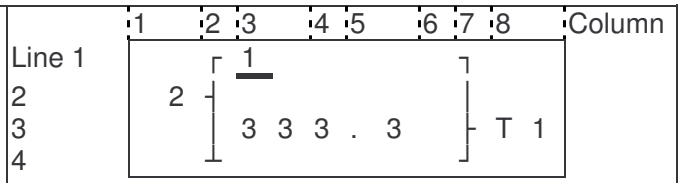
② Procedure 2-11:
Press '↑'

(move the cursor to '1" position)



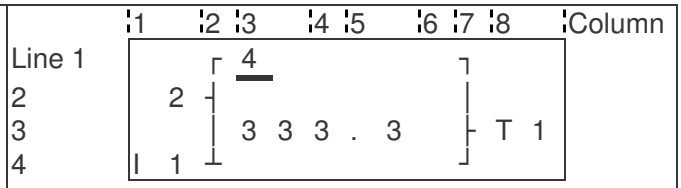
② Procedure 2-12:
Press 'SEL'

(begin to edit data)



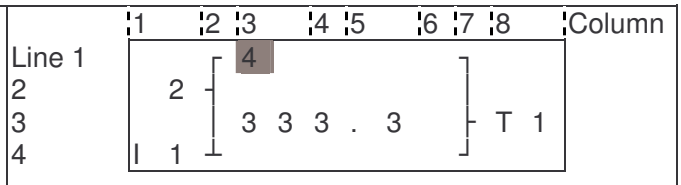
② c 2-13:
Press '↑' for 3 times

(Press 'SEL' and followed by '↑ ↓'
to change 1 to 5)



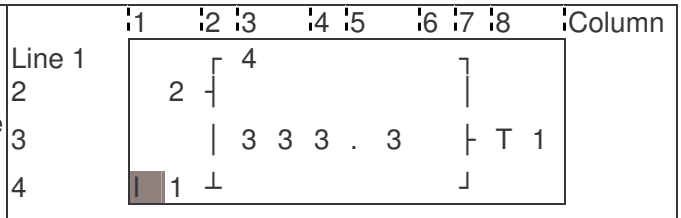
② Procedure 2-14:
Press 'OK'

(save input data)



② Procedure 2-15:
Press '↓' for 3 times

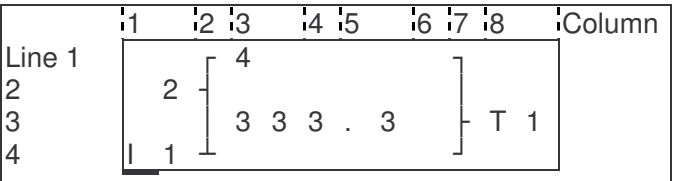
(this step leads to editing the
action
relay)



② Edit action program and preset the action relay

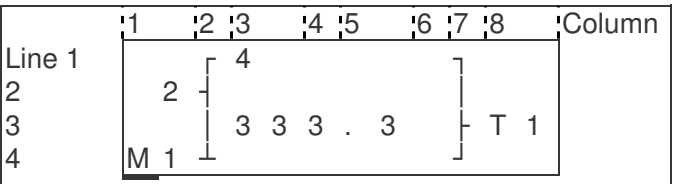
② Procedure 2-16:
Press ‘SEL’

(Begin to modify)



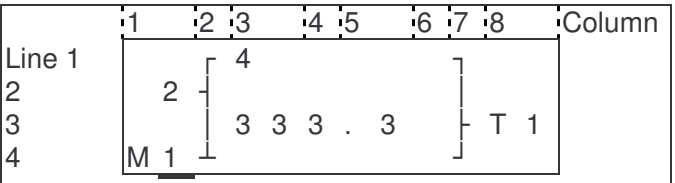
② Procedure 2-17:
Press ‘↑’ for 4 times

(Press ‘SEL’ + ‘↑ ↓’
to change I to M)



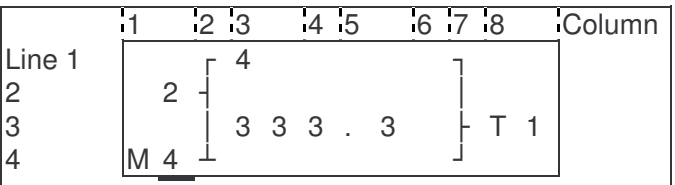
② Procedure 2-18:
Press ‘→’

(Press ‘SEL’ + ‘← →’ to move
the cursor to digital location)



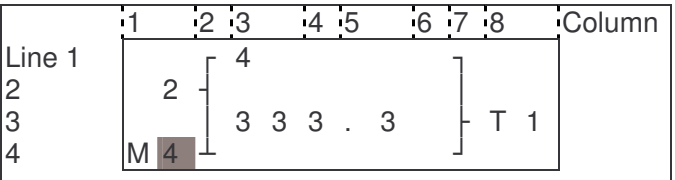
② Procedure 2-19:
Press ‘↑’for 3 times

(Press ‘SEL’ + ‘↑ ↓’ to change
‘1’ to ‘4’)



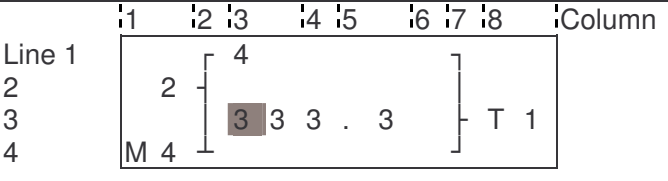
② Procedure 2-20:
Press ‘OK’

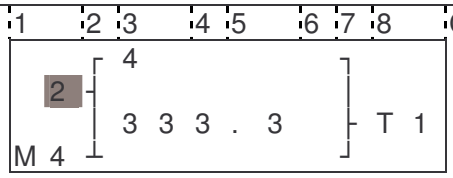
(save the input data)



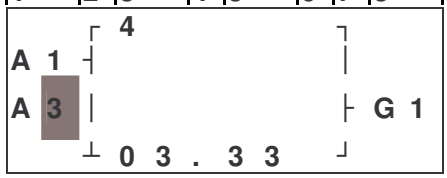
① Procedure 2-21:
Press ‘↑’

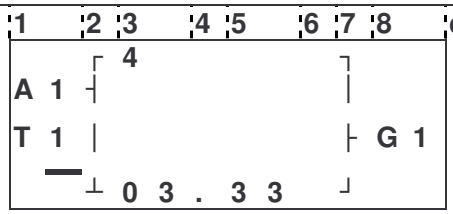
(Move the cursor to preset action
value area to repeat the step 2-1)

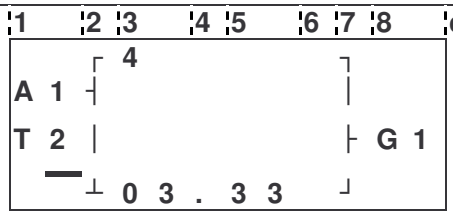


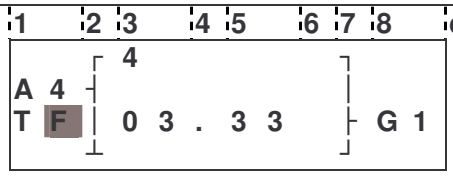
② Procedure 2-22: Press '↑' (Move the cursor to position '2' to repeat the 2-8)	Line 1 2 3 4	

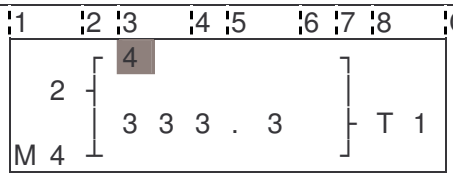
The detail operation of modify the analog comparator Ax, Ay:

② step 2-22A: **Press '↑'** **(Move the cursor to 2, or repeat the next step.** **Select A1~A4**	**line 1** **2** **3** **4**	

② Step 2-22B: **Press 'SEL'** **(Move the cursor to 2 to repeat the above step.** **Select A2-T1-C1-A1)**	**line 1** **2** **3** **4**	

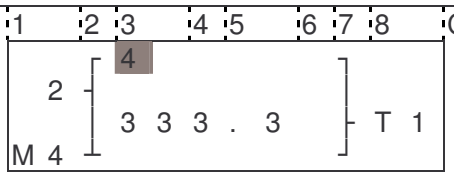
② Step 2-22C: **Press '↑'** **(Move the cursor to 2 to repeat the above step.** **Select T1~TF,C1~CF,A1~A4)**	**line 1** **2** **3** **4**	

② Step 2-22D: **Press 'OK'** **Save the present data**	**line 1** **2** **3** **4**	

② Procedure 2-23: Press '↑' (Move the cursor to position '4' to repeat the step 2-12)	Line 1 2 3 4	

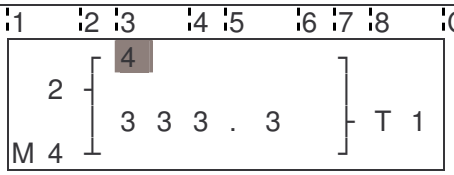
Continue to input Function Block

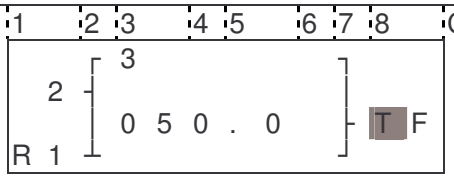
① Next Function Block

	Line 1 2 3 4 

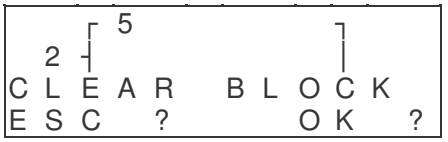
Procedure 1: Press ‘SEL+↑’ (Simultaneously)	Line 1 2 3 4 

② Last Function Block

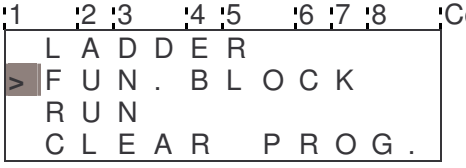
	Line 1 2 3 4 

Procedure : Press ‘SEL+↓’ (Simultaneously)	v 1 2 3 4 

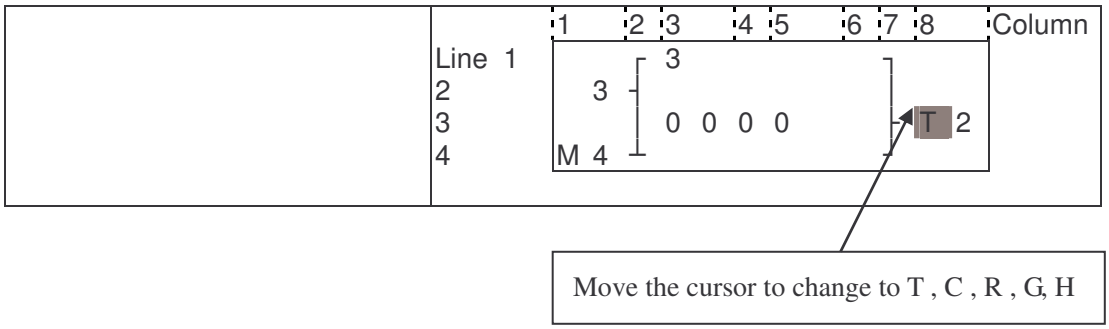
Delete Function Block

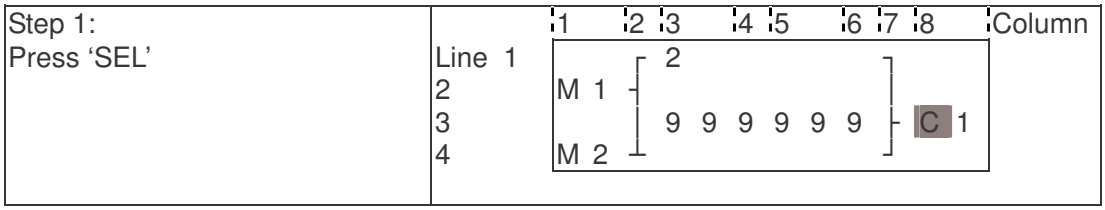
Procedure : Press ‘SEL+DEL’ (Simultaneously) (‘ESC’: Cancel ; ‘OK’: Execute)	Line 1 2 3 4 

Back to Main Menu:

Press ‘ESC’	Line 1 2 3 4 

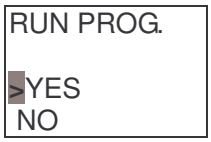
Change Function Block Category:

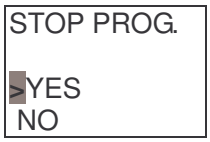




3. RUN or STOP

(1) RUN Mode (2) STOP Mode

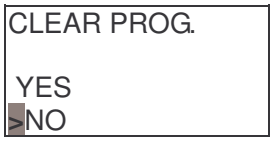




↑ ↓	Move the cursor
OK	Execute the instruction, then back to main menu
ESC	**B**ack to main menu

4. Other Menu Items

(1) CLEAR PROGRAM (Clear RAM, EEPROM and Password at the same time)



(2) WRITE (save the program (RAM) to the SMT-PM04 program spare cartridge)

(3) READ (read the program from the SMT-PM04 program spare cartridge to **iSmart** (RAM))

READ
YES
>NO

(1) ~ (3) Now Press:

↑ ↓	Move the cursor
OK	Execute the instruction, then back to main menu
ESC	Back to main menu

(4) SET (system setting)

ID SET 01	→	ID setting (00~99)
REMOTE I / 0 N	→	Remote I/O Mode (N: none M: Master S:S lave)
BACK LIGHT ×	→	Back light mode (√: always light ×: light for 5s after pressed.)
M KEEP √	→	M: non-Volatile (√:Volatile ×: Non- Volatile)
I/O NUMBER 0	→	Expansion I/O Points（0~3）
I/O ALARM √	→	Siren setting when is not available to Expansion I/O Points（√:Yes ×:No）
C KEEP ×	→	in stop/run switching, Counter Present Value Keeping（√:Yes ×:No）

Now Press:

↑↓←→	Move the cursor
SEL	Begin to edit.
Press ‘SEL’ and ‘←→’	Move the cursor for ‘ID SET item’
Press ‘SEL’ and ‘↑↓’	1. ID SET=00~99 ; I/O NUMBER=0~3 2. REMOTE I/O= N⇔M⇔S⇔N 3. BACK LIGHT ; C KEEP =×⇔√ 4. M KEEP; I/O ALARM =√√⇔××
OK	Confirm the Edition Data
ESC	1. Cancel the setting when pressed ‘SEL’ 2. Back to Main Menu

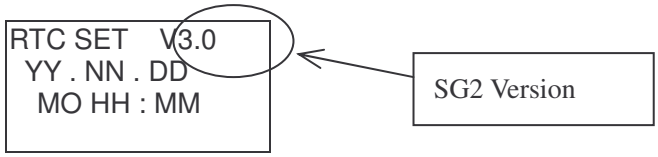
Note：

①When DATALINK is selected, ID setting range is 1~8 , which should be continuous。ID=1default as Master, ID=2~8 default as Slave

②When REMOTE I/O is selected，the distribution of the remote I/O is as follows:

Master			Slave
Remote Input	X1~X12	←	I1~I12
Remote Output	Y1~Y8	→	Q1~Q8

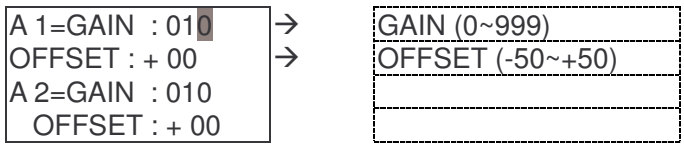
(5) RTC Setting



Now Press

SEL	Begin to input parameters
Press 'SEL' + '← →'	Move the Cursor
SEL then ↑ ↓	1. YY=00~99,NN=01~12,DD=01~31 2.MO⇔TU⇔WE⇔TH⇔FR⇔SA⇔SU⇔MO 3. HH = 00~23 or MM = 00~59
OK	Save the Input Data
ESC	1. Cancel the Input Data when press 'SEL'. 2. Back to Main Menu.

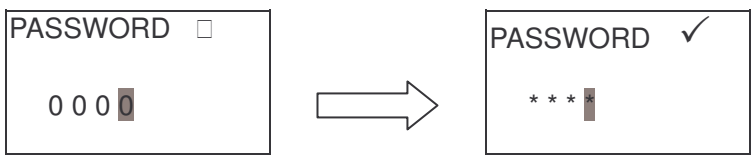
(6) ANALOG SETTING



Now Press

↑ ↓	1. Move downward the Cursor 2. Switch the setting screen from A1, A2 to A3, A4.
SEL	Begin to input parameters
Press 'SEL' + '← →'	Move the Cursor
'SEL' + '↑ ↓'	1. GAIN =000~999 2. OFFSET=-50~+50
OK	Save the Input Data
ESC	1. Cancel the Input Data when press 'SEL'. 2. Back to Main Menu.

(7) SETTING PASSWORD



Now Press

SEL	1. Begin to input numeral 2. When the password is ON, it will not display 0000, but ****.
Press 'SEL' + '← →'	Move the cursor
Press 'SEL' + '↑ ↓'	0~9
OK	Save the input data, not 0000, as the PASSWORD is ON.
ESC	1. Cancel the Input Data when press 'SEL'. 2. Back to Main Menu.

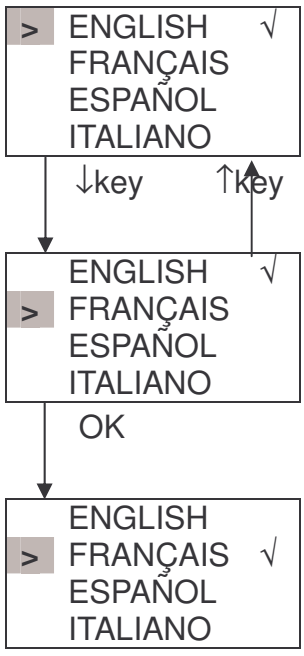
（8）LANGUAGE Selection

>	ENGLISH √	→	English
	FRANÇAIS	→	French
	ESPAÑOL	→	Spanish
	ITALIANO	→	Italian
	DEUTSCH	→	German
	PORTVGVES	→	Portuguese
	SIMPLIFIED CHINESE	→	Simplified Chinese

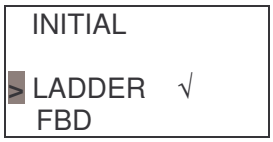
Now Press

Press '↑ ↓'	Vertically move the Cursor
OK	Select the language the cursor located
ESC	Back to Main Menu

Sample:



（8）INITIAL



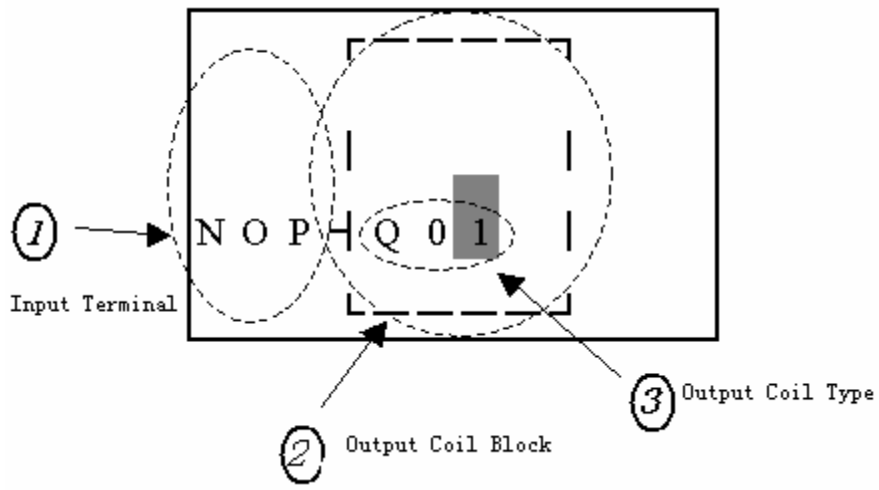
Now Press:

Press '↑ ↓'	Vertically move the Cursor
OK	Select the language the cursor located
ESC	Back to Main Menu

⚠ The origin program will be cleared as the change of edition method.

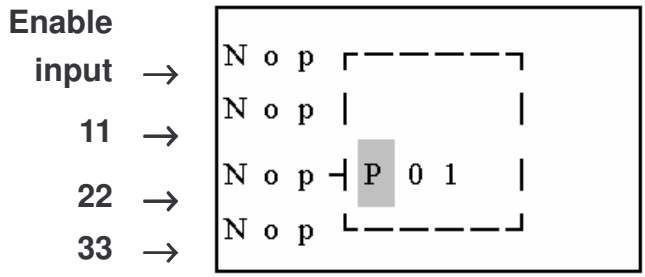
Chapter 8 FBD Block Description

8-1 Coil Block Diagram



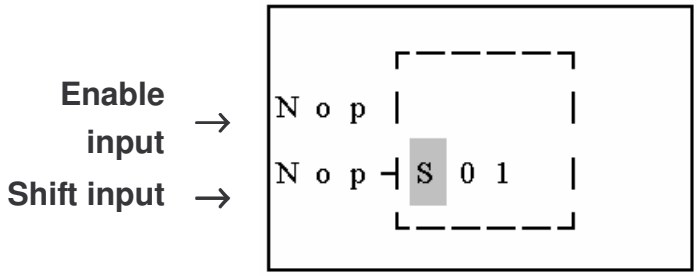
	①Input Terminal	③Output Coil	Range
Input	I		I01~I0C(12)
Expansion Input	X		X01~X0C(12)
Output	Q	Q	Q01~Q08(8)
Expansion Output	Y	Y	Y01~Y0C(12)
auxiliary	M	M	M01~M0F(15)
Knob	N	N	N01~N0F(15)
HMI		H	H01~H0F(15)
PWM		P	P01(1)
SHIFT		**S**	**S01(1)**
DATALINK		L	L01~L08(8)
Logic /Function Block	B		B01~B99(99)
Normal ON	Hi		
Normal OFF	Lo		
No Connection	Nop		

(2) PWM Function Block Description



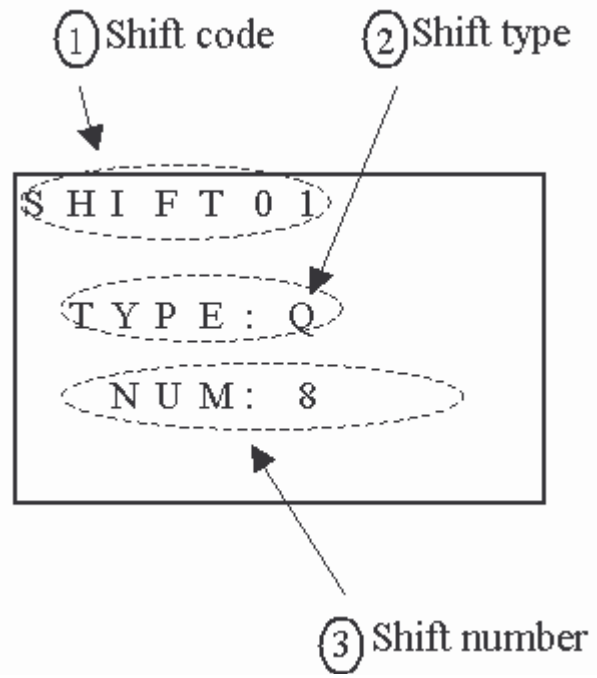
(3) SHIFT Function Block Description

Input terminal description

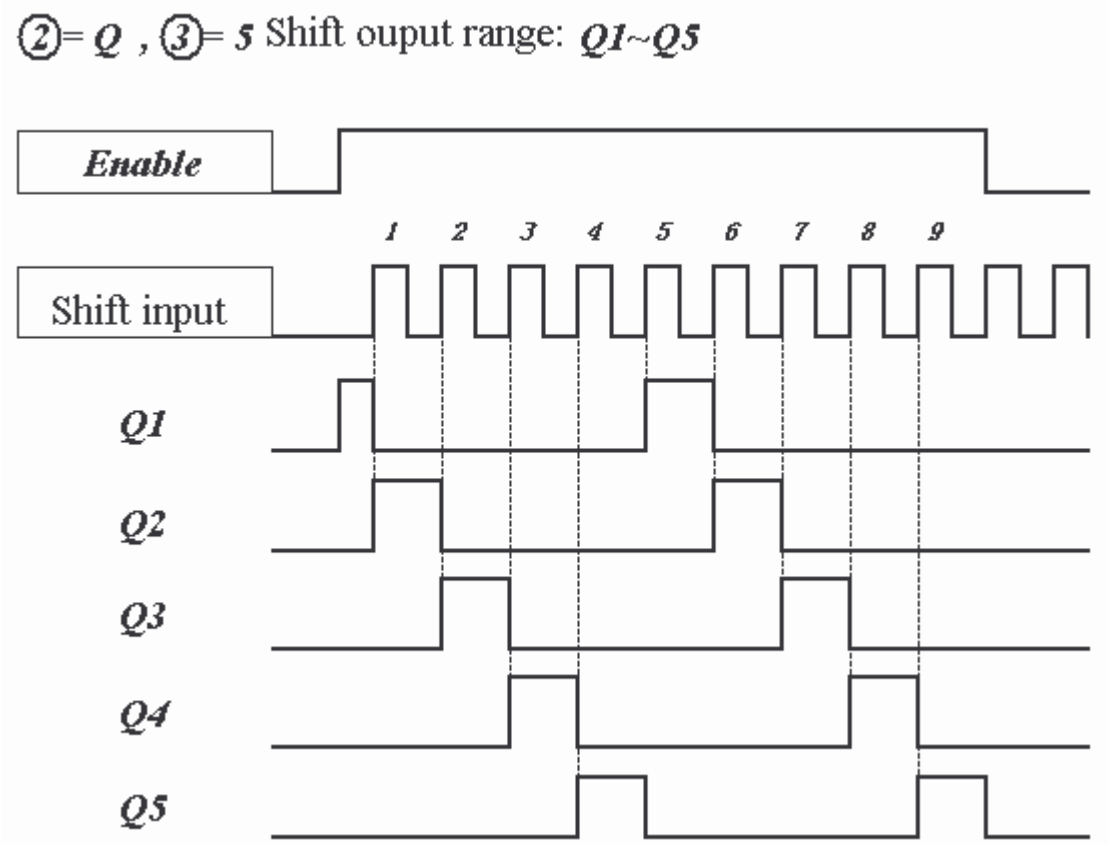


Setting parameter description:

Symbol	Description
①	SHIFT code (Total 1 group)
②	Setting output type (Q,Y)
③	Setting output shift number (1~8)

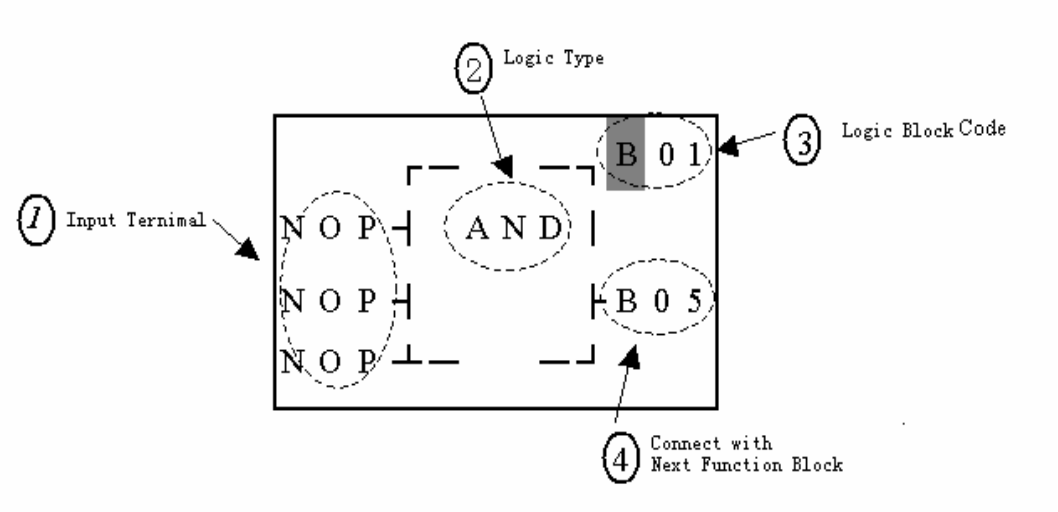

1 Shift code
2 Shift type
SHIFT 01
TYPE: Q
NUM: 8
3 Shift number

Example:


②= Q , ③= 5 Shift ouput range: Q1~Q5
Enable
1 2 3 4 5 6 7 8 9
Shift input
Q1
Q2
Q3
Q4
Q5

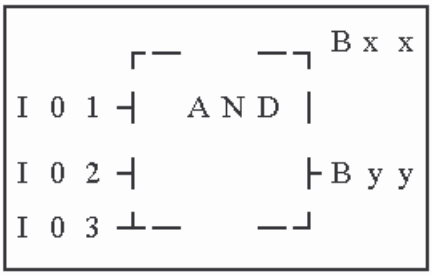
Note：When Enable is available, Q1 ON, Q2~Q4 will be OFF, till the first shift input raise edge, Q2 ON, Q1 and Q3~Q5 OFF. The next output coil will be on when meeting the each raise edge and others are OFF.

8-2 Edit Block

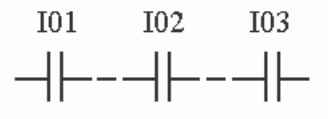


(1) AND Logic Diagram

FBD:



LADDER:

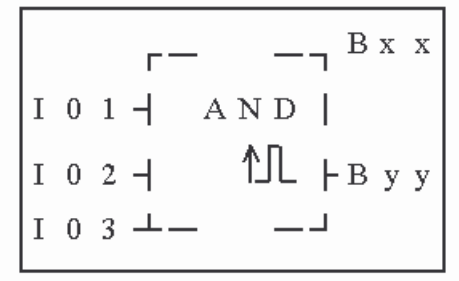


I01 And I02 And I03

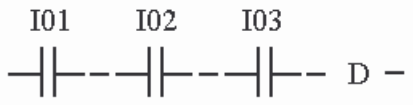
Note : The input terminal is NOP which is equivalent to 'Hi'

(2) AND (EDGE) Logic Diagram

FBD:



LADDER:

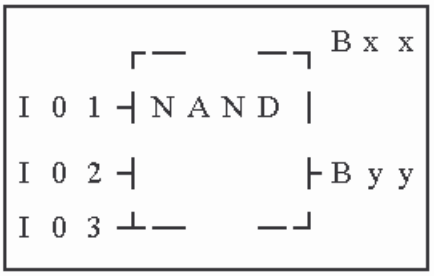


I01 And I02 And I03 And D

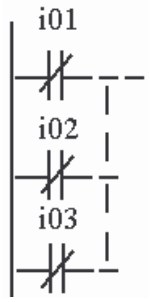
Note：The input terminal is NOP which is equivalent to 'Hi'

(3) NAND Logic Diagram

FBD:



LADDER:

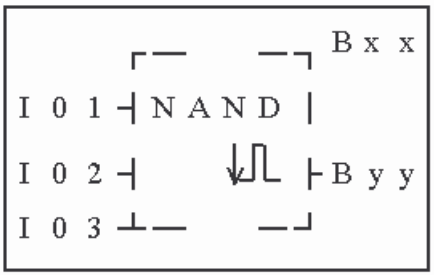


Not(I01 And I02 And I03)

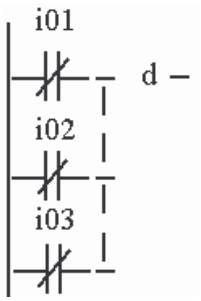
Note：The input terminal is NOP which is equivalent to 'Hi'

(4) NAND (EDGE) Logic Diagram

FBD:



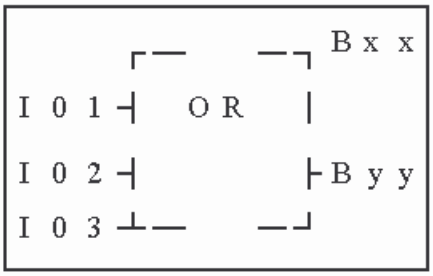
LADDER:



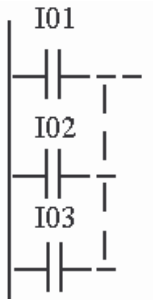
Not(I01 And I02 And I03) And d
Note : The input terminal is NOP which is equivalent to 'Lo'

(5)OR Logic Diagram

FBD:



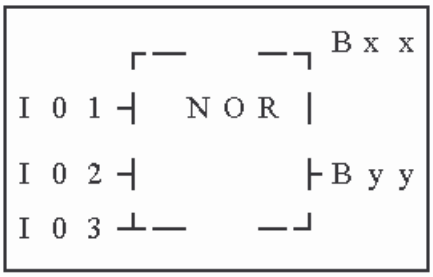
LADDER:



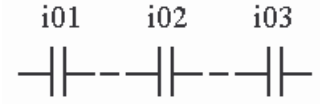
I01 or I02 or I03
Note : The input terminal is NOP which is equivalent to 'Lo'

(6)NOR Logic Diagram

FBD:



LADDER:

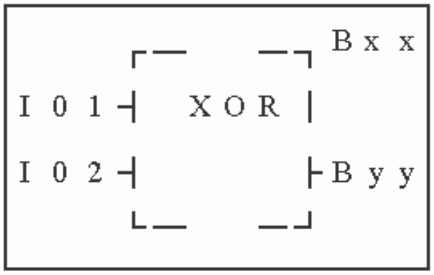


Not (I01 or I02 or I03)

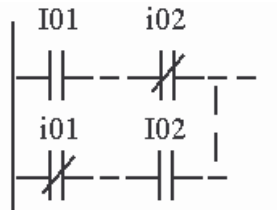
Note：The input terminal is NOP which is equivalent to 'Lo'

(7)XOR Logic Diagram

FBD:



LADDER:

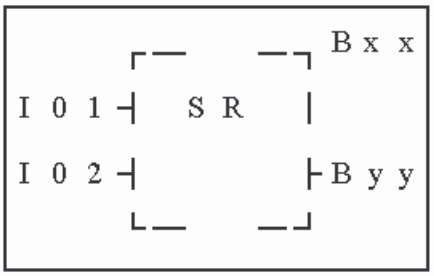


I01 Xor I02

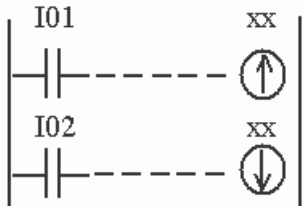
Note：The input terminal is NOP which is equivalent to 'Lo'

(8)SR Logic Diagram

FBD:



LADDER:



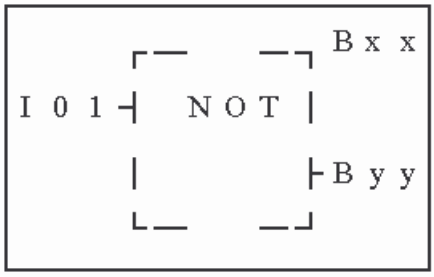
Logic Table

I01	I02	Bxx
0	0	holding
0	1	0
1	0	1
1	1	0

Note：The input terminal is NOP which is equivalent to 'Lo'

(9)NOT Logic Diagram

FBD:



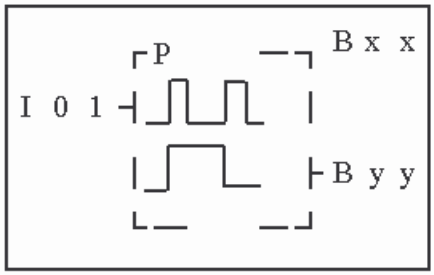
Not I01

Note：The input terminal is NOP which is equivalent to 'Hi'

LADDER:

(10) Pulse Logic Diagram

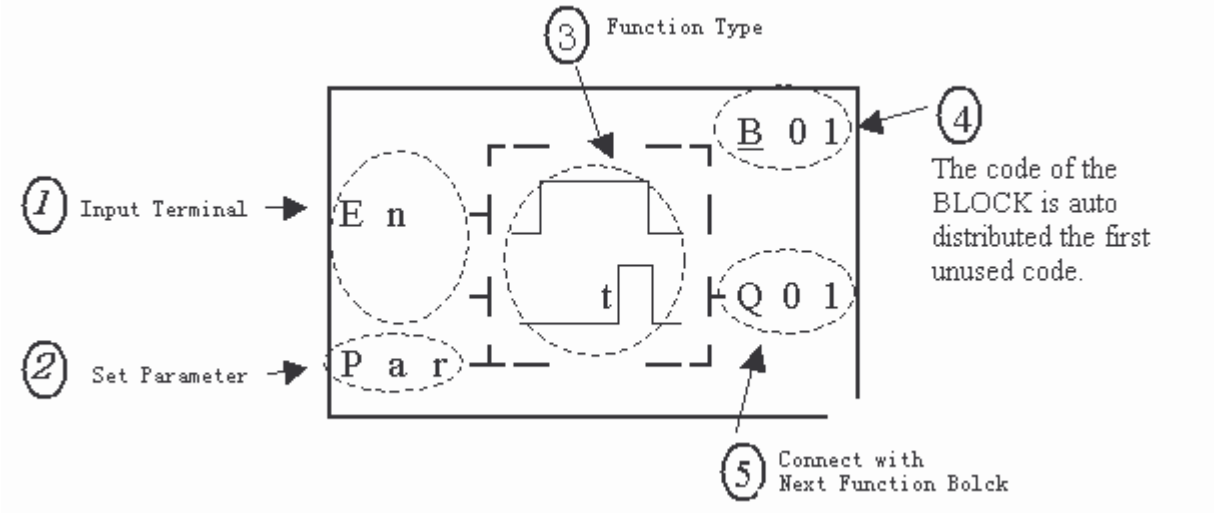
FBD:



Note：The input terminal is NOP which is equivalent to 'Lo'

LADDER:

8-3 Function Block



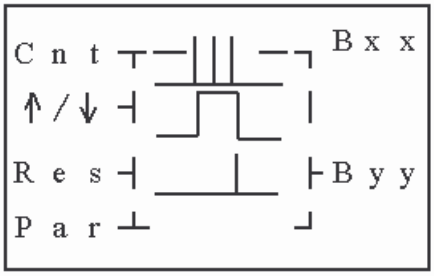
The function blocks are classified into 4 sorts: Time, Counter, RTC Comparator 'R' and Analog Comparator 'G'. The Operation Fundamental is similar to

Ladder Function Block's.

Common Counter Function Block

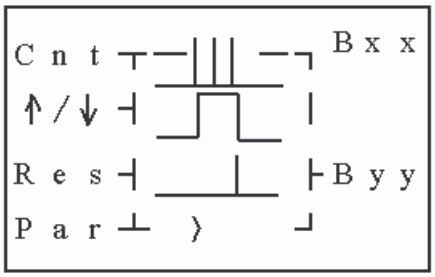
(1) Counter Mode 1

Counting Input →
Up/Down Counting →
Reset →
Counting Parameter →



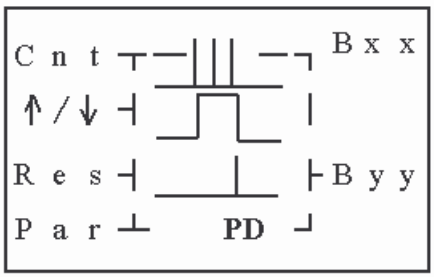
(2) Counter Mode 2

Counting Input →
Up/Down Counting →
Reset →
Counting Parameter →



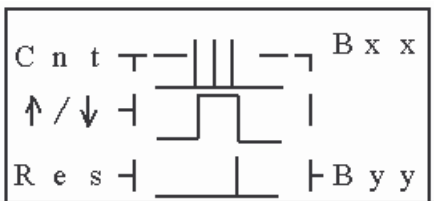
(3) Counter Mode 3

Counting Input →
Up/Down Counting →
Reset →
Counting Parameter →



(4) Counter Mode 4

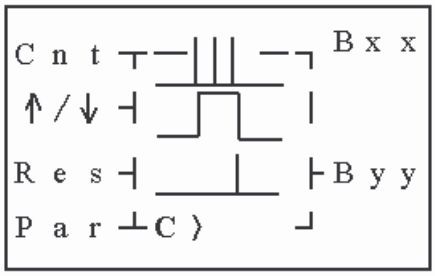
Counting Input →
Up/Down Counting →
Reset →



Counting Parameter →

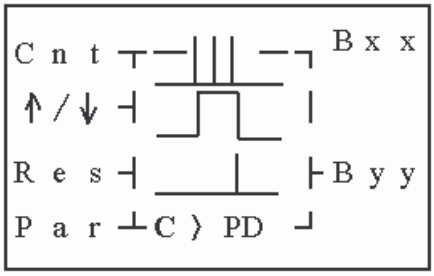
(5) Counter Mode 5

Counting Input →
Up/Down Counting →
Reset →
Counting Parameter →



(6) Counter Mode 6

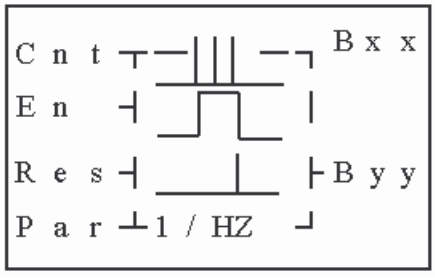
Counting Input →
Up/Down Counting →
Reset →
Counting Parameter →



□ High Speed Counter Function Block

(1) Counter Mode 7

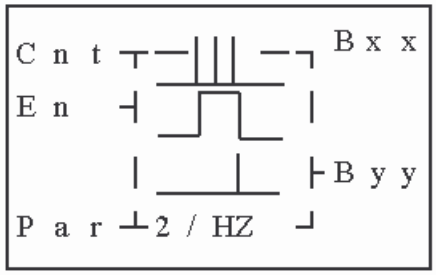
High counting input →
Enable Input →
Reset →
Counter Parameter →



Note ：High speed input terminal I1,I2

(2) Counter Mode 8

High counting input →
Enable Input →
Reset
Counter Parameter →

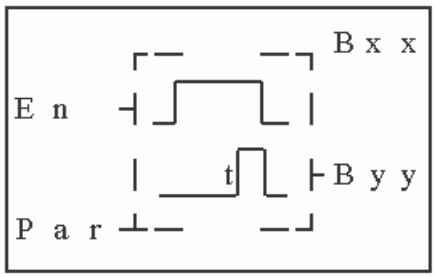


Note ：High speed input terminal I1,I2

- Timer Function Block

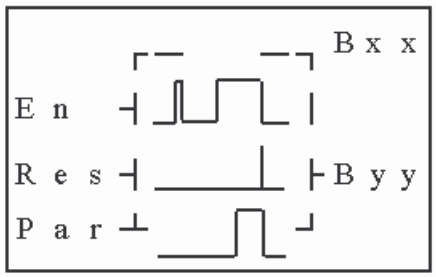
(1) Timer mode 1 (ON-Delay A Mode)

Enable Input →
Timing Parameter →

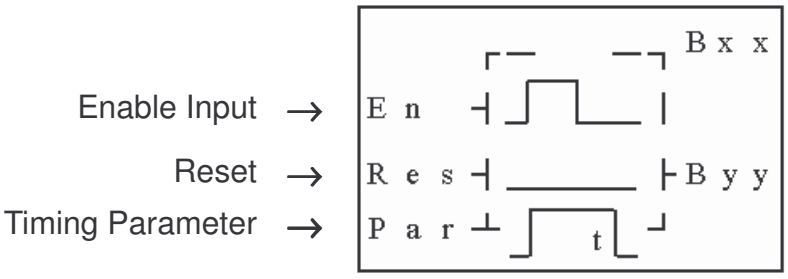


(2) Timer mode 2 (ON-Delay B Mode)

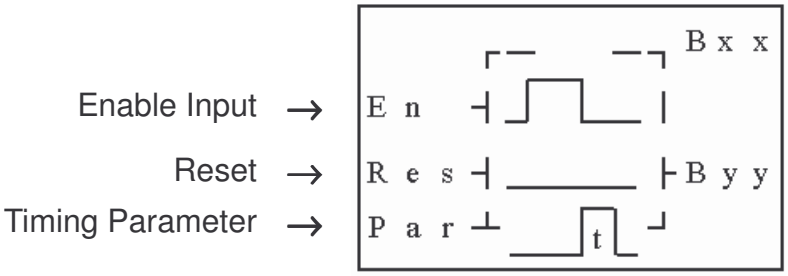
Enable Input →
Reset →
Timing Parameter →



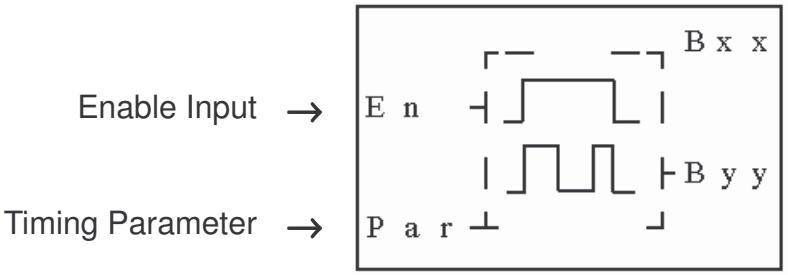
(3) Timer mode 3 (OFF-Delay A Mode)



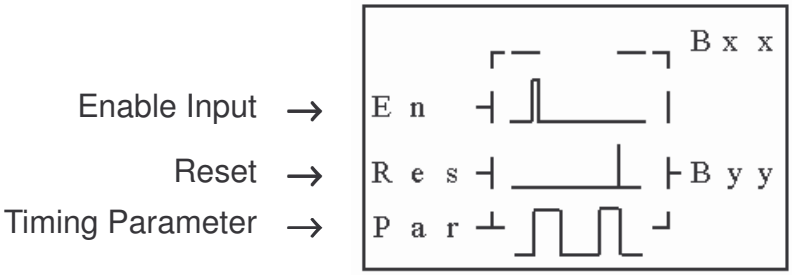
(4) Timer mode 4(OFF-Delay B Mode)



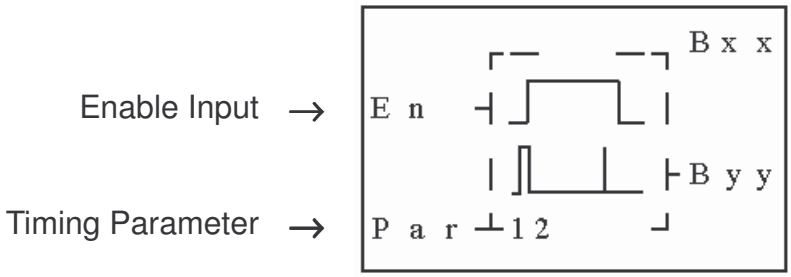
(5) Timer mode 5(FLASH A Mode)



(6) Timer mode 6(FLASH B Mode)

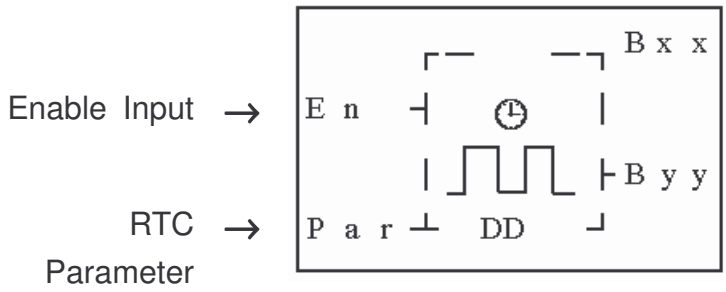


(7) Timer mode 7(FLASH C Mode)

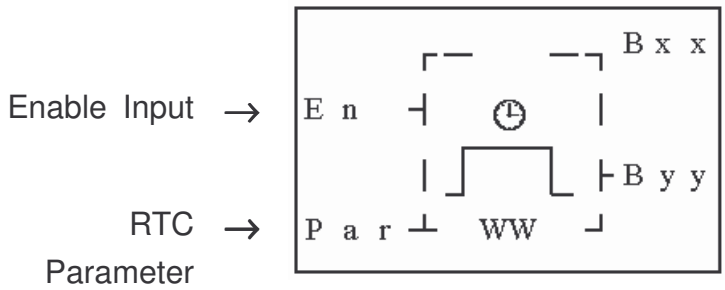


□ RTC Comparator Function Block

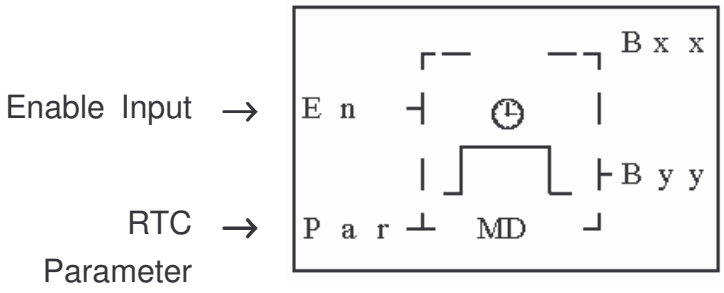
(1) RTC Mode 1(Daily)



(2) RTC Mode (Continuous)

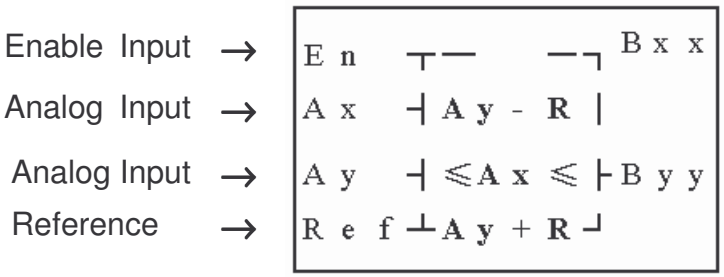


(3) RTC Mode 3 (Year Month Day)

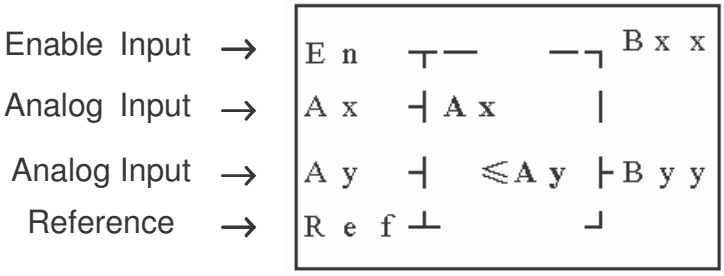


Analog comparator Function Bloc

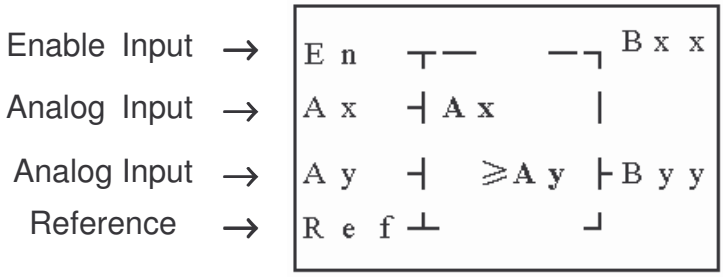
(1) Analog Comparison Mode 1



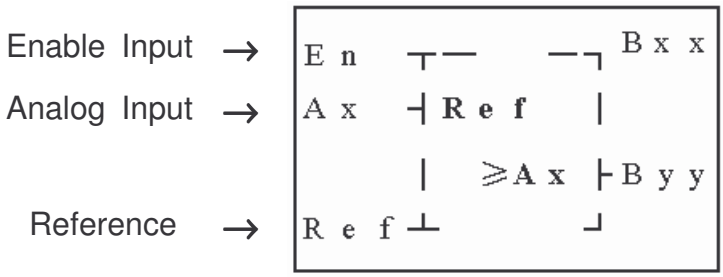
(2) Analog Comparison Mode 2



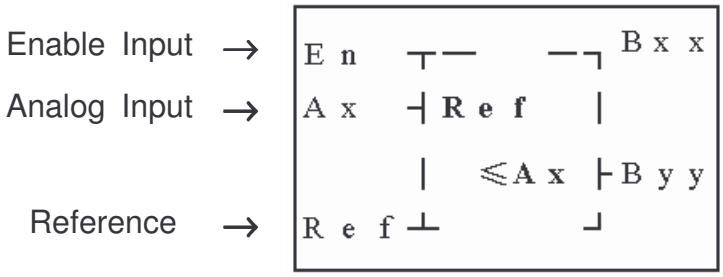
(3) Analog Comparison Mode 3



(4) Analog Comparison Mode 4



(5) Analog Comparison Mode 5



8-4 FBD Block Resource

Under FBD edition mode, the logic block and function block shares the system memory. The total memory and shared memory is shown below.

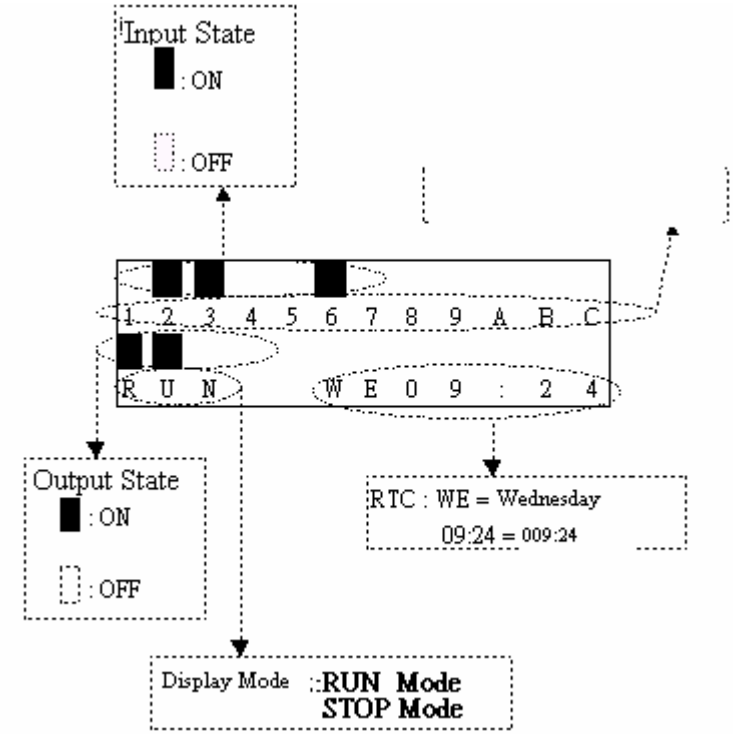
	Function Block	Timer	Counter	RTC Comparator	Analog Comparator
Total Memory	99	15	15	15	15
Logic Block	1				
Timer Mode 1~6	1	1			
Timer Mode 7	1	2			
Counter Mode 1~8	1		1		
RTC Comparator Mode 1~3	1			1	
Analog Comparator Mode 1~5	1				1

Sample for calculating the memory being used:

When the FBD program contains 2 AND, 1 OR (Logic Block), 2 Timers Mode 1, 1 Counter Mode 7, RTC comparator Mode 1(Function Block), the total Diagram Blocks used are 2+1+2+1+1=7, and the remaining blocks is 99-7=92. The number of timers used is 2+2=4, and the remaining timers is 15-4=11. One counter is used, and the remaining counters is 15-1=14. The RTC comparator used is 1, and the remaining is 15-1=14. The analog comparator is unused, so 15 are still usable.

8-5 FBD Edit Method

- The origin screen when the power is on.

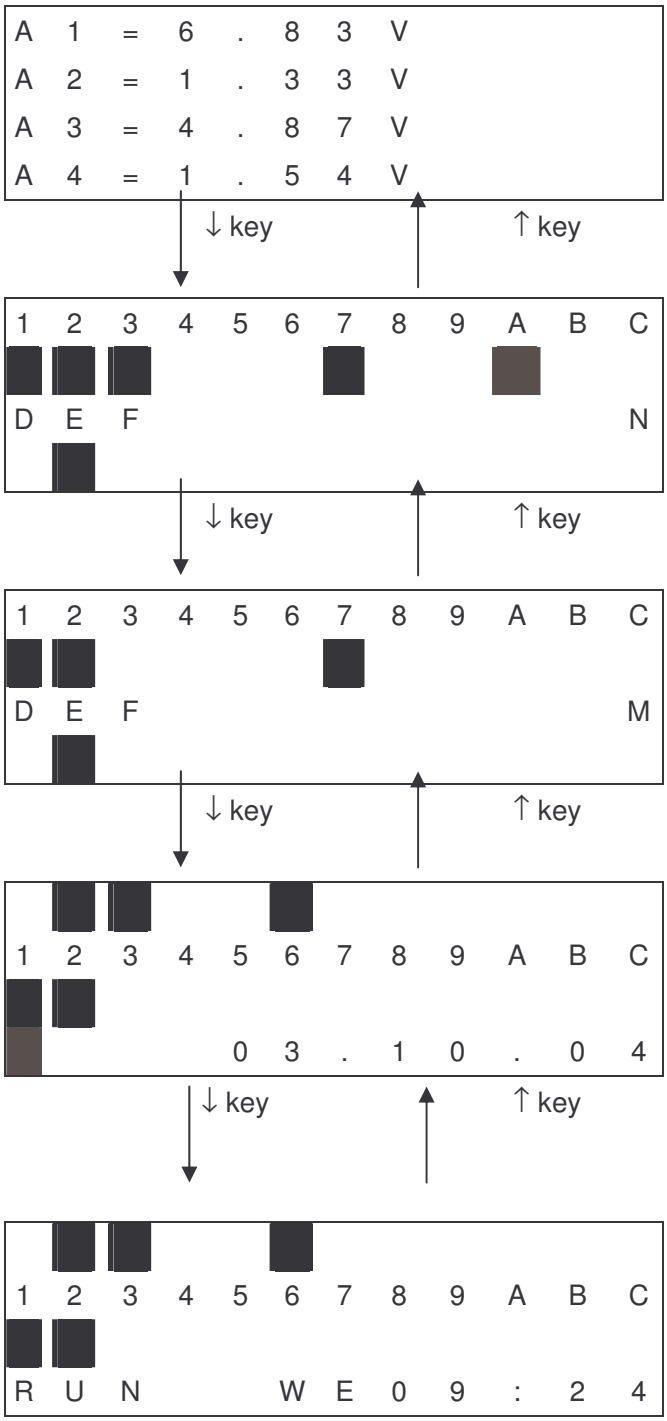


Now Press：

ESC	Back to Main Menu
↑↓	Display the state of the other relays(Expansion X&Y⇔M ⇔ N⇔A) ⇔ Original Screen
SEL	Press for 3s, H function content will be displayed, except the Mode 2 is selected in HMI.

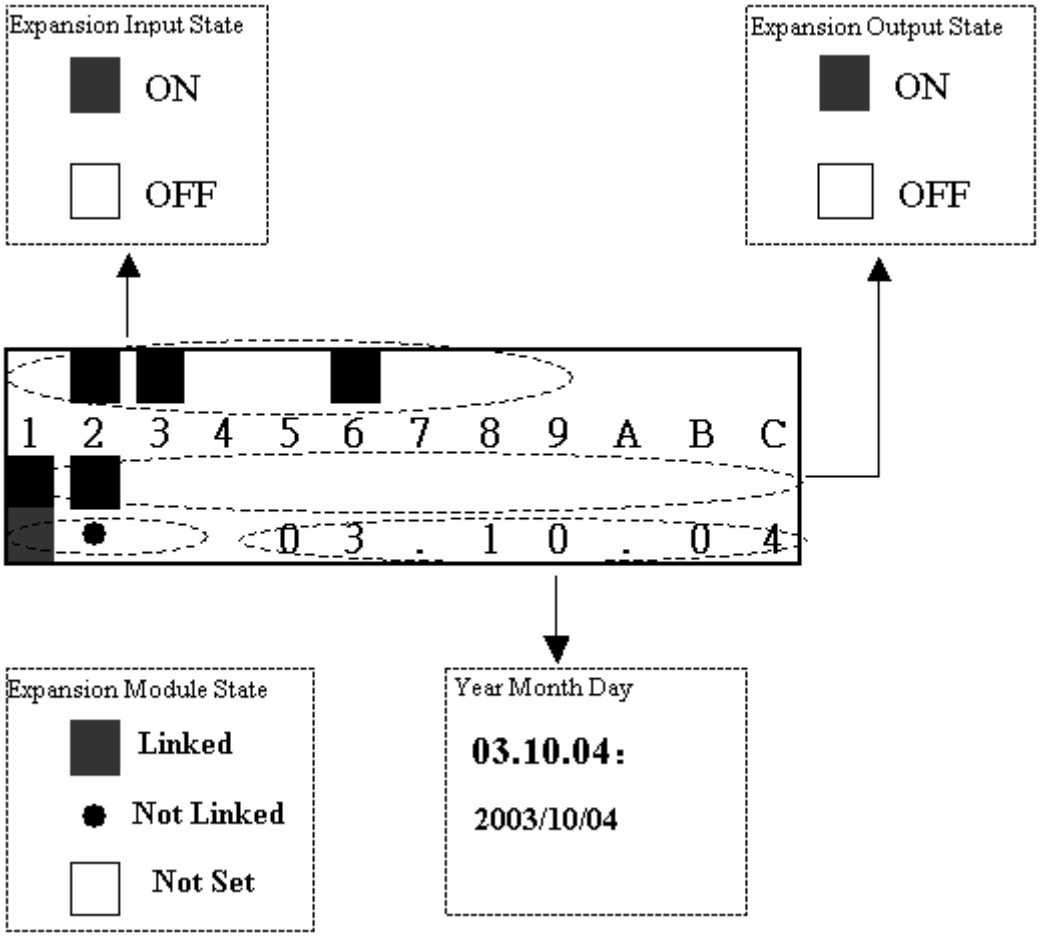
Sample：

a) operation for displaying the state of other relay.◦

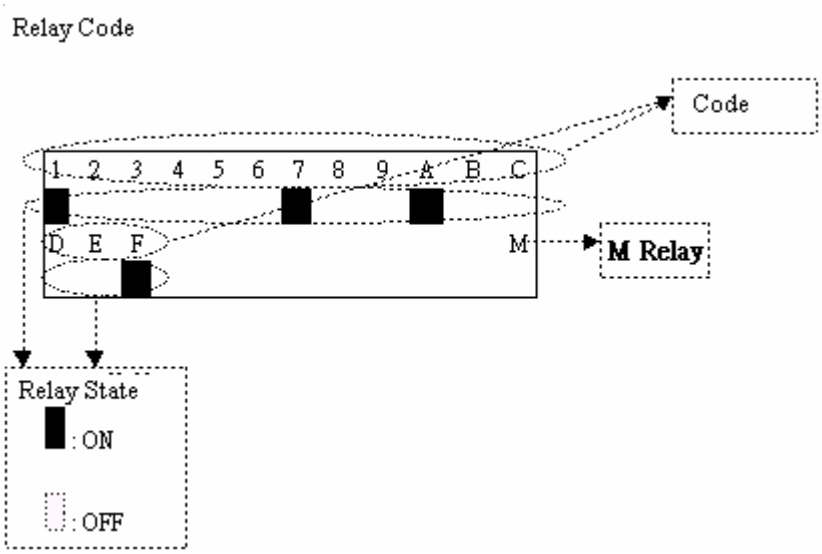

A 1 = 6 . 8 3 V
A 2 = 1 . 3 3 V
A 3 = 4 . 8 7 V
A 4 = 1 . 5 4 V
↓ key
↑ key
1 2 3 4 5 6 7 8 9 A B C
D E F N
↓ key
↑ key
1 2 3 4 5 6 7 8 9 A B C
D E F M
↓ key
↑ key
1 2 3 4 5 6 7 8 9 A B C
0 3 . 1 0 . 0 4
↓ key
↑ key
1 2 3 4 5 6 7 8 9 A B C
R U N W E 0 9 : 2 4

(1) Expansion Display State

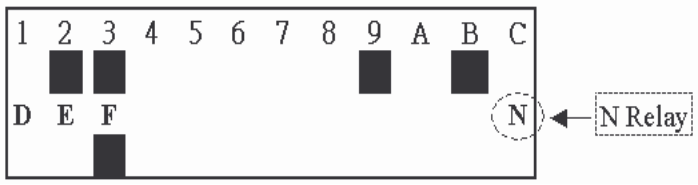
(2)



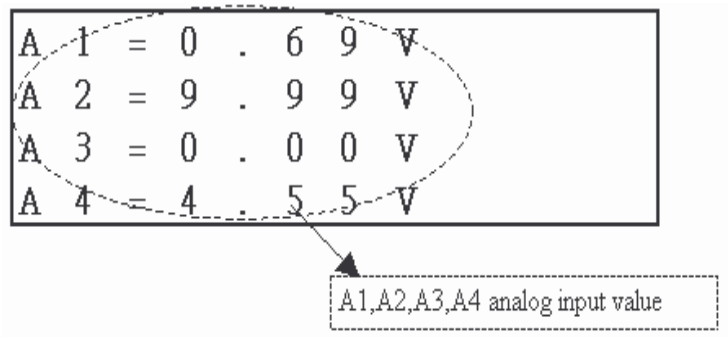
(2) M Display State：



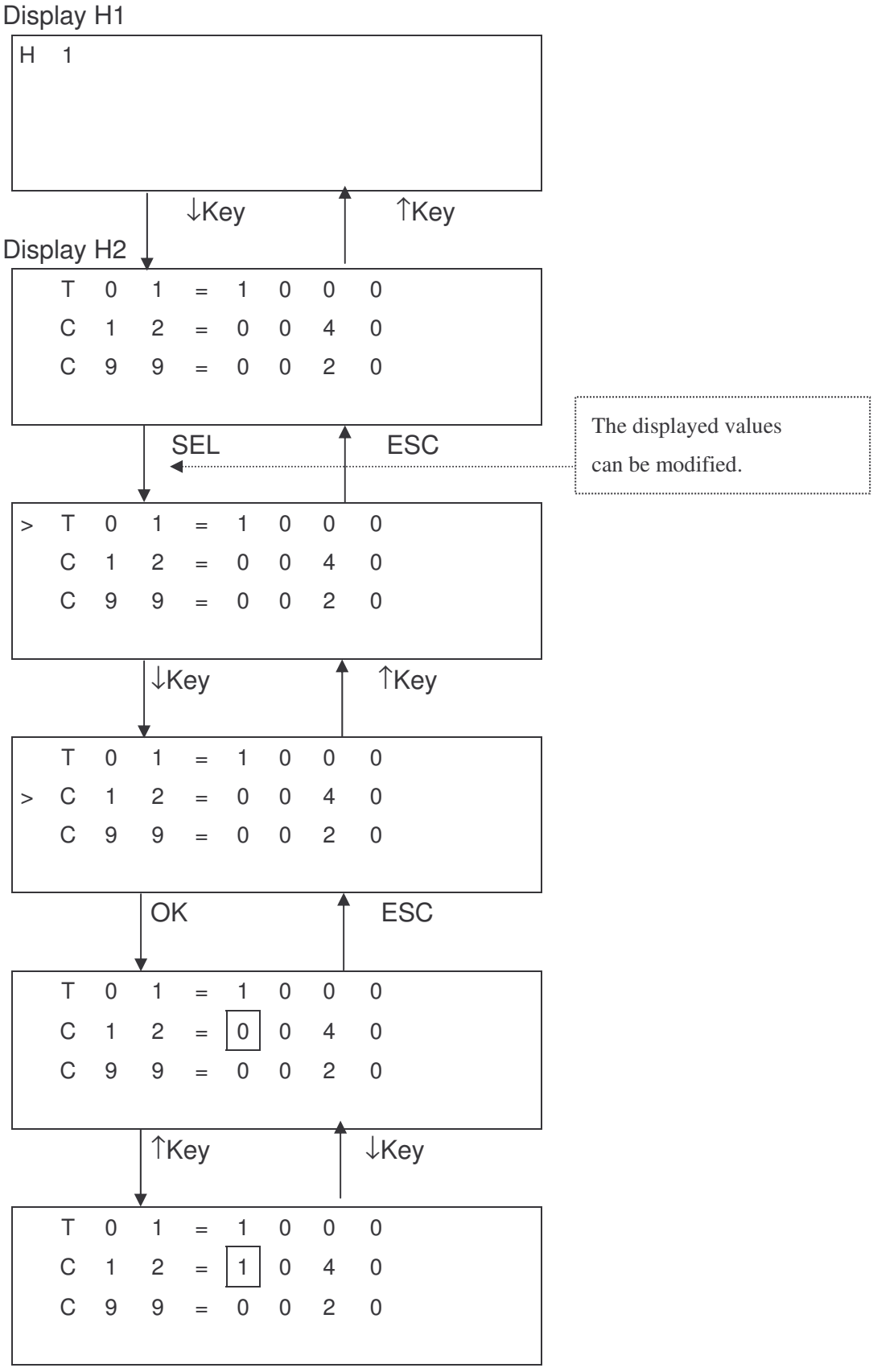
③ N Display State：

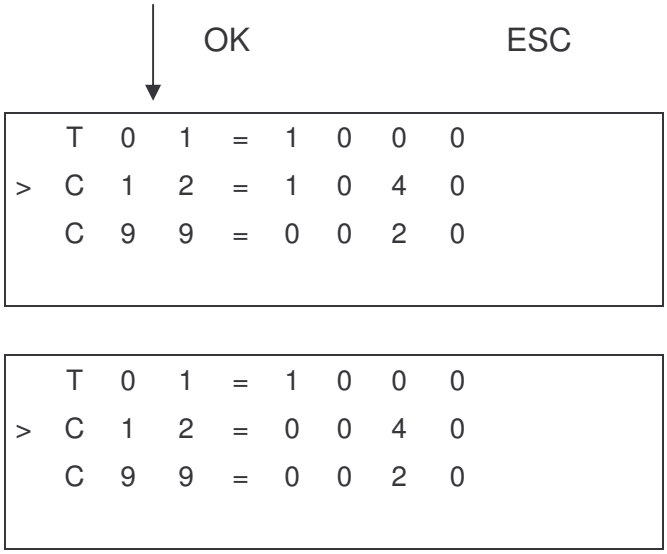


④ Analog input



b) Operation for displaying H Function Block.

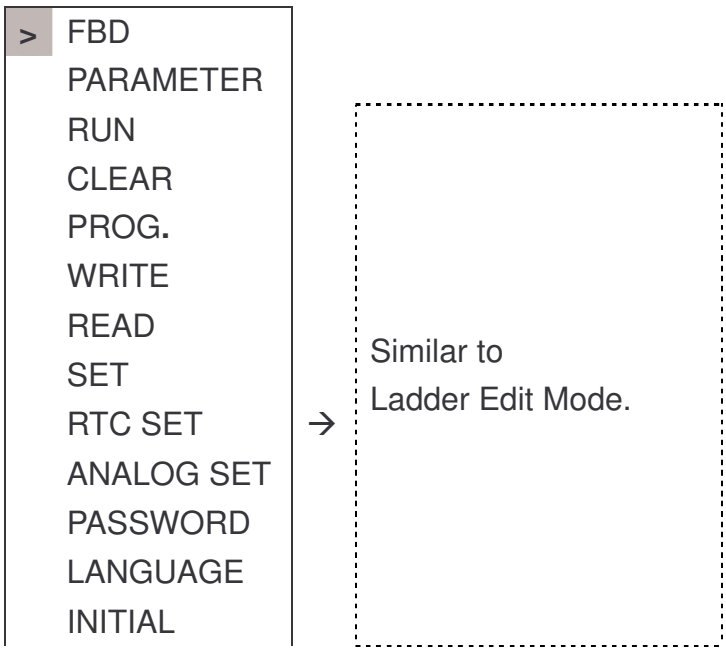

Display H1
H 1
↓Key
↑Key
Display H2
T 0 1 = 1 0 0 0
C 1 2 = 0 0 4 0
C 9 9 = 0 0 2 0
SEL
ESC
The displayed values
can be modified.
> T 0 1 = 1 0 0 0
C 1 2 = 0 0 4 0
C 9 9 = 0 0 2 0
↓Key
↑Key
T 0 1 = 1 0 0 0
> C 1 2 = 0 0 4 0
C 9 9 = 0 0 2 0
OK
ESC
T 0 1 = 1 0 0 0
C 1 2 = 0 0 4 0
C 9 9 = 0 0 2 0
↑Key
↓Key
T 0 1 = 1 0 0 0
C 1 2 = 1 0 4 0
C 9 9 = 0 0 2 0



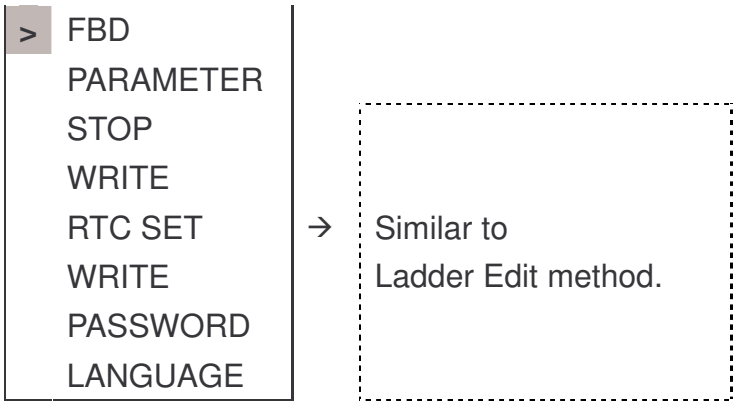
- Main Menu Screen

LCD displays 4 lines Main Menu selection

(1) When iSmart is under STOP mode, the main selection displays:



(2) When iSmart is under RUN mode, the main selection displays:

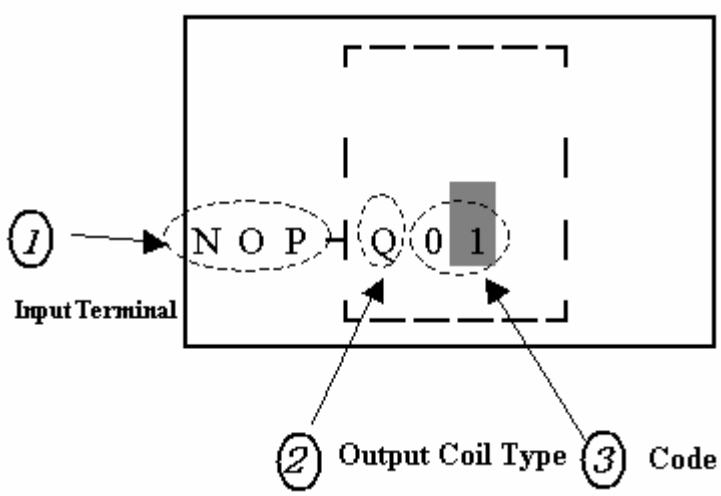


Now Press:

↑ ↓	Move the Cursor to select the Main Menu Items
OK	Confirm to enter the selected items
ESC	Back to original screen

1. FBD For Main Screen

(1) Output coil display

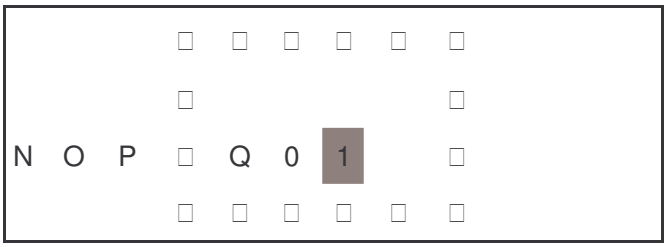
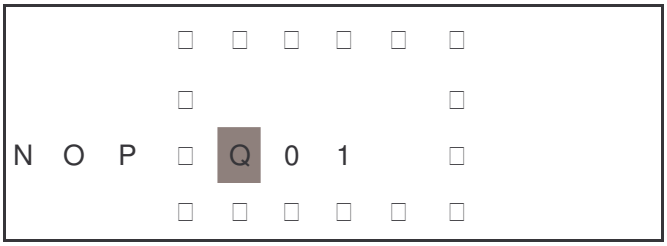
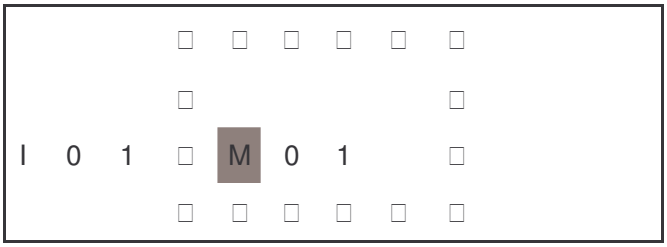


Now Press

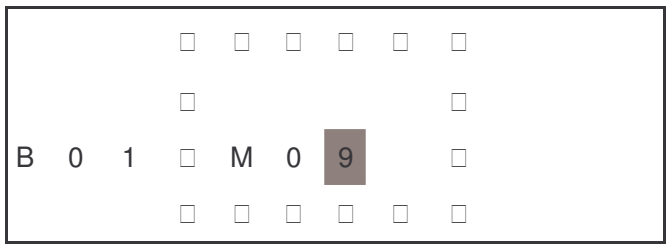
← →	1. Move the cursor①⇔②⇔③ 2. ① is Bxx, press '←' to enter Bxx screen
↑ ↓	1. Modify the code-③(Q : 01~08 , Y : 01~0C , M ,N , H : 01 ~ 0F , L : 01~08 , P : 01 ,S : 01) 2. modify output coil type-② (Q⇔Y⇔M⇔N⇔H⇔L ⇔P⇔S

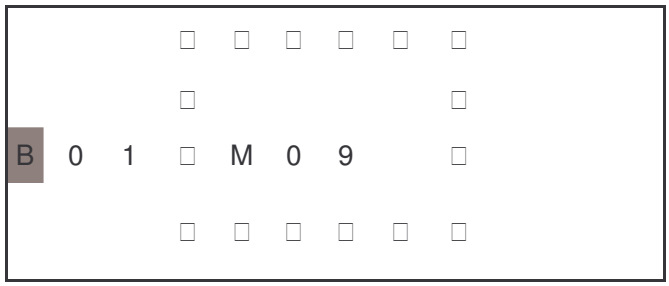
	⇔Q)
OK	1. ②, ③ confirm the output coil (as Q,Y,M,N,), the cursor move to ①. 2. When ② is H,L,P,S, enter H,L,P,S setting screen (6)(7) (8)
ESC	1. Back to Main Menu

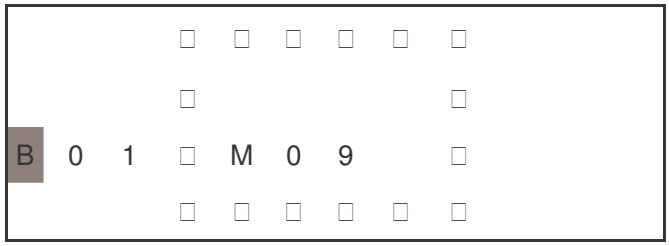
Sample:

Procedure (1)-1 Original Screen	
Procedure (1)-2 Press '←'	
Procedure (1)-3 Press '↑' twice Press '↑ ↓' to modify Q to M	
Procedure (1)-4 Press '→'	

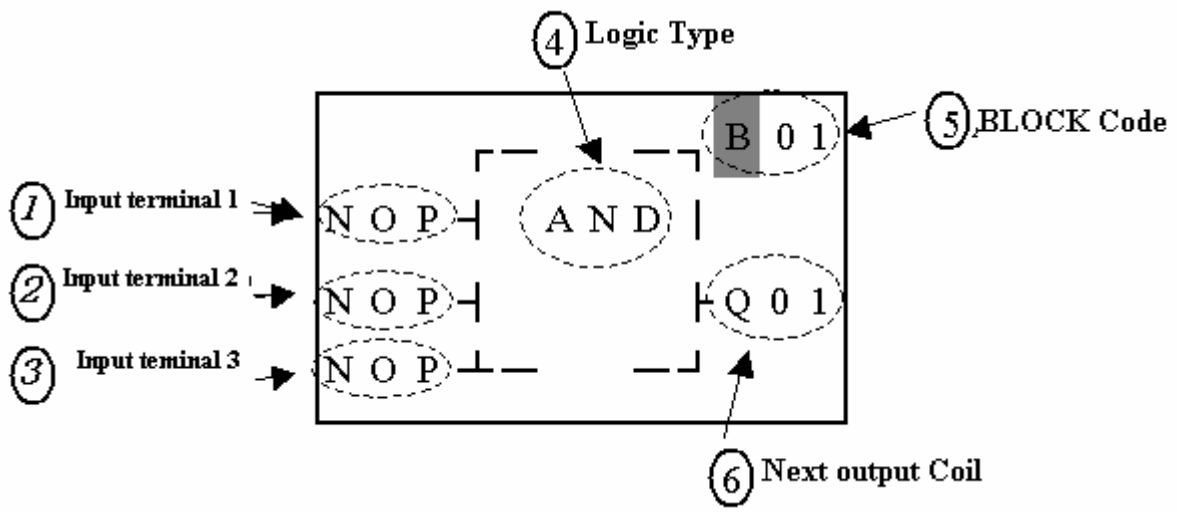
	

Procedure (1)-5 Press '↓' for 6 times Press '↑ ↓' to modify 1 to 9	

Procedure (1)-6 Press 'OK' Confirm coil M09, The cursor auto move to input terminal	

Procedure (1)-7 Press '←' Enter B01 Screen	

(2) Nr Input terminal Screen



Now Press

← → ↑ ↓	1. Move the cursor ①⇔②⇔③⇔⑤⇔next output screen 2. If ①②③ is Bxx, Press '←' to enter Bxx Screen.
ESC	1.Back to Main Menu

Sample:

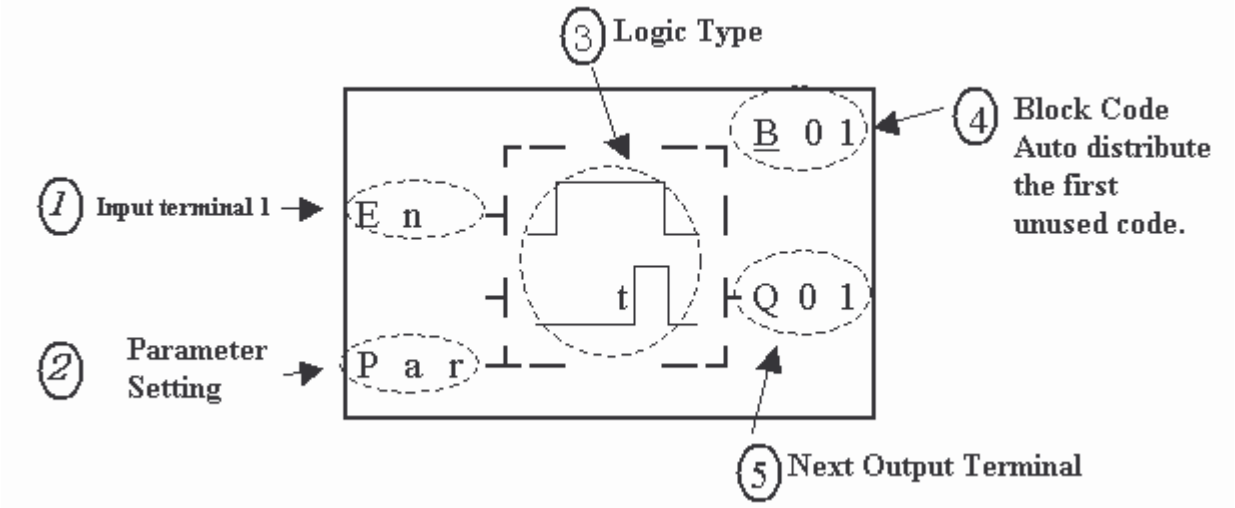
Following step (1)-7：

Procedure (2)-1 Press '←' or '↓'	□ □ B 0 1 M 0 3 □ O R □ B 0 2 □ □ M 0 9 N O P □ □

Procedure (2)-2 Press '↓' once	□ □ B 0 1 M 0 3 □ O R □ B 0 2 □ □ M 0 9 N O P □ □

Procedure (2)-3 Press '←' Enter B02 screen	M 0 3 □ O R □ B 0 1 B 0 2 □ □ M 0 9 N O P □ □

(3) Edit Screen for Bn input terminal



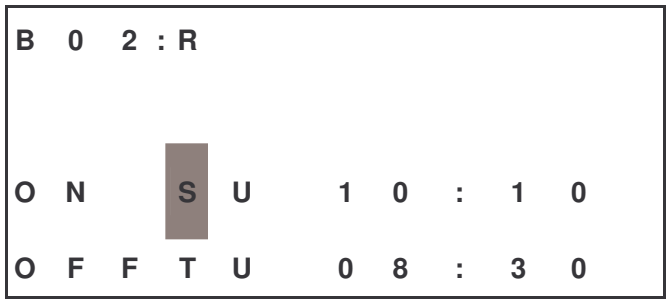
Now press

← → ↑ ↓	Move the cursor ①⇔②⇔④⇔ Output coil / Function block screen
OK	1. ② enter the parameter setting screen of the function block
ESC	1.Back to Main Menu

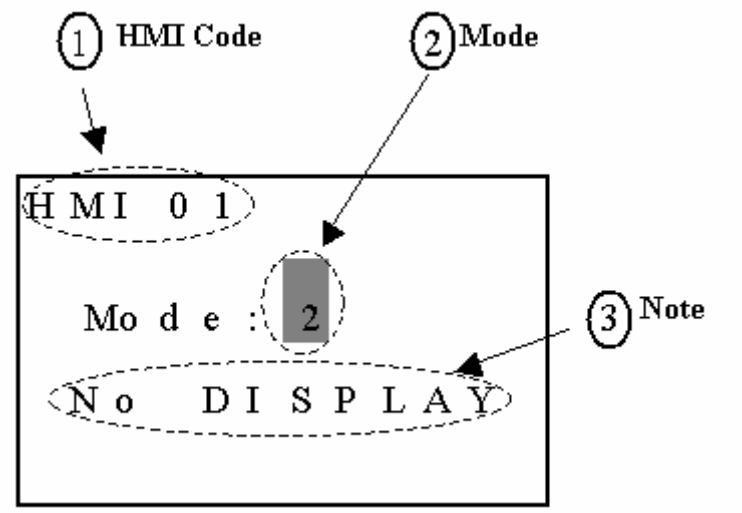
Sample:

Following the procedure (2)-3,

Procedure (3)-1 Press '↓' twice	Q 0 1 □ □ B 0 2 □ □ B 0 1 P a r □ D D □

Procedure (3)-2 Press 'OK' Enter Parameter setting screen Refer to 2 Parameter of Main Menu	

(4)HMI Setting Screen

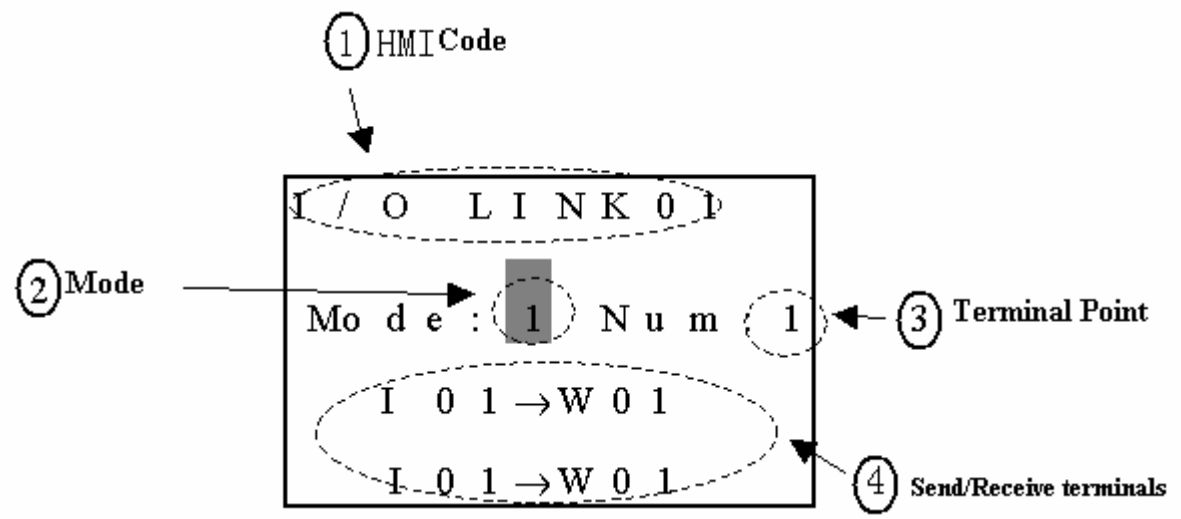


Now press

SEL	Edit the mode
SEL +↑ ↓	Modify the mode (1~2)
OK	Save the modified mode after press 'SEL'.
ESC	1. Cancel the modified content after press 'SEL'. 2. Back to edit screen for coil(1)

Note：HMI text content setting should use SMT-CONFIGURATOR only.

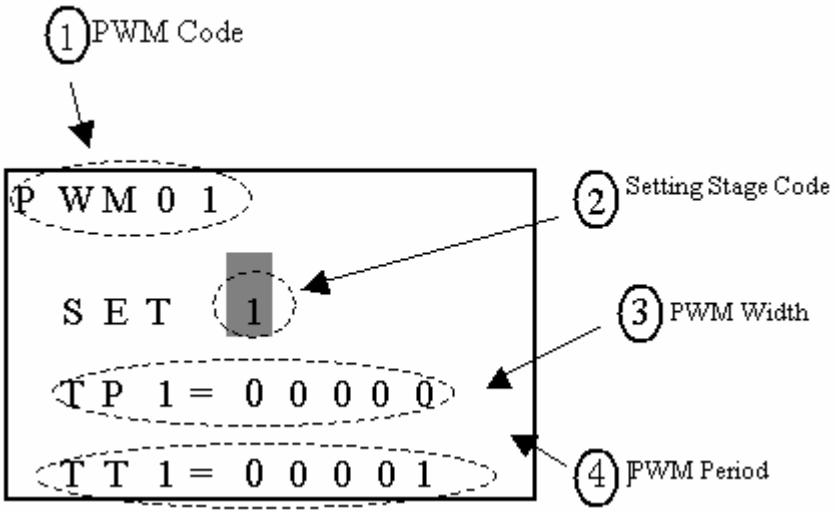
(5)DATALINK setting screen



Now press

← → ↑ ↓	Move the cursor ②⇔③⇔④
SEL	Begin to edit
SEL + ↑ ↓	1. ② Modify the mode (1~2) 2. ③modify the terminals point (1~8) 3. ④ modify the send/ receive terminals (I01~I0C,X01~X0C,Q01~Q08, Y01~Y0C,M01~M0F,N01~N0F)
OK	Save the modified content after press 'SEL'
ESC	1.Cancel the modified content after press 'SEL' 2. Back to edit screen(1) for coil

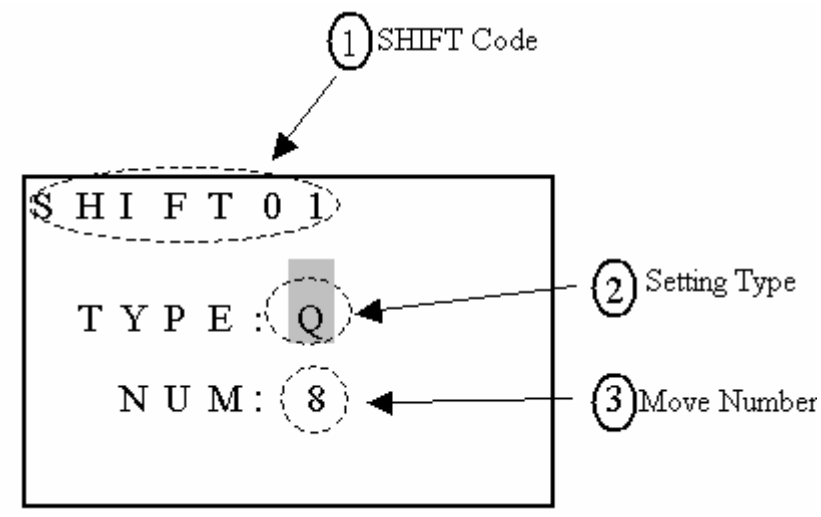
(6) PWM setting screen



Now press

↑↓	Move the cursor ②⇔③⇔④
← →	③,④ move the cursor
SEL	Begin to edit
SEL 後 ↑ ↓← →	1・② modify the setting stage (1~8) 2・③ modify the pulse width(00000~32768) 3. ④ modify the period (00001~32768)
OK	Save the modified content after press ‘SEL’
ESC	1.Cancel the modified content after press ‘SEL’ 2. Back to edit screen(1) for coil

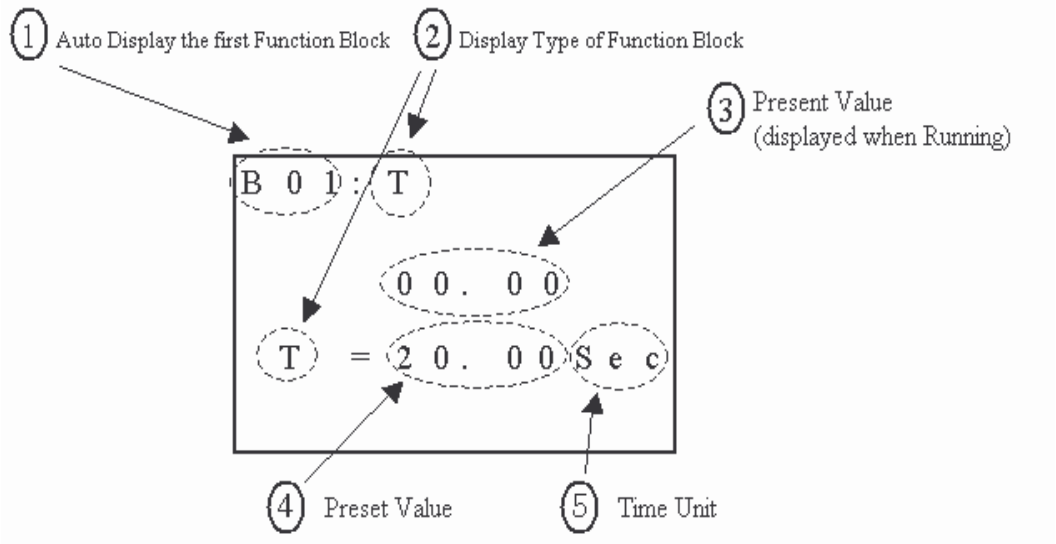
(7)SHIFT setting screen



Now press

↑↓	Move the cursor ②⇔③
SEL	Begin to edit
SEL , then ↑ ↓	1・② modify the output type Q⇔Y⇔Q 2・③ modify the move coil number (1~8)
OK	Save the modified content after press 'SEL'
ESC	1.Cancel the modified content after press 'SEL' 2. Back to edit screen (1) for coil

2 PARAMETER of Main Menu

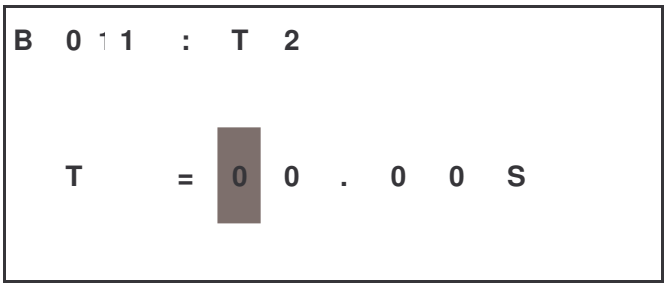
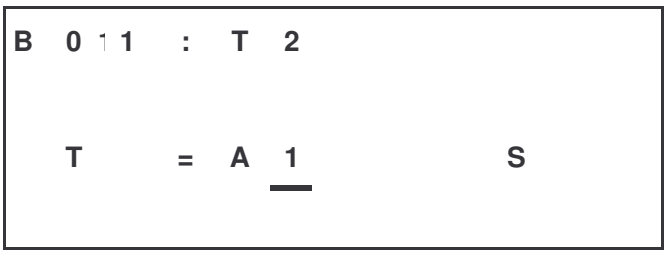


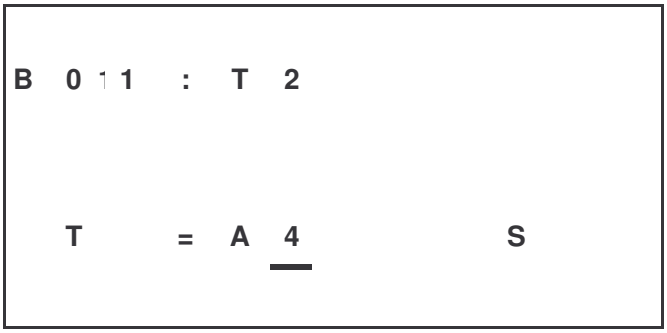
Now Press:

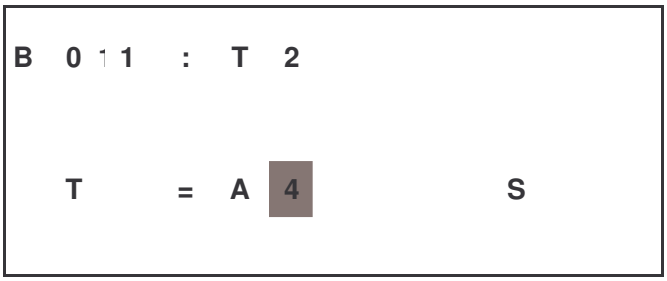
← →	1. ① display the previous / next Function Block Parameter 2. ④, ⑤ move the cursor
↑ ↓	1. move the cursor from ① to ④ 2. move the cursor from ④, ⑤ to ①
SEL then ↑ ↓	1. ④modify the setting value (000000~999999) 2. ⑤modify the time unit(0.01s⇔0.1s⇔1s⇔1min)
OK	Save the modified data after press 'SEL'
ESC	1. Cancel the modified data after press 'SEL' 2. Back to Main Menu.

FDB PARAMETER modifying step:

Take timer (mode 1) as an example: Analog input A4 is set as preset value. Time unit is s.

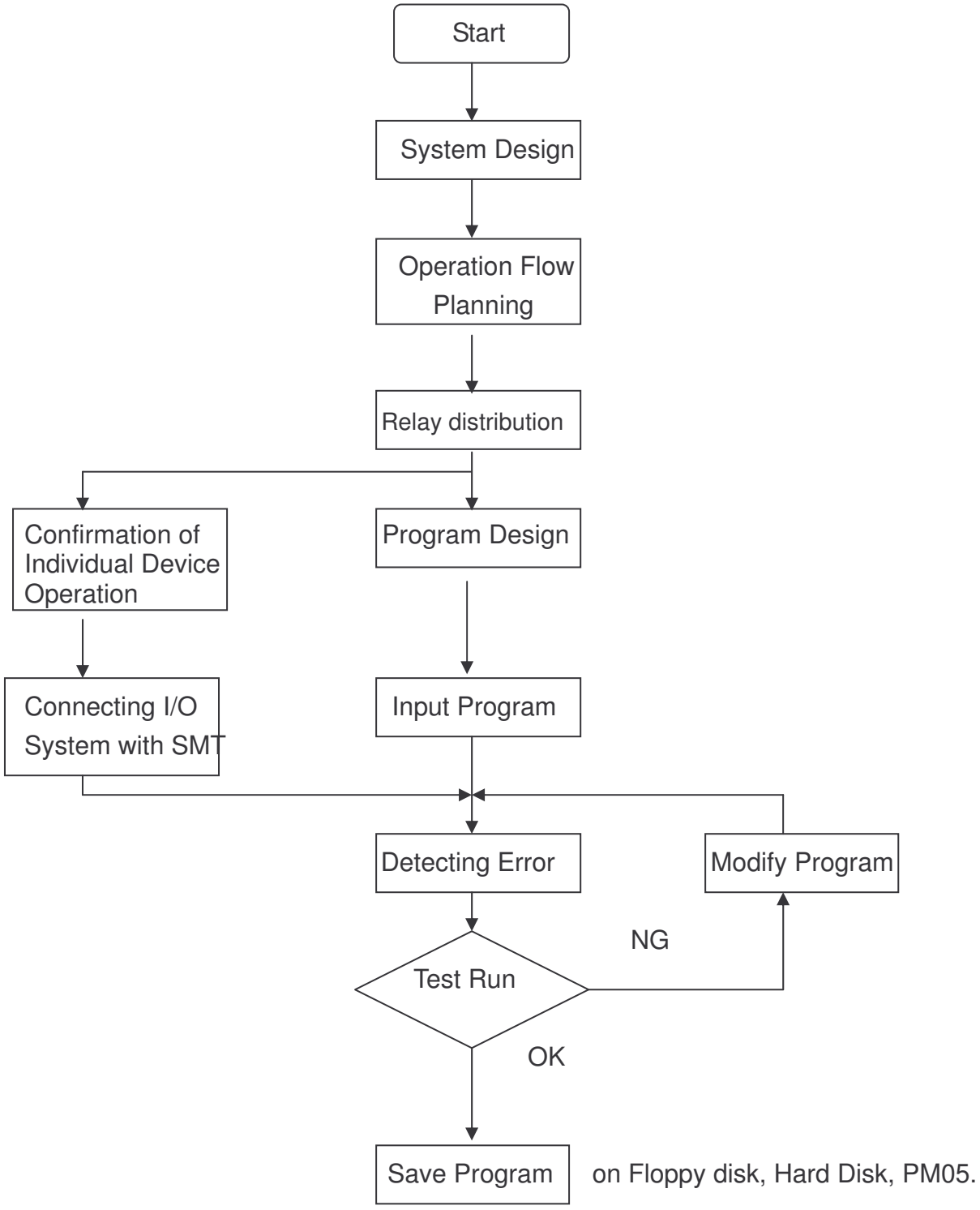
Step 1 **Press '↑↓'** **Move the cursor to default place**	
Step 2 **Press 'SEL' twice**	
Step 3	

Press '↑' for three times, change to A2~A4 in turn	

Step 4 **Press OK to save present data.**	

Chapter 9 System Design

9-1 Procedure for system design



9-2 Consideration for System Design

iSmart differs from the traditional intelligent relays in controlling circuit fundamentals. iSmart is periodic-loop controlled circuit (series controlled circuit), while a relay is parallel controlled circuit. Consequently, if a failure were to take place in a conventional intelligent relay, it would only affect a single relay, whereas it could affect the whole system in iSmart.

Therefore, it is recommended the external protection device to be installed：

① Emergency-Stop Circuit
② Protection Circuit
③ Operation Circuit for High-Voltage Components

9-3 Code Distribution for Relay

(1) 10 Point：

① Input Code：I =1~6
② Output Code：Q=1~4

(2) 20 Point：

① Input Code：I =1~C (12)
② Output Code：Q=1~8

(3) Expansion Point：

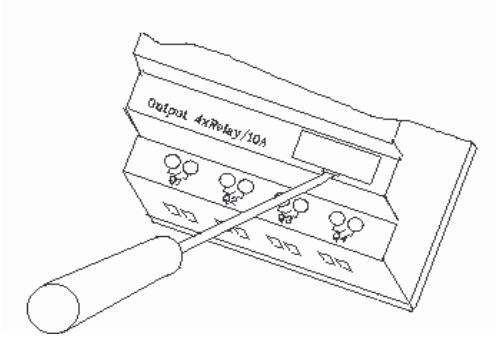
① Input Code：X =1~C (12)
② Output Code：Y=1~C (12)

Chapter 10 Spare Program

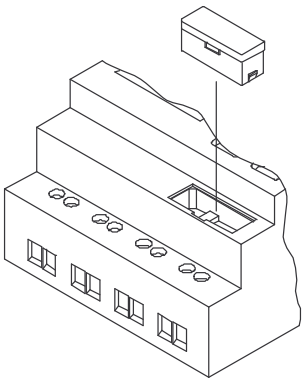
10-1 Spare Program Cartridge (SMT-PM04)

The installation method for PM04 (optional) is as follow

Step 1：Remove the cover of SG2 with a screwdriver, as follows :



Step 2：Plug SMT-PM04 **into the programming slot, as follows :**

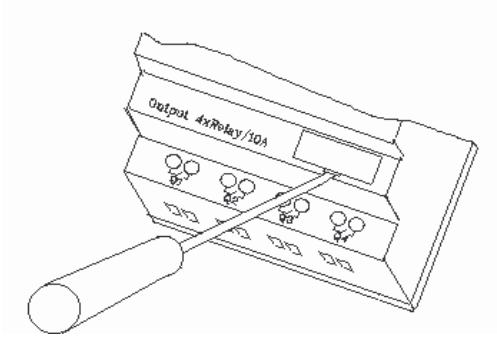


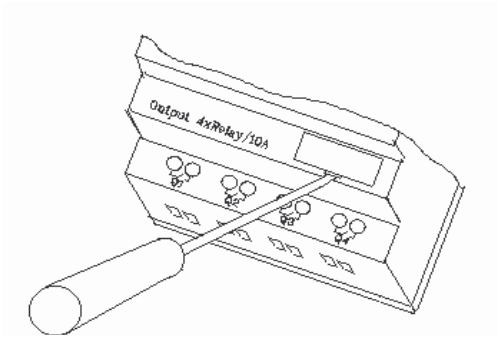
Step 3：In the operation function list, click WRITE to enter the confirmation interface and click YES to download the spare program.

Note：If it is desired to recover the spare program, click READ on the operation function list to enter the confirmation interface and click YES to upload the spare program

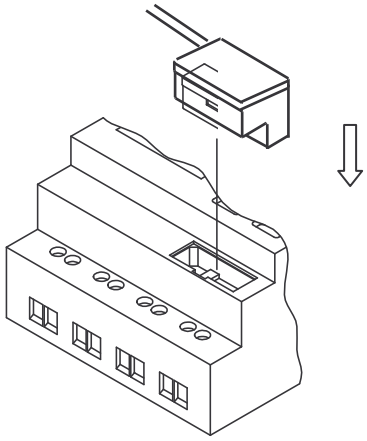
10-2 Computer Write Software (SMT-CONFIGURATOR)

Step 1：Remove the port cover of iSmart with a screwdriver or similar device, as follows:





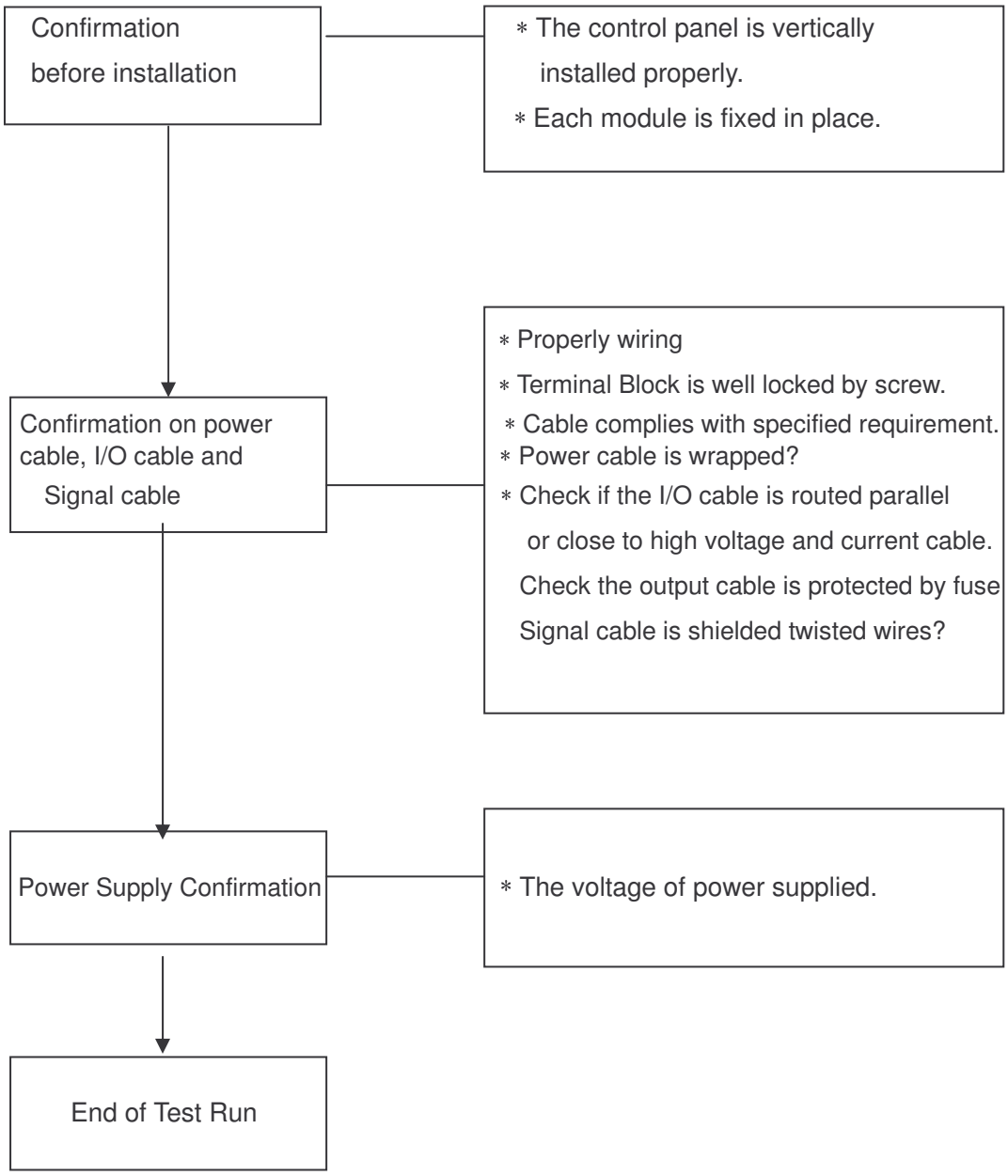
Step 2：Insert SMT-PC03 (Cable) to the slot, as follows: The other terminal of cable is connected with the RS 232 communication port on computer.



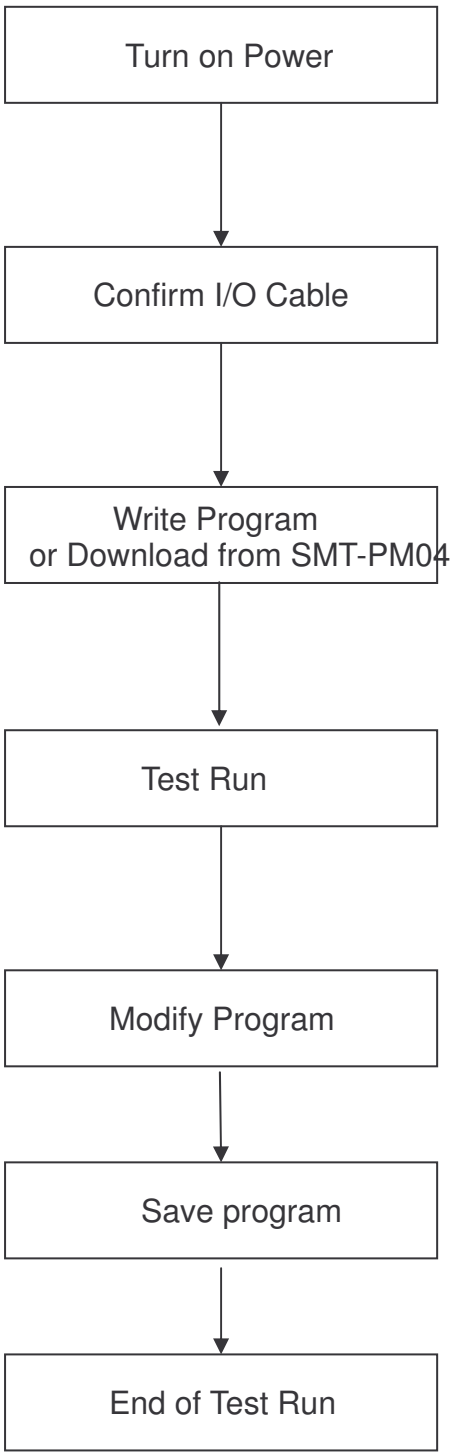
Step 3：With SMT-CONFIGURATOR software, the computer is ready to read a program from, or write a program to the iSmart.

Chapter 11 Test Run

11-1 Confirmation before Test Run



11-2 Procedure of Test Run



* Confirm the LCD is ON?

Chapter 12 Inspection and Maintenance

12-1 Periodic Inspection

□ General Items

Inspect Item	Inspect content	Standard	Remarks
Ambient temperature	They shall be limited to the specification, the temperature inside the control panel shall equal to the ambient temperature	0-55 Deg. C	
Relative humidity		5-90% RH	No Frost
Gas		No corrosive gas exists	
Vibration		None	
Impact		None	

◎ Master

Item	Contents	Standard	Remarks
Power voltage	Check the terminal voltage to ensure that it complies with specification	AC 100-240V	SMT AC model
DC 24V	Check the terminal voltage to ensure that it complies with specification	DC 24V±10%	SMT DC model
Input power	Check the input voltage to ensure that it complies with specification	AC 100 – 240V DC 10V – 26.4V	
Output power	Check the output voltage to ensure that it complies with specification	Below 250VAC Below 30VDC	
Installation	The iSMART is firmly fixed	No loose bolts	
	Check for loose screws on the terminal lock	No loose screws	

12-2 Troubleshooting

◎ When there is no display, but the operation is normal, there be possible LCD failure, please consult IMO for help.

◎ If there is no display and no action, please consult the IMO for help after confirmation of Power Supply ‘ON’

Chapter 13 Technical Specification

13-1 General Specification

Item		Specification
Method of input program		By means of Ladder / Function Block
Operation Environment	Operation	0-55 Deg. C.
	Storage temperature	-40 – 70 Deg. C.
	Operation humidity	20-90% RH, no frost
	Environmental gas	No corrosive gas exists
Mail Structure	Vibration resistance	IEC60068-2-6 standard 0.075mm amplitude/1.0g acceleration
	Impact resistance	IEC60068-2-27 standard 15g peak, 11ms duration
Noise proofing	ESD	Contact ±4KV, air discharge ±8KV
	EFT	Power DC/AC: ±2KV
	CS	0.15~80MHz 10V/m
	RS	80~1000MHz 10V/m
	EMI	EN55011 class B
Installation	Enclosure Protection	IP20
	Fixing method	Direct or Din rail (35mm) installation
	Direction	No limit
Size of cable		AWG 12/ψ3.5mm^2

Dimension	72×90×59.6 mm(W×L×H) Din rail 72×106×59.6 mm(W×L×H) Direct installation

13-2 I/O System Specification

	MODE	AC 100~240	DC 24V	Input Point	Output Point		Analog Input	RTC	LCD Key	Expan-sion	1KHz High Speed Input	PWM Output	Data Link
10-Point	Expansion Variant												
	10HR-A	O		6	4	Relay		O	O	O			
	12HR-D		O	8*	4	Relay	2	O	O	O	O		
	12HT-D		O	8*	4	Transistor	2	O	O	O	O	O	
	Expansion Variant without control panel												
	10KR-A	O		6	4	Relay		O		O			
	12KR-D		O	8*	4	Relay	2	O		O	O		
	12KT-D		O	8*	4	Transistor	2	O		O	O	O	
	Standard Variant without up-cover												
	10CR-A	O		6	4	Relay		O					
	12CR-D		O	8*	4	Relay	2	O			O		
	12CT-D		O	8*	4	Transistor	2	O			O	O	
20-point Variant	Expansion Variant												
	20HR-A	O		12	8	Relay		O	O	O			
	20HR-D		O	12*	8	Relay	4	O	O	O	O		
	20HT-D		O	12*	8	Transistor	4	O	O	O	O	O	
	Expansion Variant without control panel												
	20KR-A	O		12	8	Relay		O		O			
	20KR-D		O	12*	8	Relay	4	O		O	O		
	20KT-D		O	12*	8	Transistor	4	O		O	O	O	
	Standard Variant without up-cover												
	20CR-A	O		12	8	Relay		O					
	20CR-D		O	12*	8	Relay	4	O			O		

	20CT-D		O	12*	8	Transistor	4	O			O	O	
	High-speed communication Variant												
	20VR-D		O	12*	8	Relay	4	O	O	O	O		O
	20VT-D		O	12*	8	Transistor	4	O	O	O	O	O	O
Expansio	8ER-A	O		4	4	Relay							
	8ER-D		O	4	4	Relay							
	8ET-D		O	4	4	Transistor							

O **: YES** / **TRUE (Circle)**

*: The input points consist of the ones having analog input function.

Power Supply Module

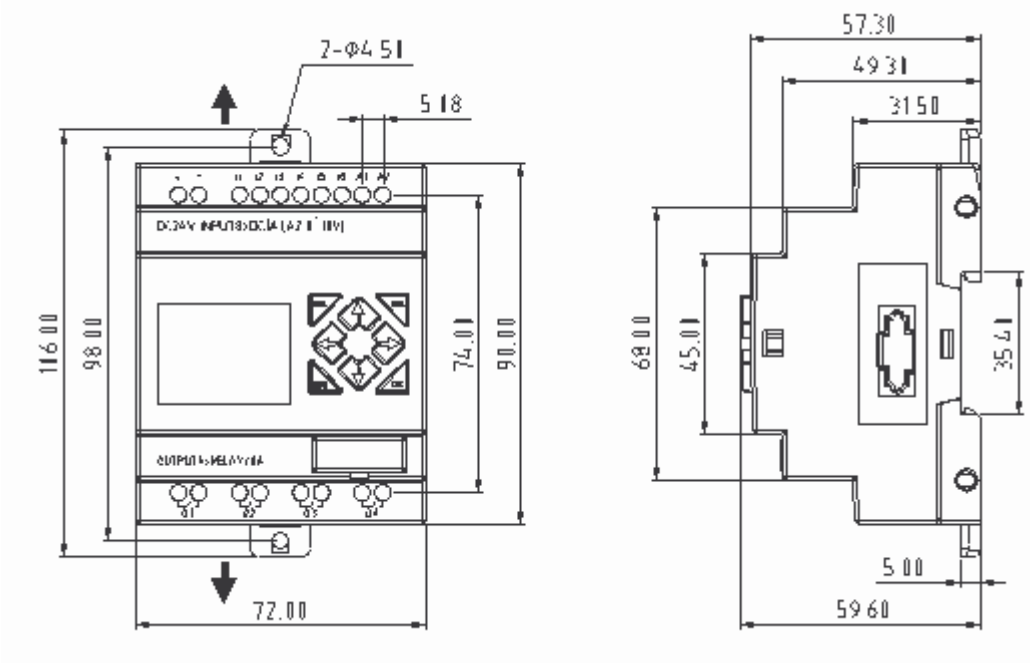
Module	Input/Output
DC +12V	AC 100~240V / DC +12V
DC +24V	AC 100~240V / DC +24V

Optional Devices

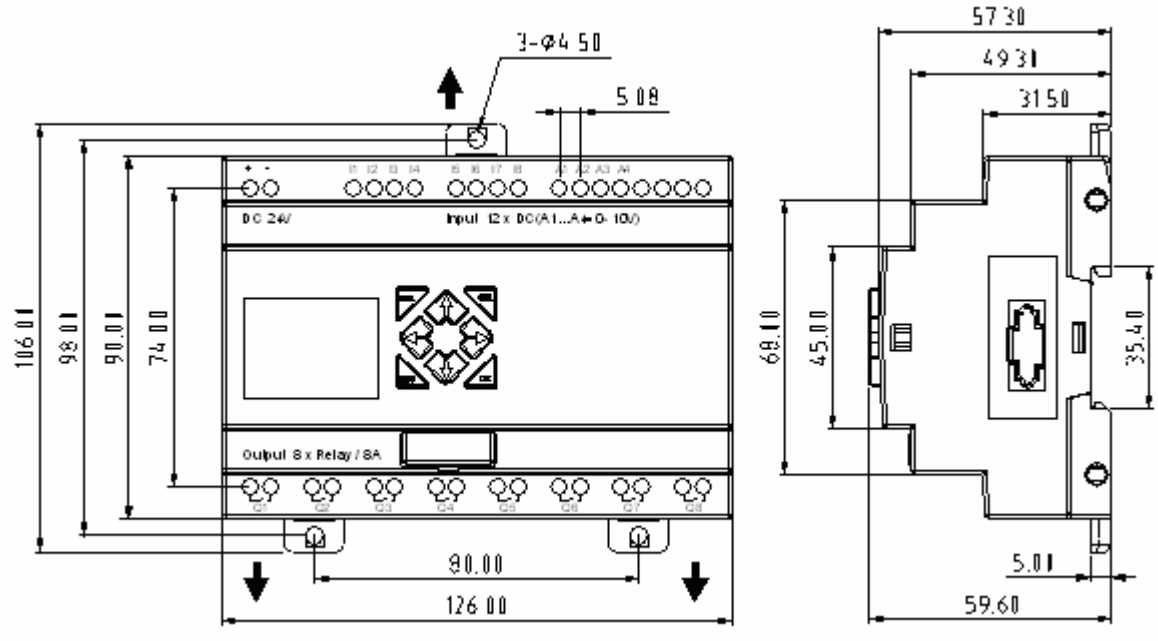
MODE	**Description**
PM05	Spare Program Cartridge
Client	Computer Edition Software

13-3 Dimension Diagram

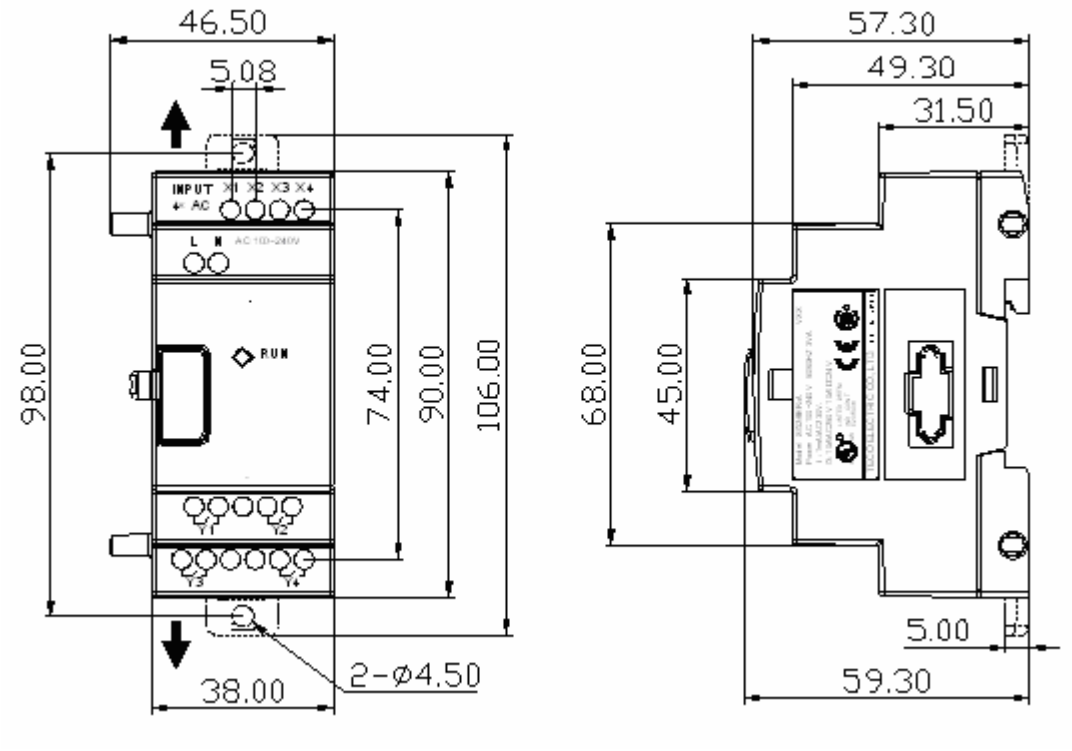
□ 10/12 points



□ 20 points



 Expansion 8 points



Appendix Application Illustration

1. Lighting Control for Staircase

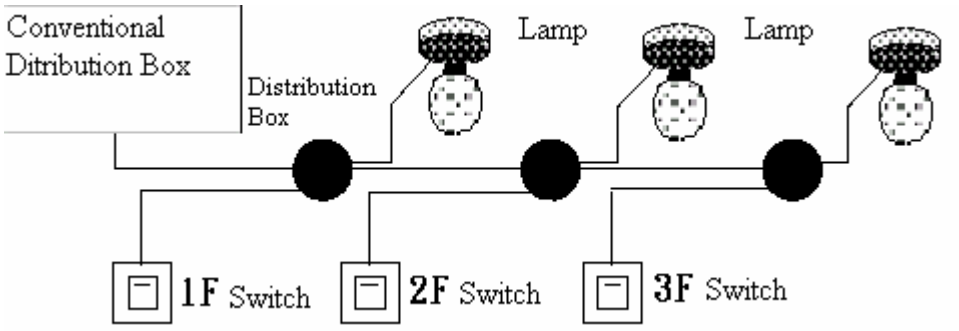
1.1 Requirement for Staircase Lighting

- When someone goes up or down-stairs, the lighting system shall be energized to provide sufficient luminance.
- After the walker passes the staircase, lighting system shall be turned off in five minutes automatically or manually.

1.2 Traditional Lighting Control

There are two traditional controls available:

- Apply pulse relay
- Apply automatic timer to control the lighting system on the staircase



Components Applied

- Switches
- Auto lighting system or pulse relay for staircase

Applying the pulse relay as controller for staircase lighting system

- The lighting is on as long as any switch is turned on.

- Press any switch again to turn off the lighting system.

Shortcoming: It is a frequent action for the person to forget to turnoff the light at most cases.

Auto lighting control system for the staircase

- The light is on whenever the switch is turned on.
- Lighting system shall be turned off in a few minutes automatically or manually

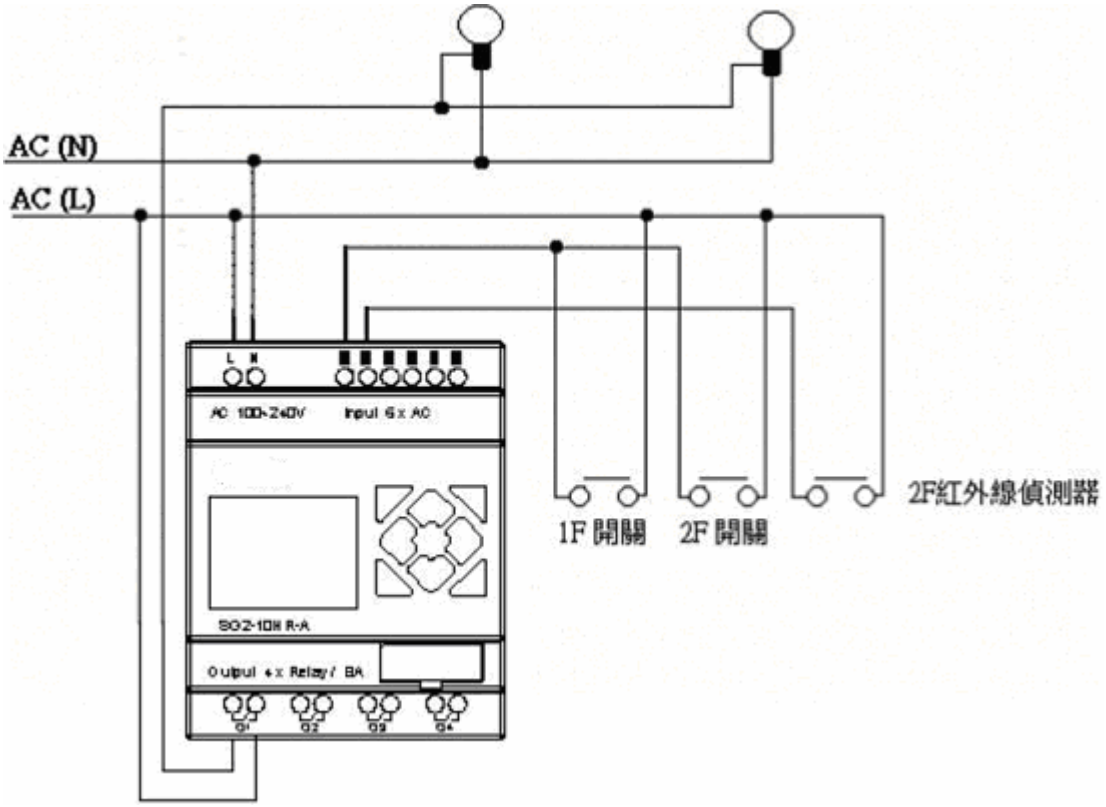
Shortcoming: The user has no way to reset the turn-off time.

1.3 Apply iSmart in Lighting System

Devices Applied

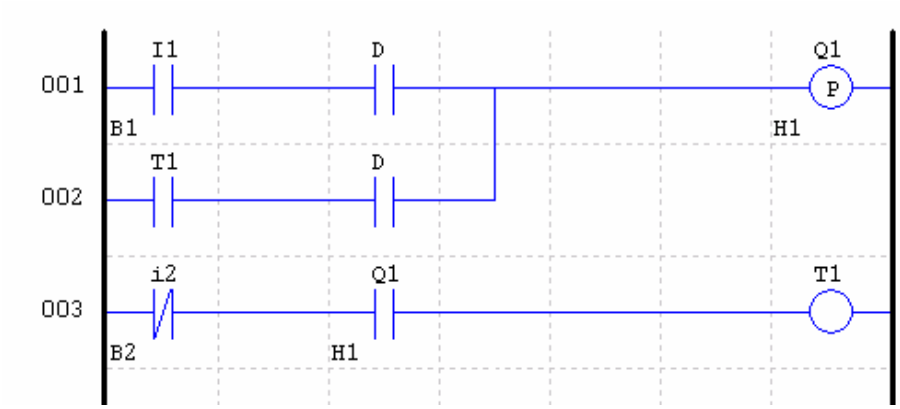
- Q1 Lamp H1
- I1(No terminal) Switch B1
- I2(No terminal) Infrared sensor for climbing

Wiring Diagram for Lighting System

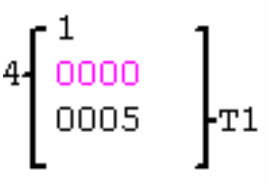


Illustrated program using iSmart in lighting system

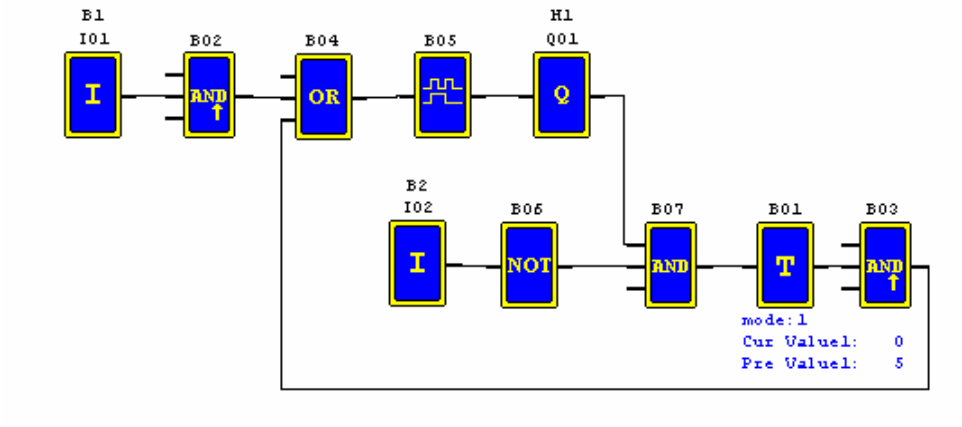
Ladder：



FUNCTION：



FBD：

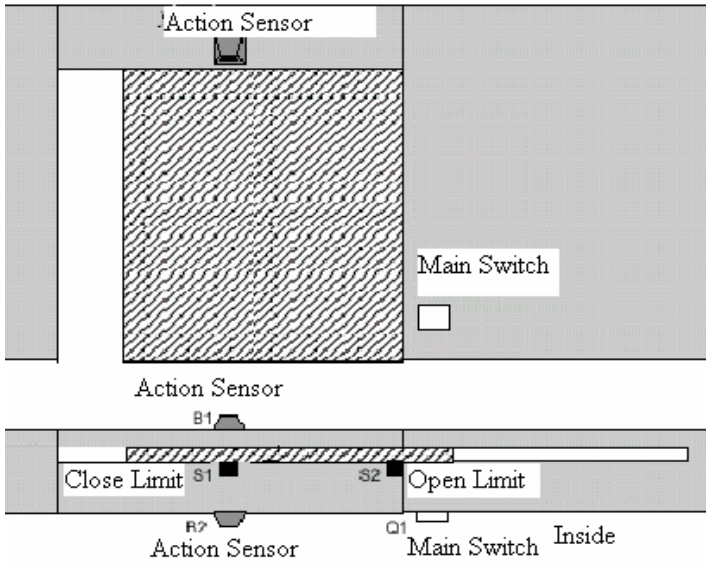


2 Auto Door Control

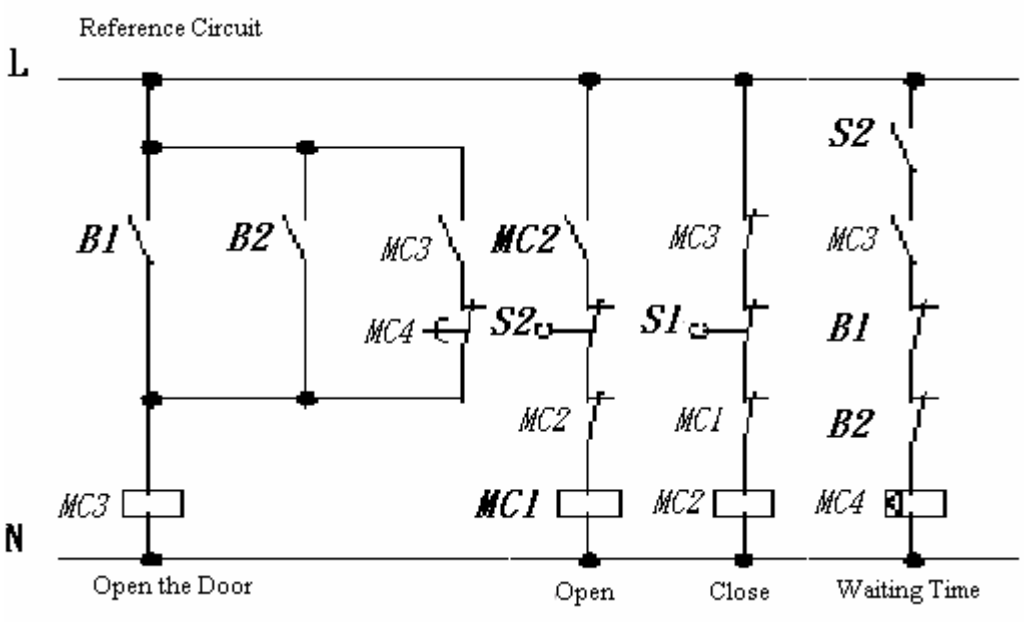
The automatic doors are very popular ie: installed at the entrance of supermarkets, banks and hospitals.

2.1Requirement for Auto Door Control

- It automatically opens whenever a person is approaching.
- The door remains open for a certain period and closes if no person is present.



2.2 Traditional solution



Whenever B1 or B 2 senses the approach of a visitor, the door is actuated to open. After an elapse of time, B1 or B2 senses no presence of a visitor; MC 4 will close the door.

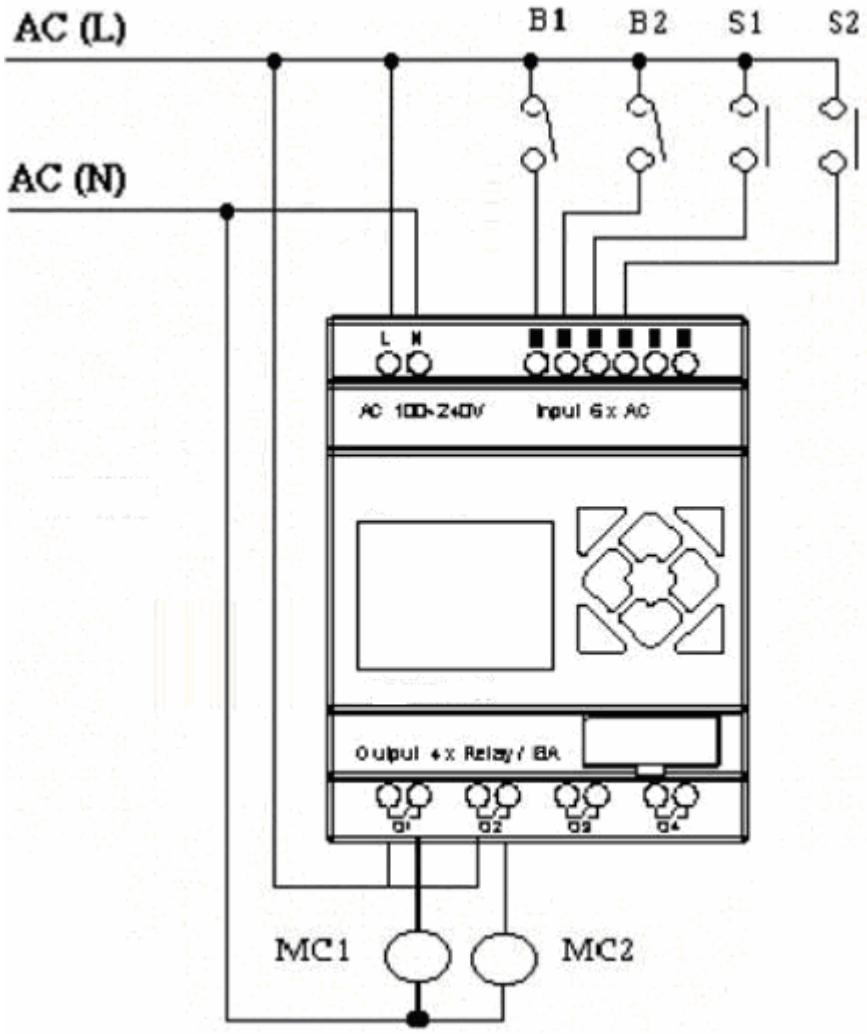
2.3 Apply iSmart in Door Control System

Applying iSmart in door control system can simplify the circuit. All that one need to do is connect the action sensor, limit switch and contactor with iSmart.

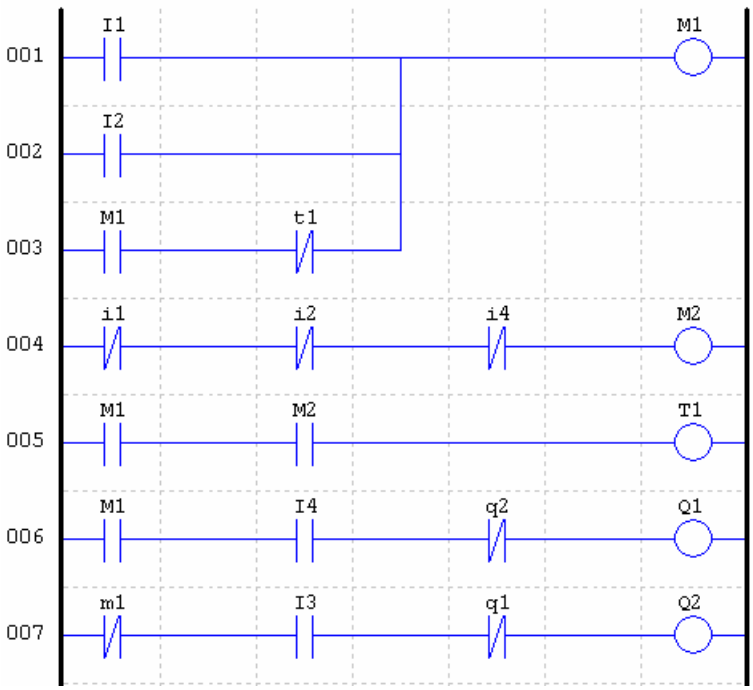
Devices Applied

- MC1 main door open contactor
- MC2 main door close contactor
- S1(NC contact) closing limit switch
- S2(NC contact) opening limit switch
- B1(NO contact) outdoor infrared sensor
- B2(NO contact) indoor infrared sensor

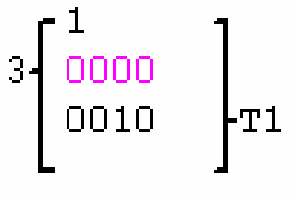
Wiring Diagram and Program with iSmart applied in door control system.



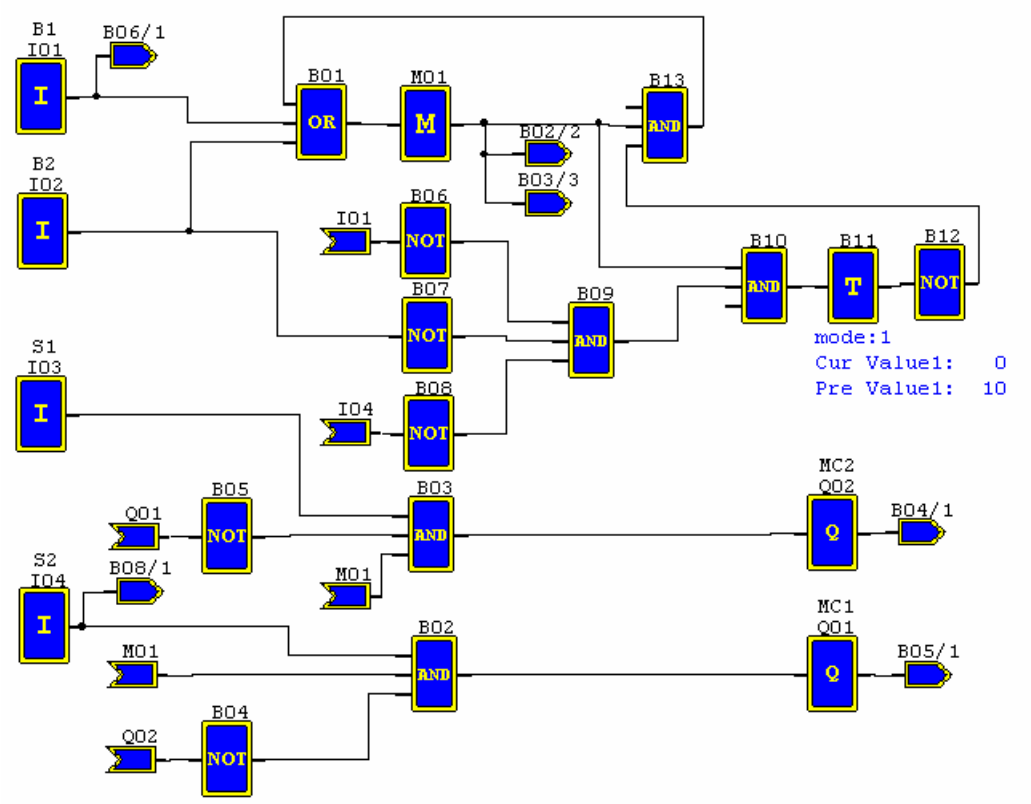
Ladder :



FUNCTION :



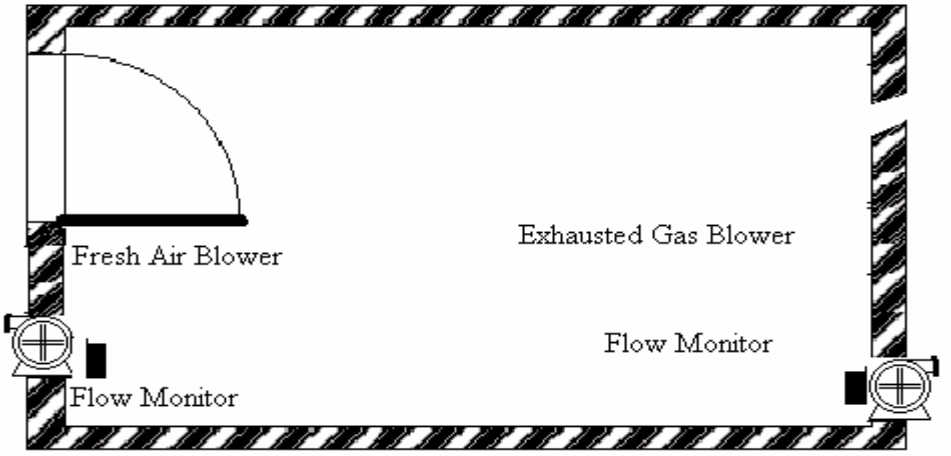
FBD Operation Flow：



3. Ventilation Control

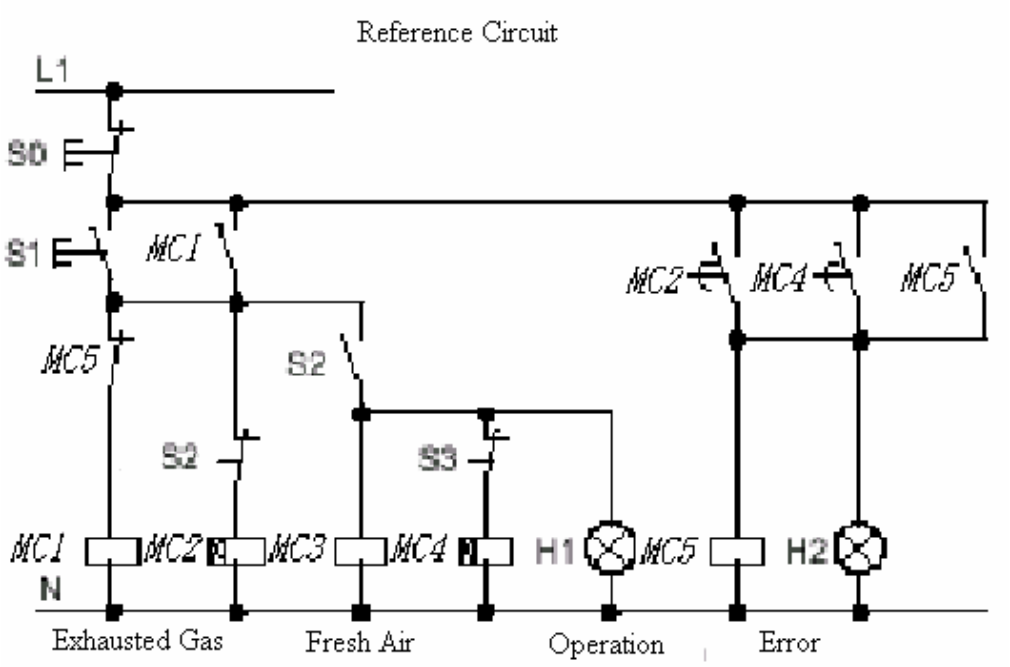
3.1 Ventilation System Requirement

The main function of the ventilation system is to blow in the fresh air and blow out the waste air as shown in the below drawing



- The room is provided with exhausted gas blower and fresh air blower
- The flow sensor controls the blowing in and out operation
- Over pressure is permitted at no time.
- The fresh blower will run only if the flow monitor senses that the exhausted gas blower is working properly.
- If any irregularity takes place on air in blower and air out blower, the warning lamp will light.

The control circuit for the traditional ventilation system is shown below:

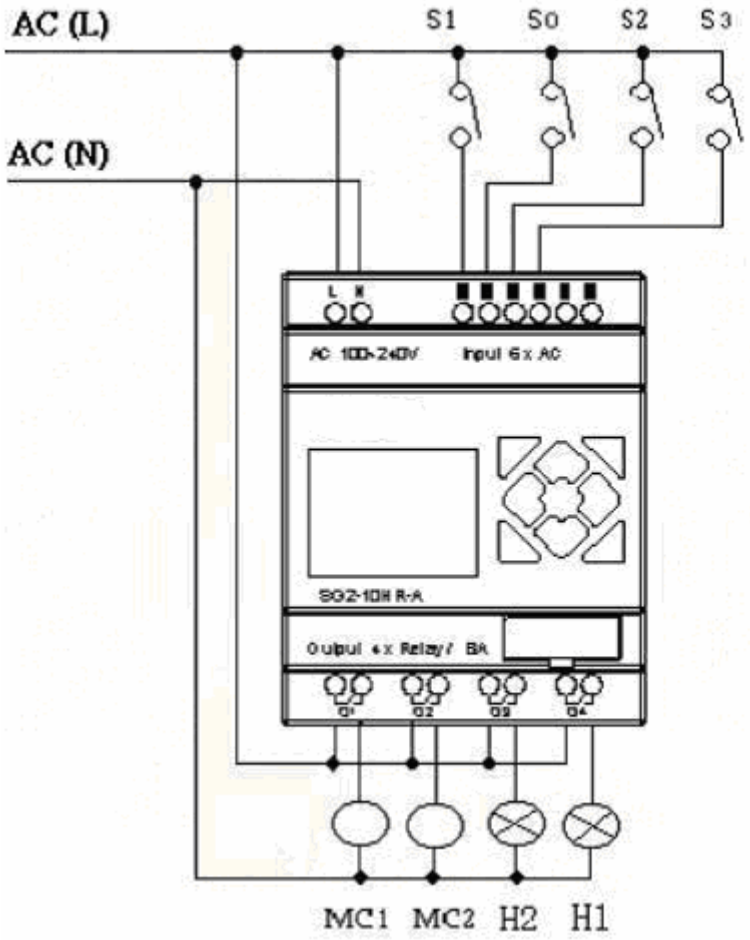


The ventilation system is wholly controlled by the airflow monitor. If there is no flow air in the room after a designated duration of time, the system will activate the warning system so the user shall can shut off the system.

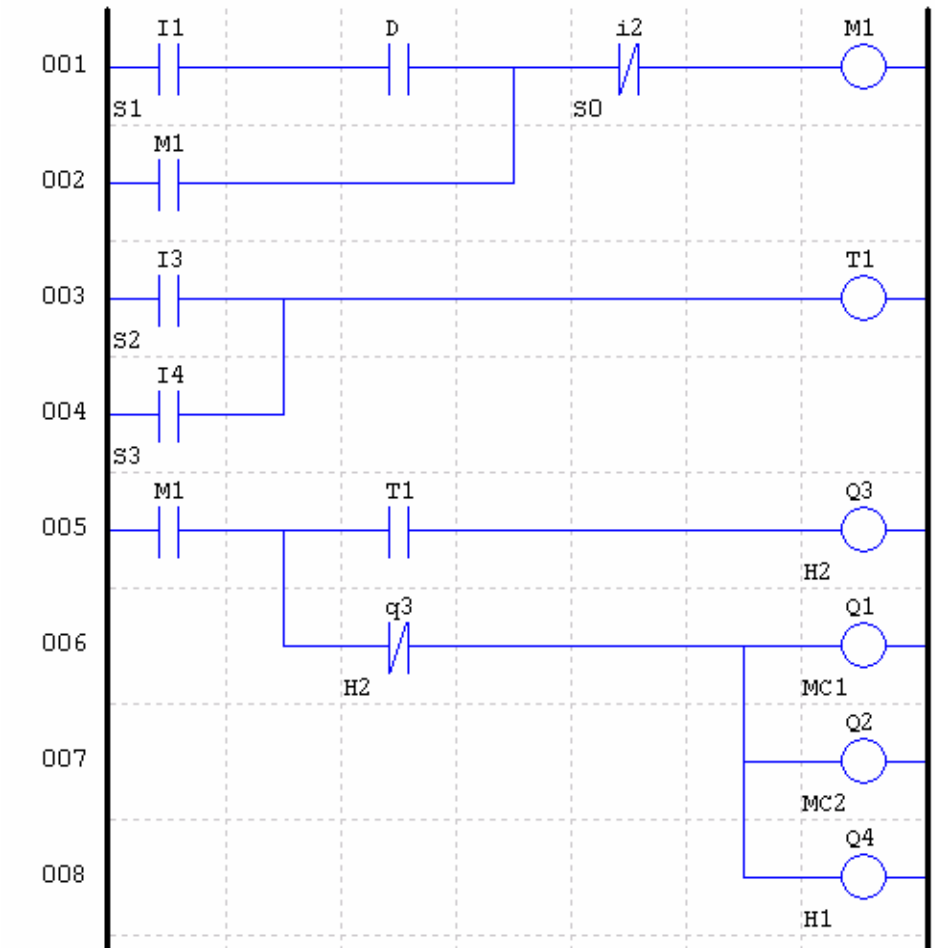
Devices Applied

- MC1 main contactor
- MC2 main contactor
- S0(NC contact) stop switch
- S1(NO contact) start switch
- S2(NO contact) air flow monitor
- S3(NO contact) air flow monitor
- H1operation indicator
- H2 alarm light

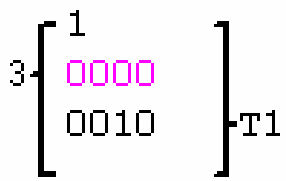
Wiring Diagram and Program with iSmart applied in Ventilation System.



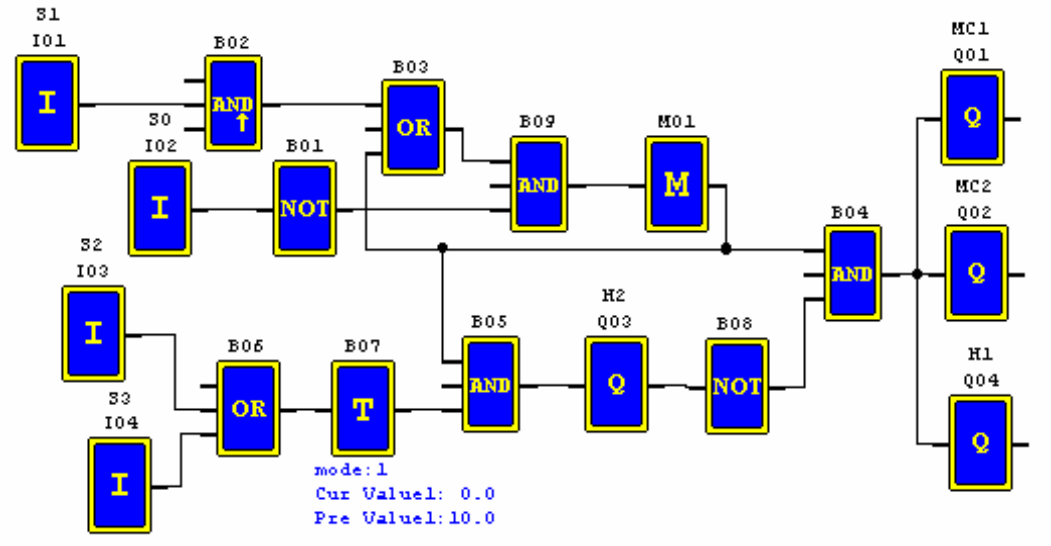
Ladder：



FUNCTION：



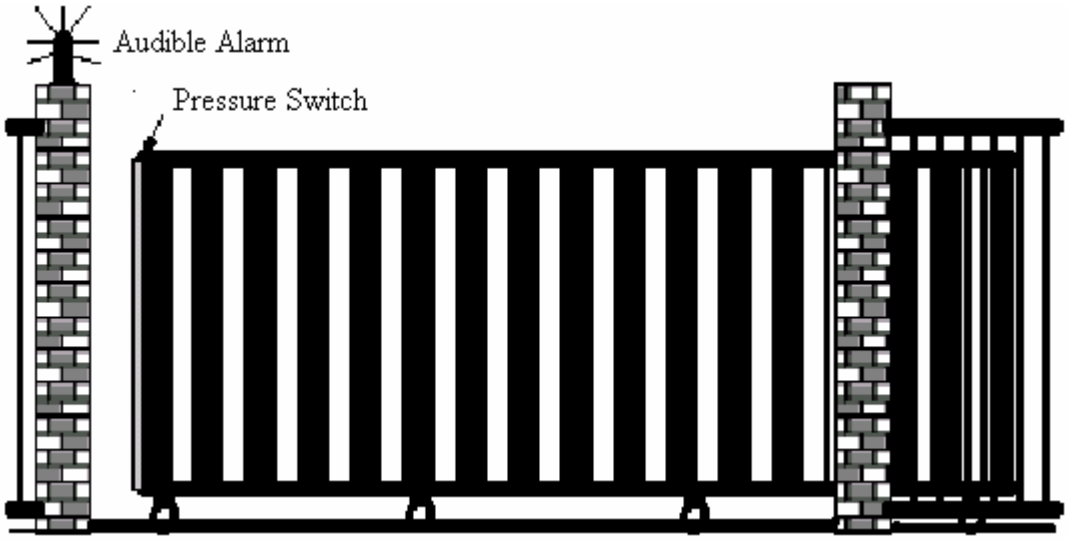
FBD Operation Flow：



4. Plant Gate Control

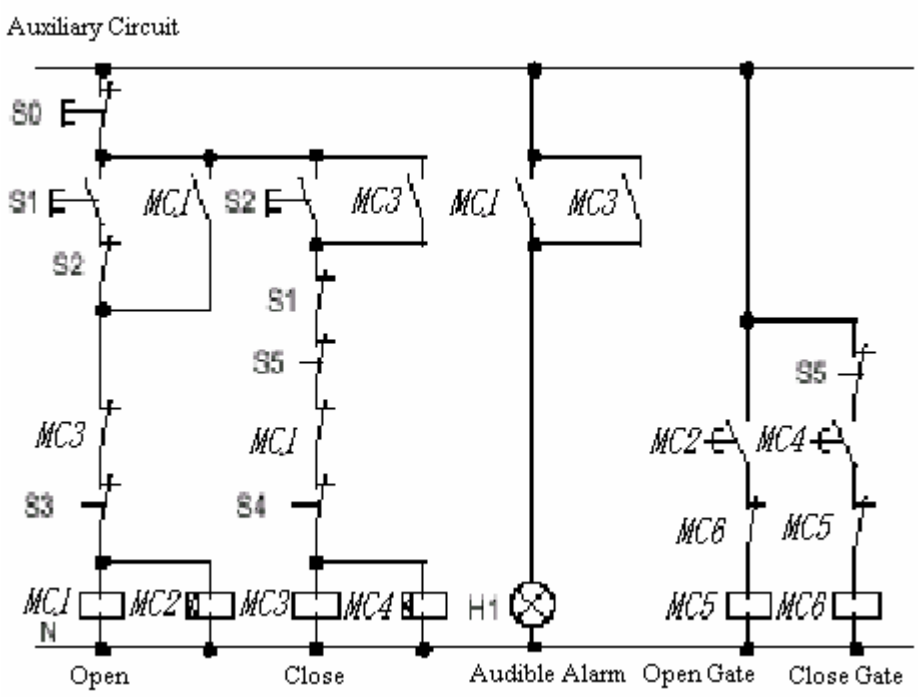
4.1 Requirements for Plant Gate Control

The main purpose of the plant gate is to control the access of vehicals, which is



manually operated by the gate guard.

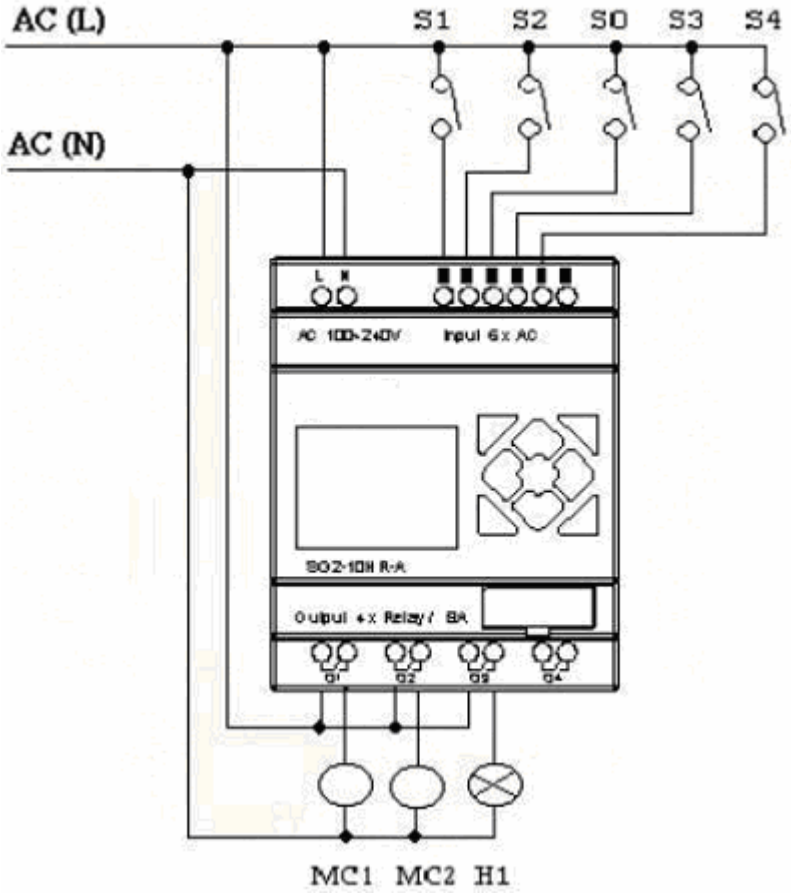
- The door guard controls and oversees the opening, closing of the plant door gate.
- The stop switch can be activated at any time regardless of whether the gate is fully open or in a closed condition.
- The alarm light will be activated for 5 seconds in advance before the gate begins an operation.
- A damper is fitted on the gate. In the closing operation the gate will stop if the damper makes contact with an object or gate post.



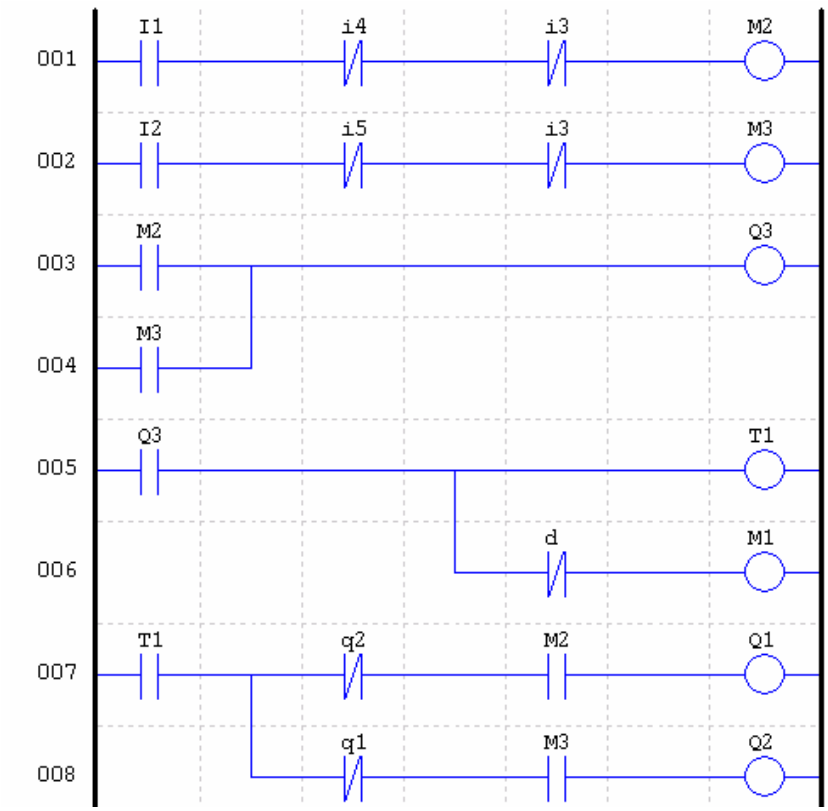
Devices Applied

- MC1 Main Electromagnetic Contactor
- MC2 Main Electromagnetic Contactor
- S0(NC contact) stop switch
- S1(NO contact) open switch
- S2(NO contact) close switch
- S3(NC contact) open safe damper
- S4(NC contact) close safe damper

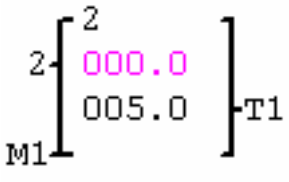
Wiring Diagram and Program with iSmart applied in Plant Gate



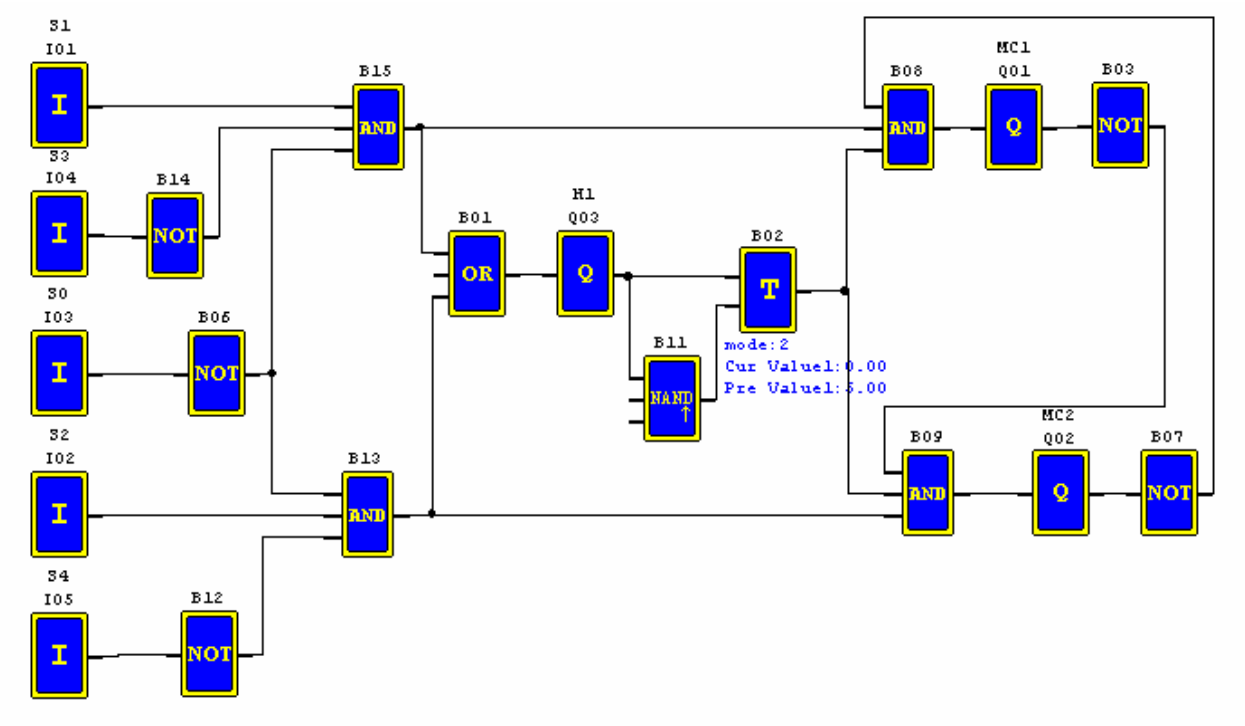
Ladder：



FUNCTION



FBD:


S1
I01
I
B15
AND
MC1
Q01
B08
AND
Q
B03
NOT
S3
I04
I
B14
NOT
B01
OR
H1
Q03
Q
B02
T
S0
I03
I
B06
NOT
B11
NAND
mode:2
Cur Value1:0.00
Pre Value1:5.00
MC2
Q02
B09
AND
Q
B07
NOT
S2
I02
I
B13
AND
S4
I05
I
B12
NOT

5. Counting Control for Packing Machine

Requirement：

1) The packing cycle is that it begins counting the finished products in the assemble line, when the counting value reaches 12, it proceeds packing operation which takes 5 seconds. After finished, it begins a new cycle.
2) It simultaneous counts the finished packs of product.
3) In case of power failure, the counting remains unchanged.

Analysis：

1) A transducer is employed to produce the pulse signal when the transducer detects the arrival of a product. A counter generates an output when the counting value reaches 12 and a timer is employed to have a delay of five seconds.

2) The counter will be operated in mode 3 or mode 4 in an effort to keep the accurate counting even in case of power failure.

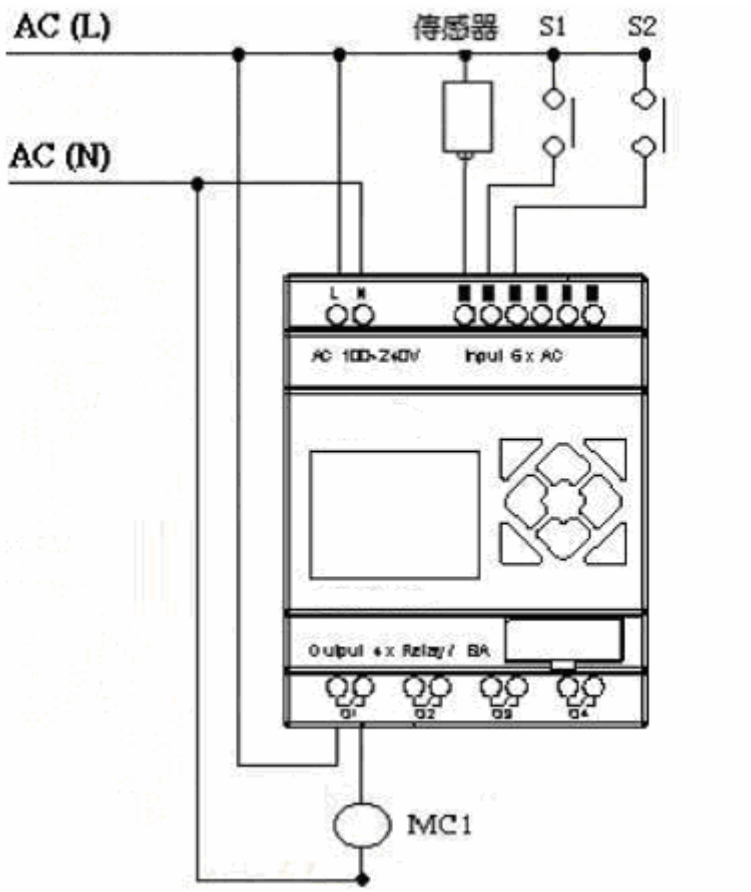
Devices Applied

I1：counting sensor;

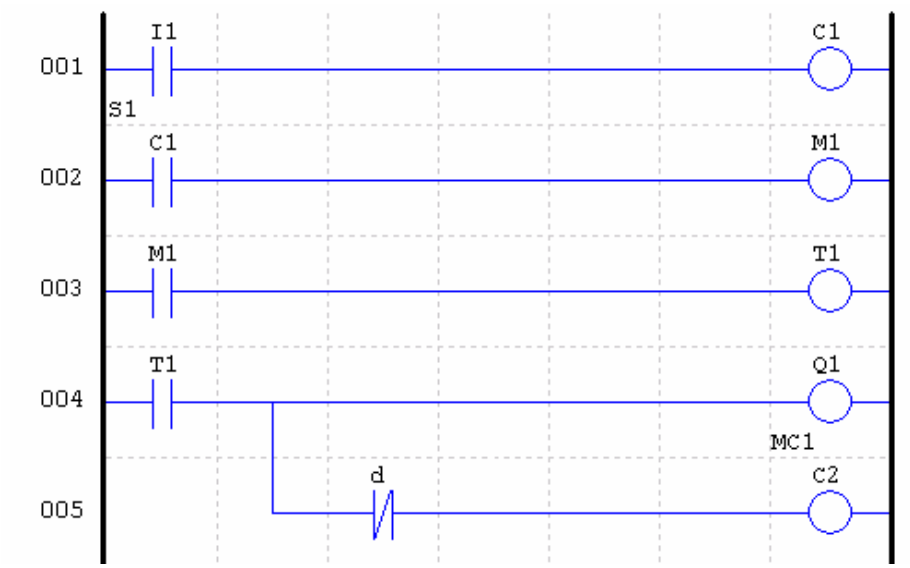
S1：reset the counting value to zero;

MC1：packing

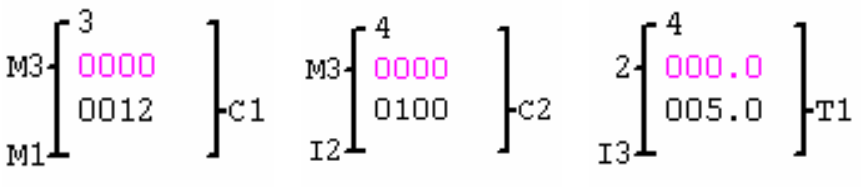
Wiring Diagram and Program with iSmart applied for Packing Machine



Ladder :



FUNCTION :



FBD :