



Operation Manual Version: First Edition



IMO Precision Controls Ltd

Safety Precaution

□.Precaution for Installation:



Never install the product in the environment beyond the one brochure and user manual specified, such as high temperature, humidity, dust, erosive gas, vibration, impact condition resulting in the risk of inductive electricity, fire and error operation.



Please exactly comply with the installation instruction in the user manual, or the undesired situation as falling down, accident or error operation would happen to the iSmart



Pay close attention to the cable and conductor incidentally fall into the module to prevent fire, trouble and wrong action.

□.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 operation.



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



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



Improper wiring would lead to fire, trouble, 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 the safety protection such as an emergency stop and external interlock circuit to prevent the iSmart from trouble and mechanical damage.



Run the iSmart after safety confirmation. Error operation will result in mechanical damage.



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

Table of Contents

Chapter 1 General

Chapter 2 Operation Precaution

Chapter 3 System Configuration

3-1 Basic System Configuration

3-2 Configuration for Computer Connection and Program Spare Cartridge

Chapter 4 Installation

4-1 Installation environment

4-2 Directly Installing

4-3 DIN-Rail Installing

Chapter 5 Wiring

5-1 Precaution for Wiring

5-2 10/12 points variant

5-3 20 points variant

Chapter 6 Operation Flow

6-1 After Power Supply Connection

Chapter 7 Description for Ladder Instruction

7-1 Basic Instruction

7-2 Basic Instruction Function

⊙ D (d) Instruction Function

⊙ NORMAL (-[] output

⊙ SET (▲) output

⊙ RESET (▼) output

⊙ P output

7-3 Application Instruction

⊙ General Counter

⊙ High-speed Counter (only available in DC Power Supply types)

⊙ Timer

⊙ RTC

⊙ Analog Comparator

- ◎ HMI(Text Function)
- ◎ PWM Output Function (only available in Transistor output types)
- ◎ DATALINK Function (only available in SMT-C types)

7-4 Operation Method

Chapter 8 FBD Block Description

8-1 Coil Block

8-2 Logic Block

8-2 Function Block

8-4 FBD Block Resource

8-5 FBD Edition Method

Chapter 9 System Design

9-1 Procedure

9-2 Consideration for Designing

9-3 Allocation of Relay Code

Chapter 10 Spare Program

10-1 Spare Program Cartridge (SMT-PM04)

10-2 Computer Written Software (SMT CONFIGURATOR)

Chapter 11 Trial Run

11-1 Pre-Trial run Confirmation

11-2 Trail Run Procedure

Chapter 12 Maintenance and Inspection

12-1 Periodic maintenance

12-2 Trouble Shooting

Chapter 13 Specification

13-1 General Specification

13-2 Input and output Specification

13-3 Profile Dimension

Appendix Application Example

Chapter 1 General

iSmart is a tiny smart PLC having 44 points O/I system, applying ladder graphic program and FBD program, and applicable to the small-scale automatic operation. iSmart can expand 3 groups of 4-input-4-output module. The smart mobility and supremacy the iSmart inheres are greatest assistance for you to considerably saving both time and cost in operation. The special features the iSmart owns 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 x 57.3 (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 inputting ladder program
- (2) The computer compiled programs are applicable to WIN 32 platform (Windows 95/98/ME/NT/2000/XP)
- (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/points, with resistive load. Transistor output 0.5A/Point
- (2) It can directly drive 1/3 HP motor.
- (3) Sufficient program memory and abundant Instruction
 - ① Max. 200 step Ladder Instruction input
 - 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

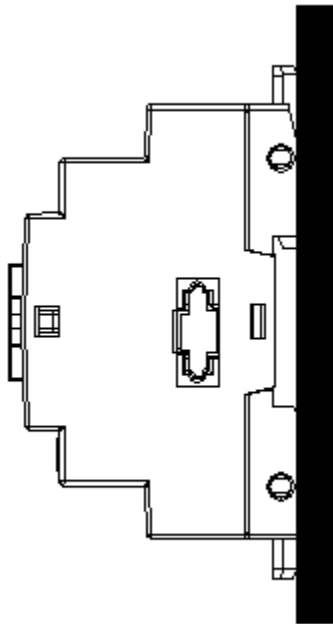
IMO recommend that you do not install iSmart in the following conditions:

- In direct sunshine or when the ambient temperature is beyond 0-55Deg C .
- The relative humidity exceeds 5-90% the temperature is subject to rapid change, susceptible to condensation.
- The area contains inflammable or erosive gases

(2) Installation

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

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 the signal interference.

(4) Static Electricity

- In the extremely arid area, the humans' body is susceptible to generate of static electricity. Never touch the **iSmart** with hands to avoid static damage to the unit.

(5) Cleanness

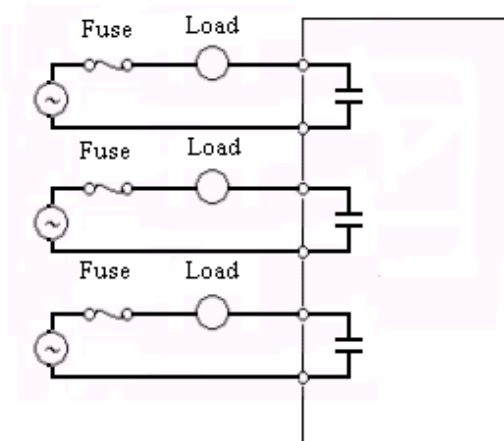
Use the clean and dry cloth to wipe the surface of the **iSmart**. It is prohibited to clean the **iSmart** with water or volatile solvent to prevent structure deformation and discoloration.

(6) Storage

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

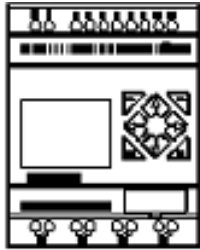
(7) Over-current Protection

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



Chapter 3 System Configuration

3-1 Basic System Configuration



iSmart 10 points:

Expansion variant

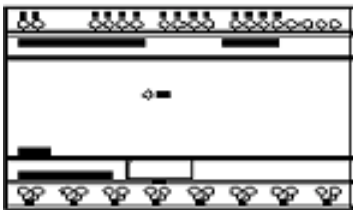
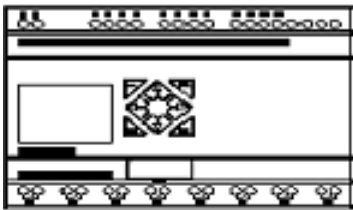
- SMT-EA-R10
- SMT-ED-R12
- SMT-ED-T12

Blind variant

- SMT-BA-R10
- SMT-BD-R12
- SMT-BD-T12

iSmart expand 8 points:

- SMT-MA-R8
- SMT-MD-R8
- SMT-MD-T8



iSmart 20 points:

Blind variant

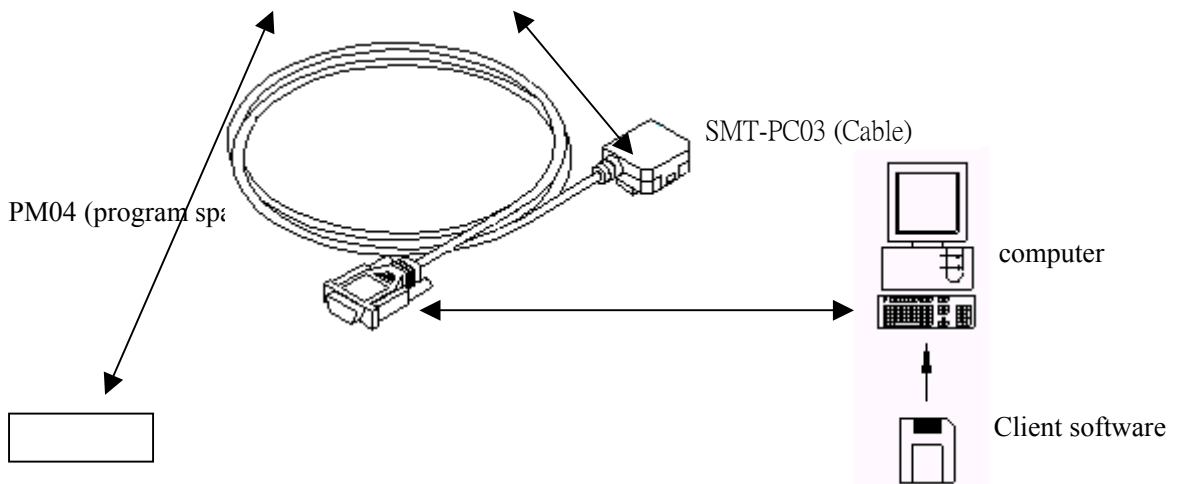
- SMT-BA-R20
- SMT-BD-R20
- SMT-BD-T20

High-Speed variant

- SMT-CD-R20
- SMT-CD-T20

Expansion variant

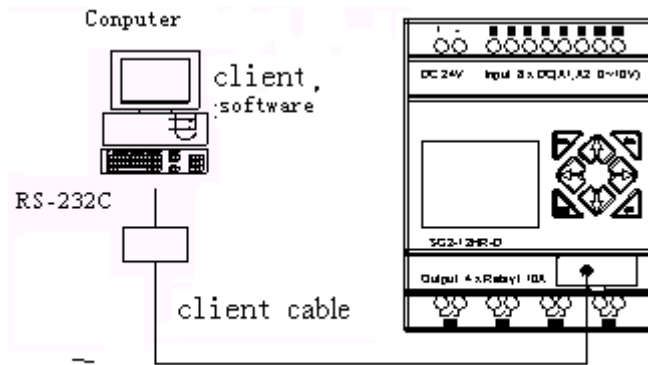
- SMT-EA-R20
- SMT-ED-R20
- SMT-ED-T20



3-2 Configuration for computer Connection and Spare Program Cartridge

(1) Link the computer and **iSmart** with SMT-PC03. Through the SMT-CONFUIRATOR (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)



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

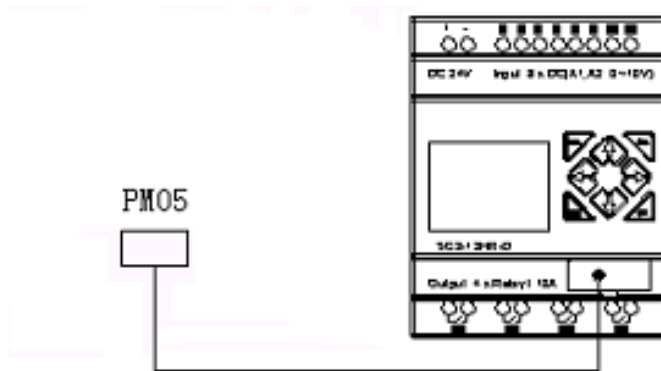


Figure 3-2-2

Chapter 4 Installation

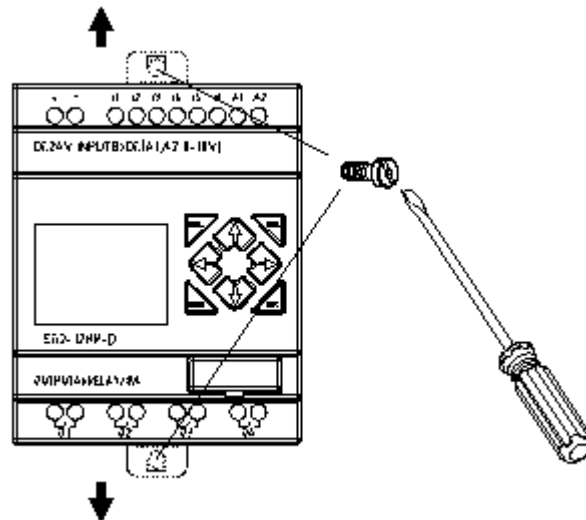
4.1 Installation Environment

The iSmart is not recommended to be installed under the following environments:

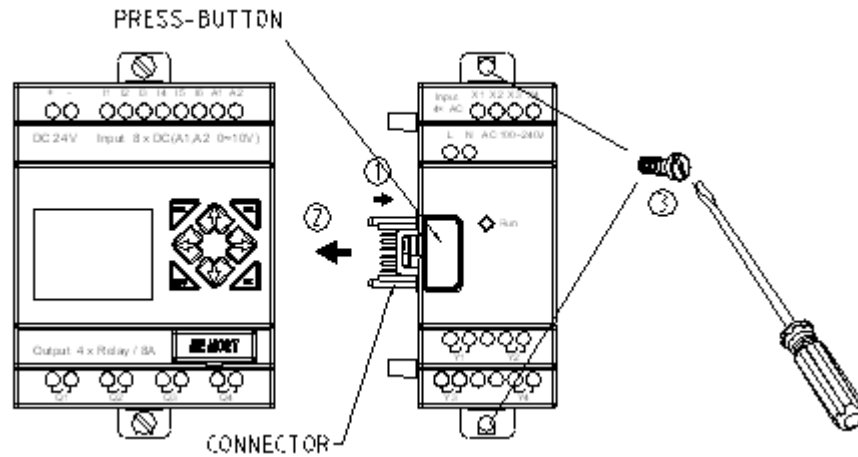
- If the ambient temperature is beyond 0-55Deg C.
- If the relative humidity exceeds 5-90%.
- Area is brimful of dust, salt and iron powder.
- Under direct sunshine.
- If the environment is subject to frequent vibration and impact.
- If the area contains erosive and inflammable gases susceptible to fire.
- If the area is abundant of volatile oil gas, organic solvent, ammonia, electrolytic gas.
- Poor ventilation or close to heating source.

4.2 Direct Installation

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



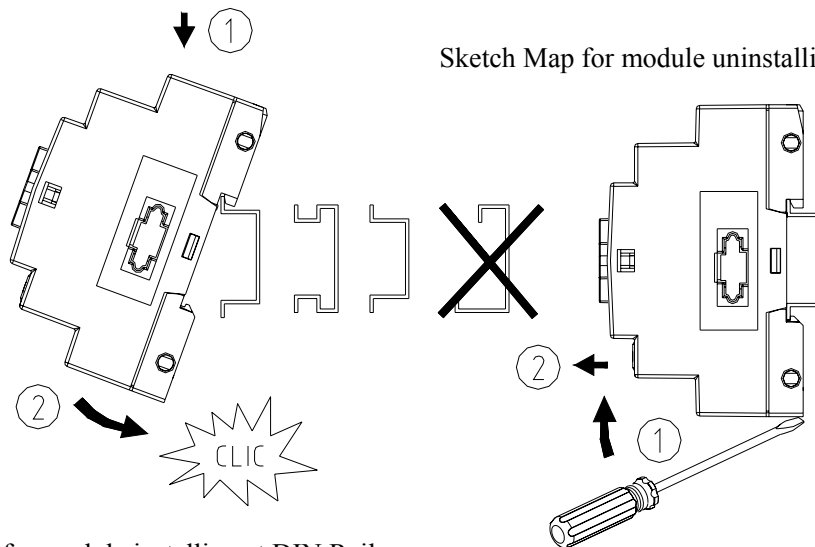
- Ⓢ If the expansion module is to be installed, plug the module into the Master after the Master is fixed. Install with M4×15mm Screw. (Operate Action②, please press PRESS-BUTTON simultaneous)



⊙ Uninstall process is the other way around.

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

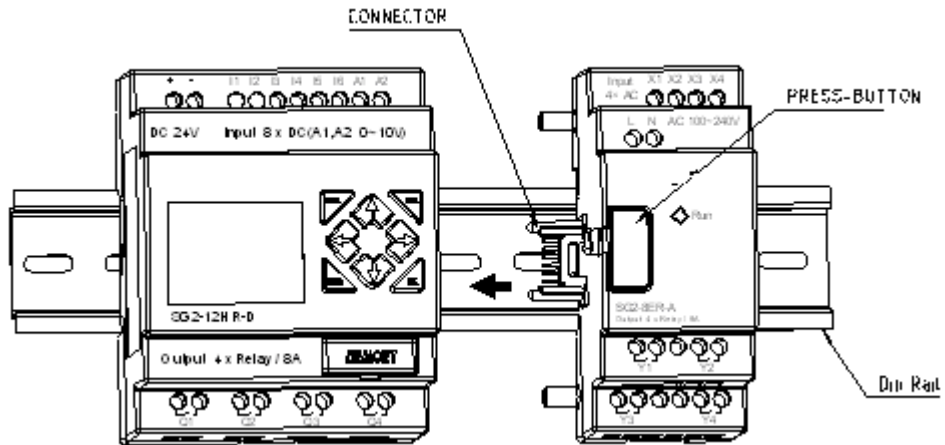
4-3 DIN Rail Installation



Sketch Map for module installing at DIN Rail

□ To install

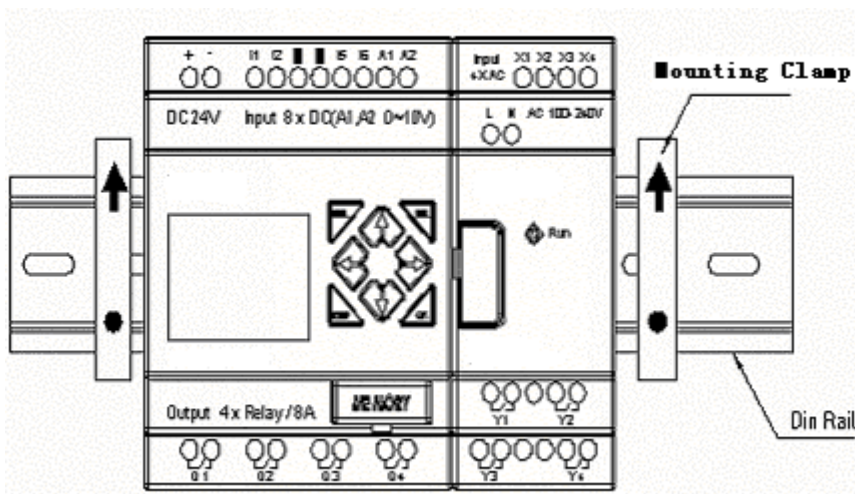
Press the slots on the back of the **iSmart** and expansion module plug **CONNECTOR** onto the rail until the elastic clamps hold the rails in place. Then connect the expansion module and **CONNECTOR** with the Master (press the **PRESS-BUTTON** simultaneously)



- To uninstall

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

- It is recommended to apply clamp to hold the iSmart in place.



Chapter 5 Wiring

5.1 Precaution for Wiring

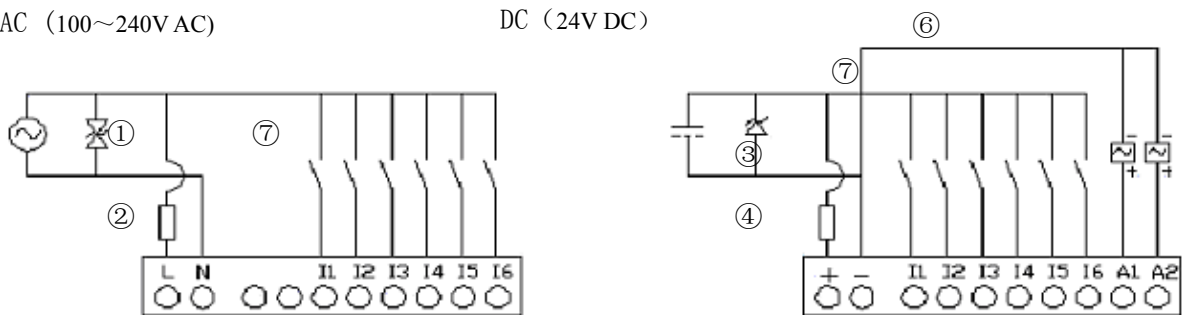
- The I/O signal wire should not be routed in parallel to the power wire or placed in the same tray.
- Adopt 0.75-3.5mm² cable as the external wire.
- Apply 4~6kgf.cm torques to tighten the lock screws.

5-2 10/12 points Variant

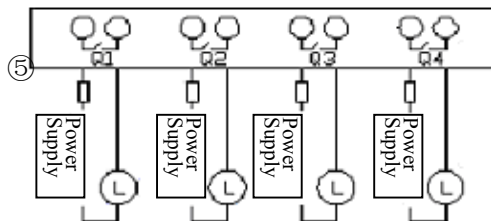
(1) Power Supply and Input Terminal

AC (100~240V AC)

DC (24V DC)



(2) Output Terminal

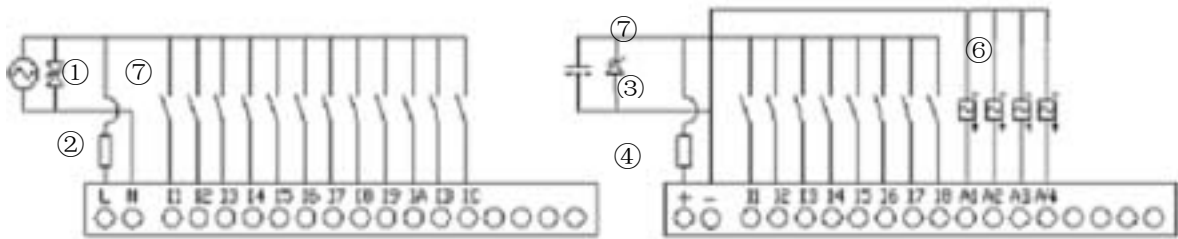


5-3 20 points Variant

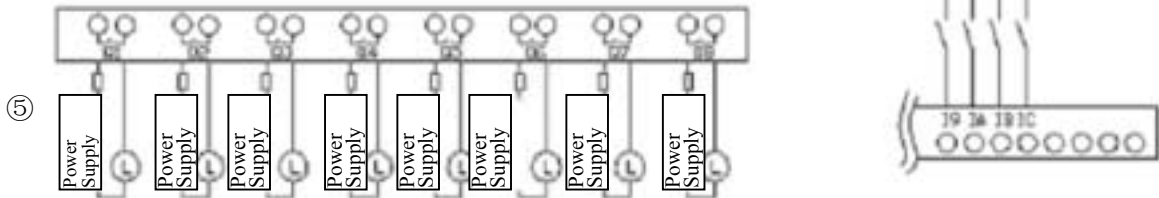
(1) Power Supply and Input Terminal

AC (100~240V AC)

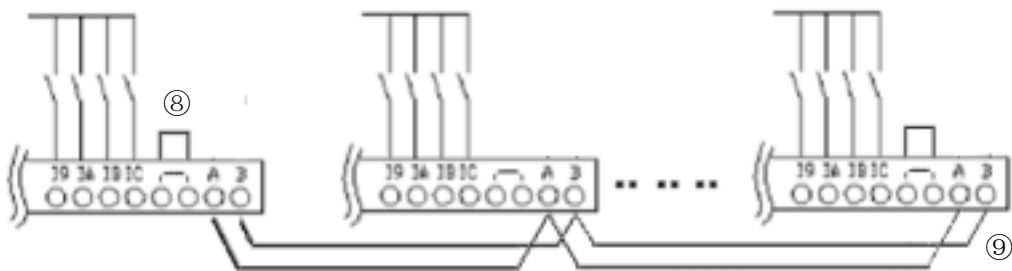
DC (24V DC) (with Analog Voltage Input)



(2) Output Terminal (with no Analog Voltage Input)



(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

Common terminal for analog voltage input should be connected with the same ground terminal of

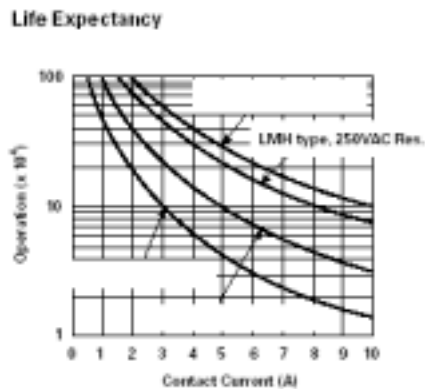
DC power supply.

The power supply and the input shall share the same power source.

□ Only short circuit the first and the last module.

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

5-4 Relay Lifespan



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 actions, the output relay and the input relay will carry out the operations the operator input in the unused portion and update the results.

(2) Transfer Programs from ROM -> RAM

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

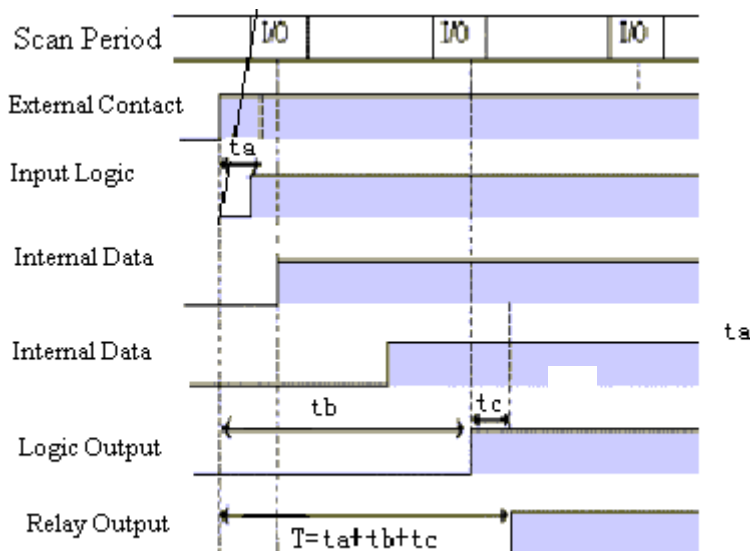
(3) Scan Time

- The scan time covers the time for processing input and output data, the process time the operator applied until the final result is obtained.

The scan time is related to the capacity of the Instruction. Under Ladder mode: 5~20mS;

Under RBD: 2~10mS

(4) Overall Response Time for iSmart





ta: Input OFF -> ON response time

tb: one scan time

tc: Output OFF-> ON response time

Chapter 7 Description for LADDER Instruction

7-1 Basic Instruction

	(	▲	▼	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

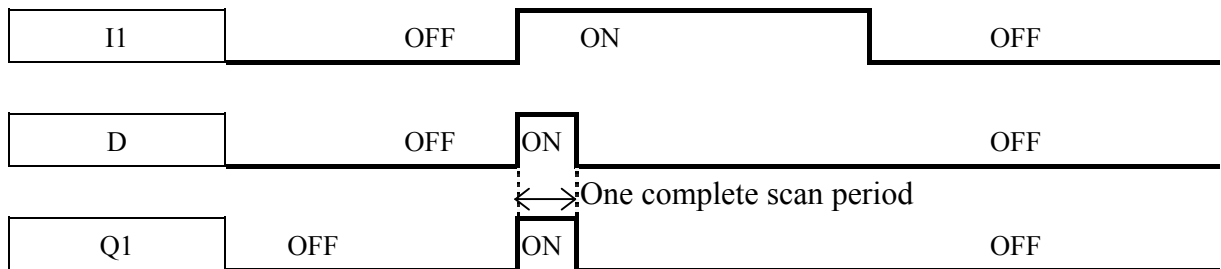
Open Circuit	“ ”	
Short Circuit	“ ”	

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

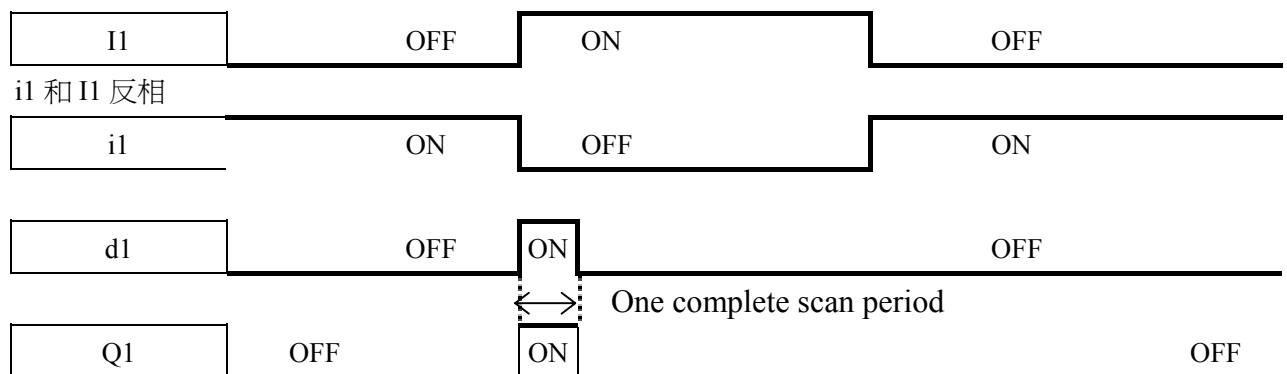
7-2 Function of Basic Instruction

□ Function D (d) Instruction

例1： I1-D — [Q1

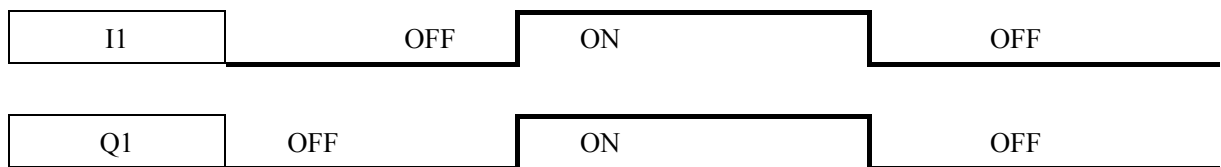


例2： i1-d — [Q1



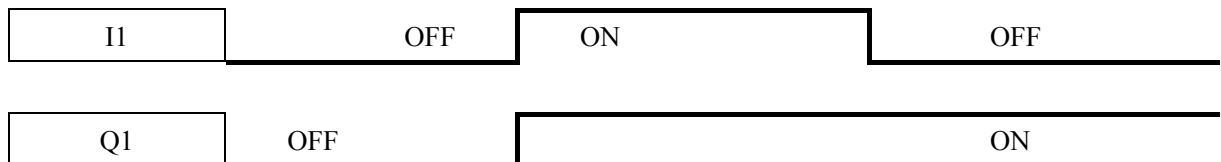
□ NORMAL(-[) output

I1 — [Q1



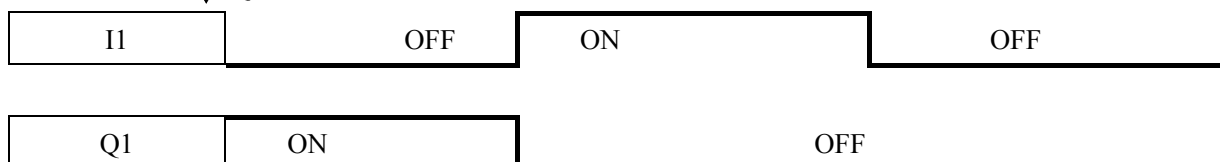
□ SET (▲) output

I1 — ▲ Q1



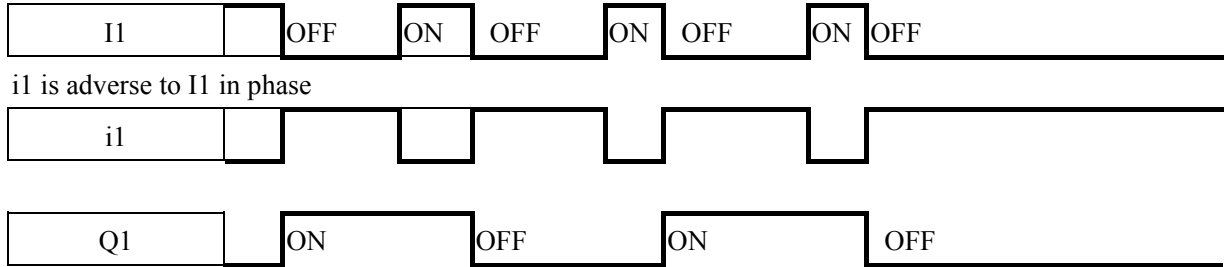
◎ RESET (▼) output

I1 — ▼ Q1



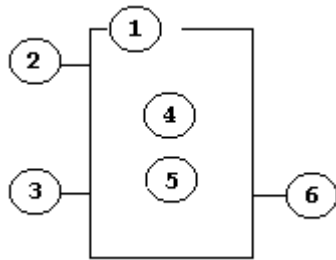
□ P output

i1—PQ1



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

※ FoerI1~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).

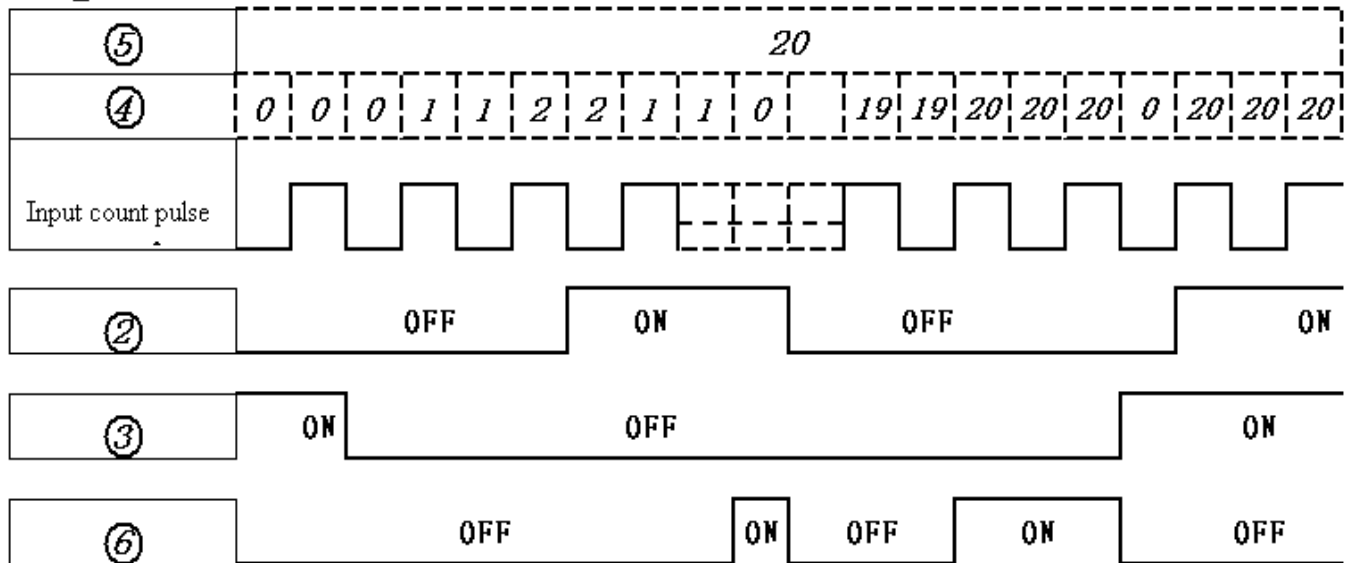
RTC Comparator: R1~RF (R1~R15) , Analog Comparator: G1~GF (G1~G15),

Auxiliary Terminal:M1~MF (M1~M15) .

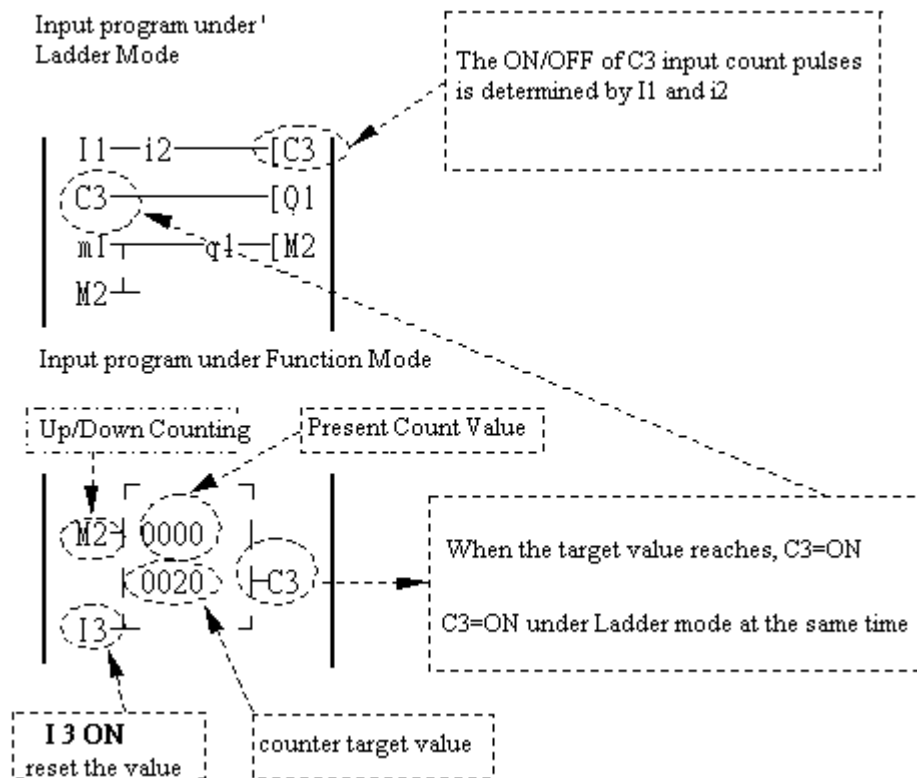
The upper case (I1) is Contact 'a' while the lower (i1) case is Contact 'b'.

(1) Counter Mode 1

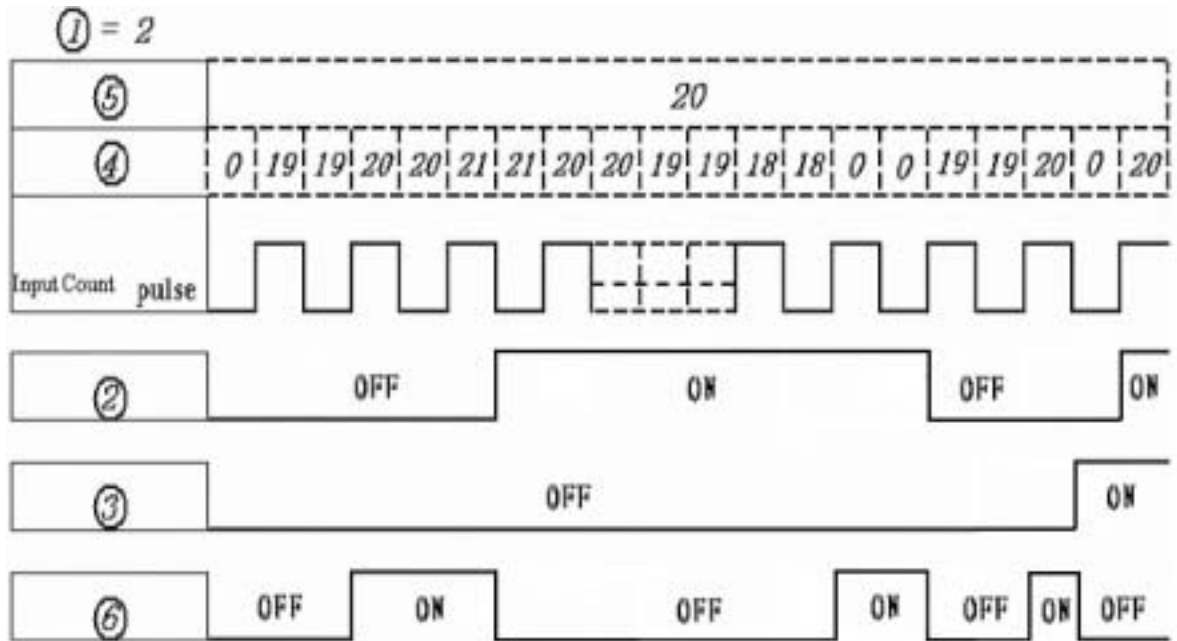
$i1 = 1$



Example :

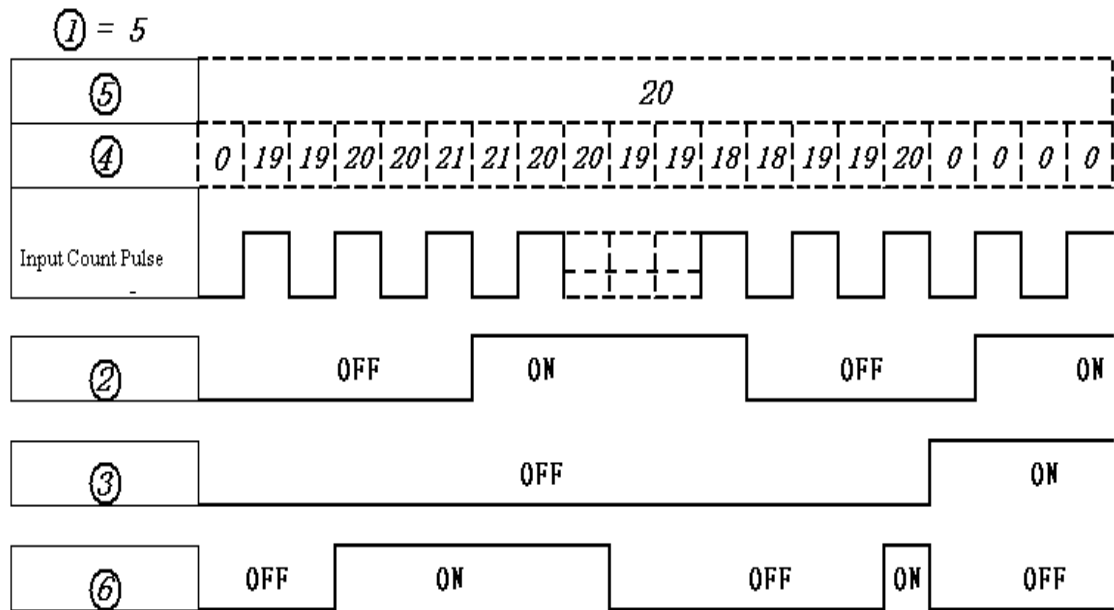


(2) Counter Mode 2



Note:

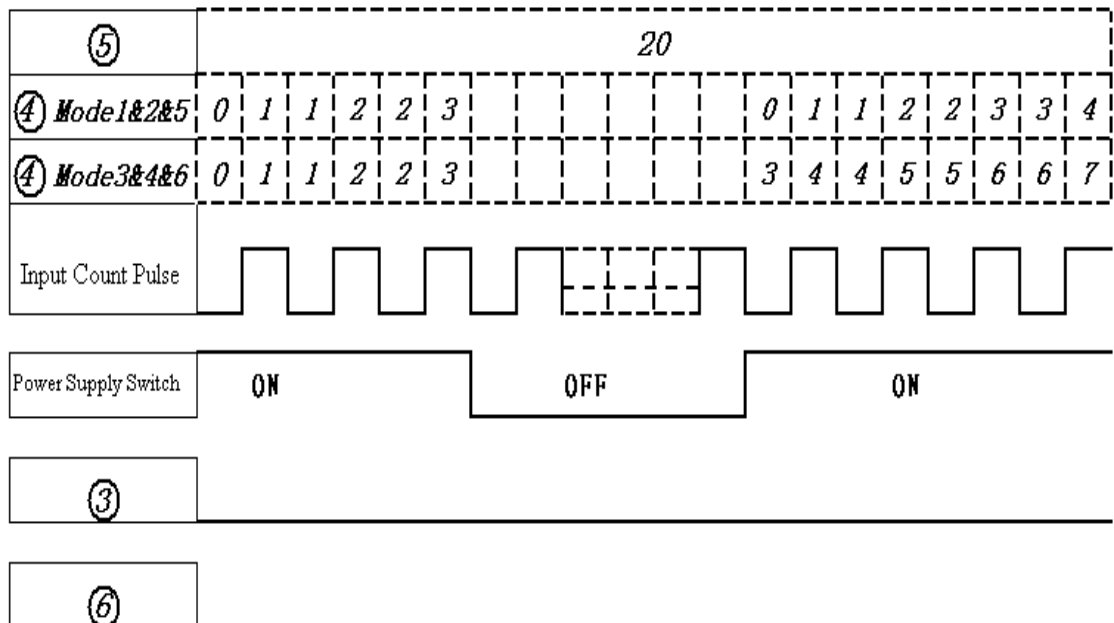
- Under this Mode, the counting present value appeared will be greater than 20, unlike the Mode 1 in which the value is locked at 20.
- (3) The counter Mode 3 is similar to the counter Mode 1 except that the former can remember the recorded value after the power is cut off and continued counting when the power is turned on at the next time.
 - (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 continued counting when the power is turned on at the next time.
 - (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.

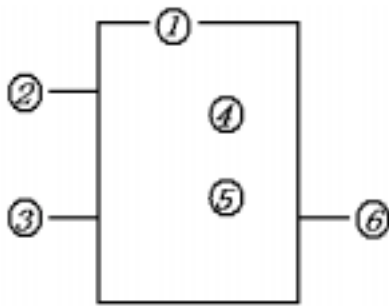


©High Speed Counter (Only Provide for DC Power Supply)

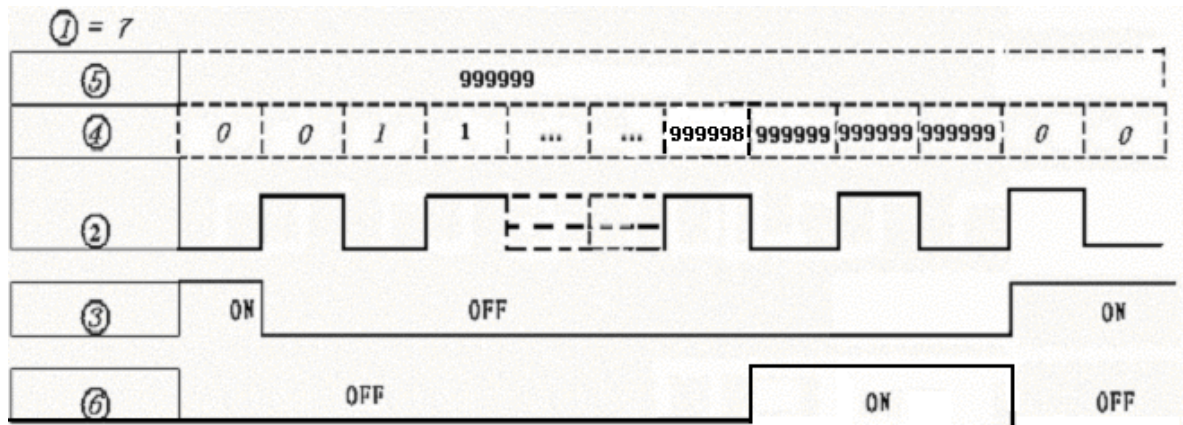
DC power supply variant has two 1 KHz High speed input terminals, I1 and I2. Two

groups of high-speed counting function is available with these two timers.

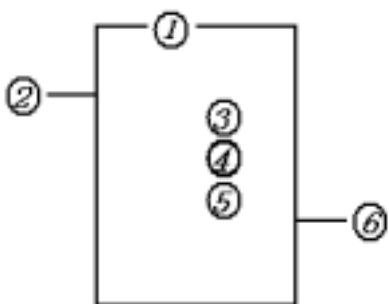
(1) Counter Mode 7



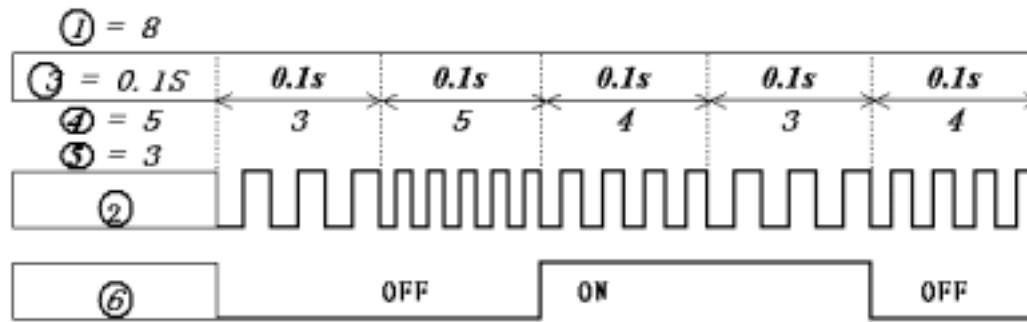
Symbol	Description
①	Counting mode(7)—high speed counting
②	High speed counting input terminal: only I1, I2 available.
③	Use I1~gF to reset counting value. ON: counter is reset to zero and ④OFF OFF: counter continues to count.
④	Counter present value: 0~999999
⑤	Counter target value: 0~999999
⑥	Code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



(2) Counter mode 8



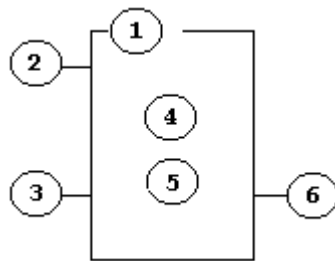
Symbol	Description
①	Counting Mode(8)—Frequency Comparison
②	High speed counting input terminal: only I1, I2 available.
③	Counting interval time:(0~99.99S)
④	Counter 'on' target value (000000~999999)
⑤	Counter 'off' target value (000000~999999)
⑥	Code of Counter (C1~CF Total :15Group)



Note :

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

□ Timer



Note :

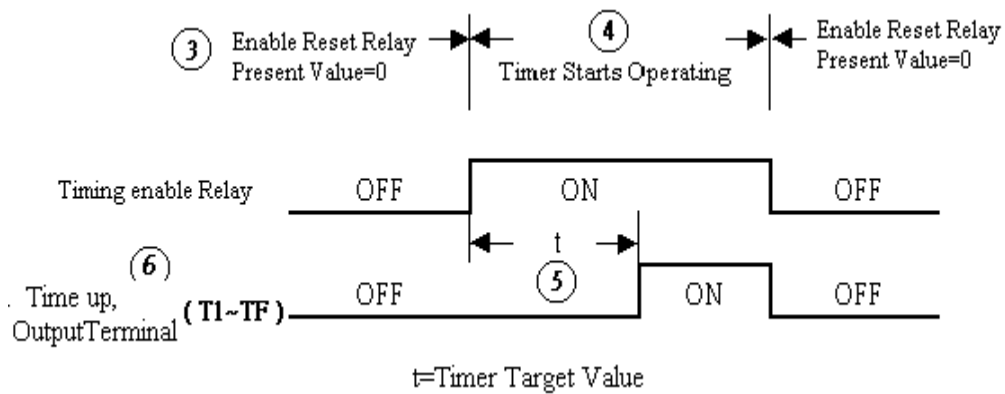
※ The setting value of the timer could be constant, or the present value of the timer, counter or analog input of A1~A4.

※ 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 Conparator: G1~GF(G1~G15),Auxiliary terminal:M1~MF (M1~M15) .

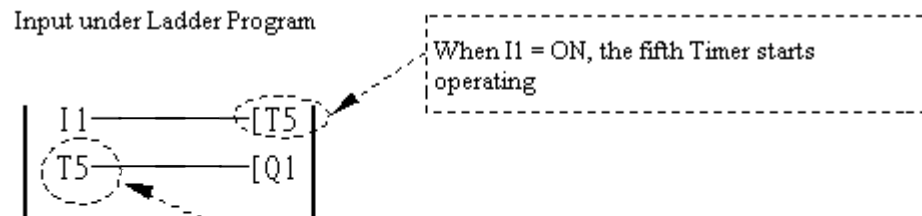
The upper case (I1) is Contact 'a' while the lower (i1) case is Contact 'b'.

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)

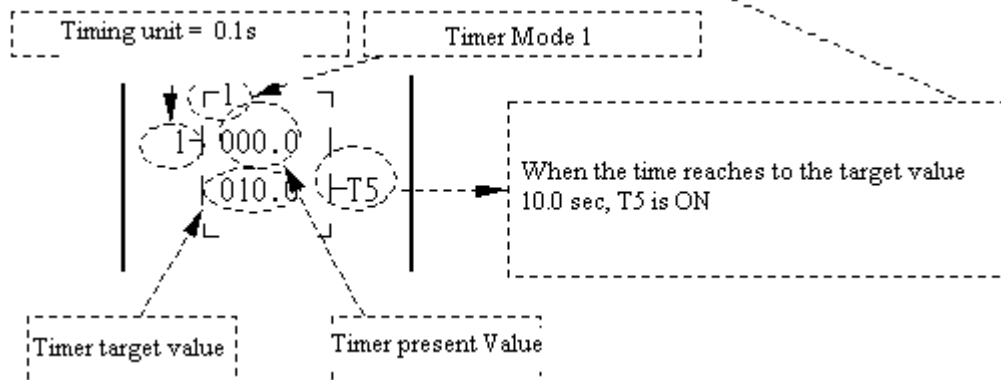
(1) Timer Mode 1(ON-Delay A mode)



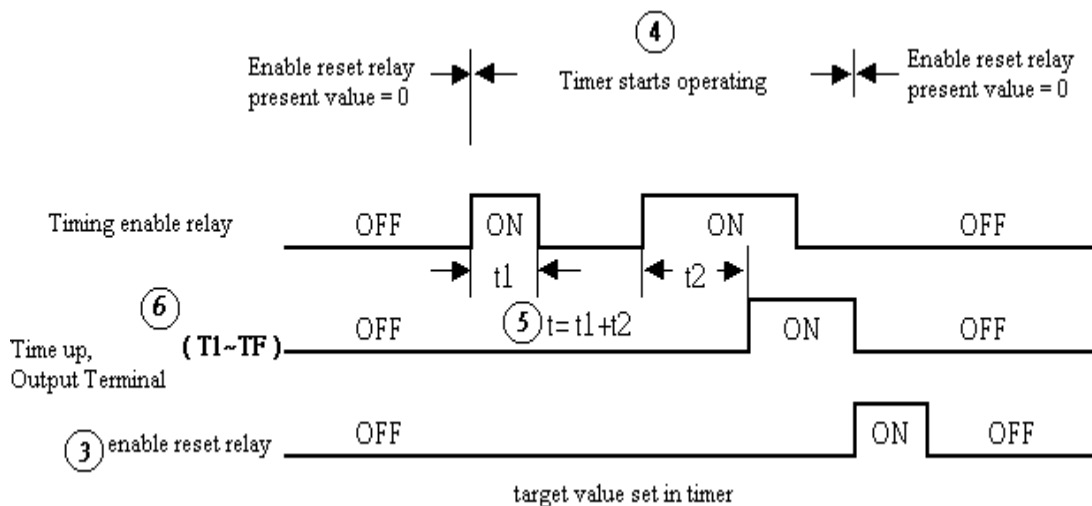
Sample:



Input under Function Program

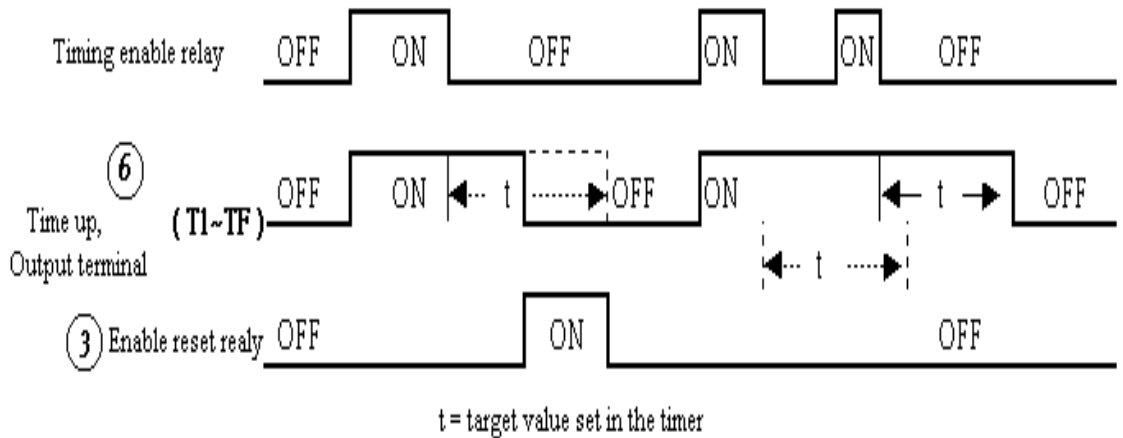
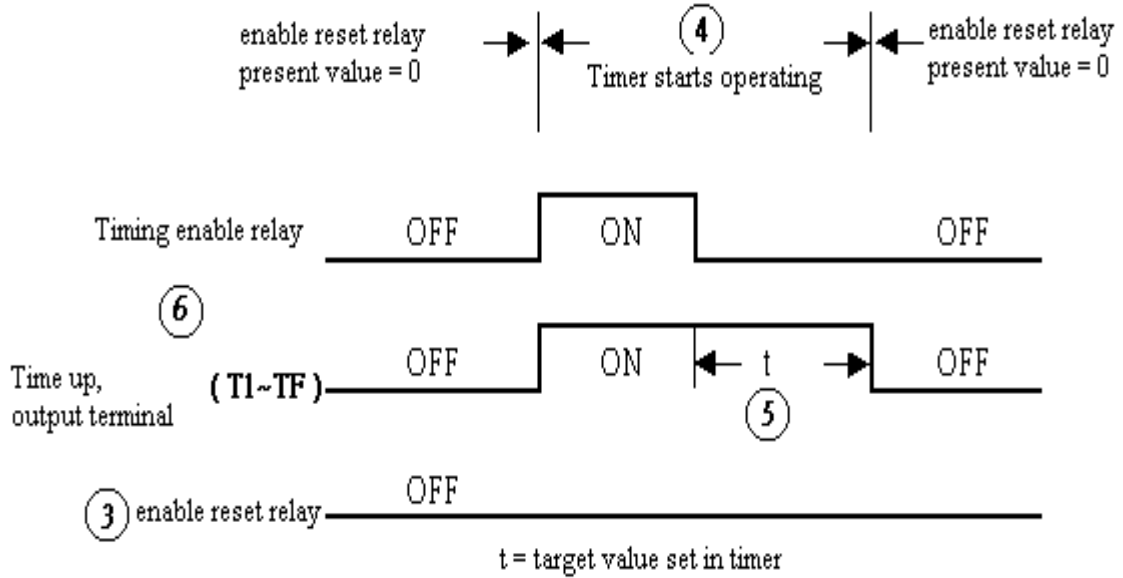


(2) Timer mode 2(ON-Delay B mode)

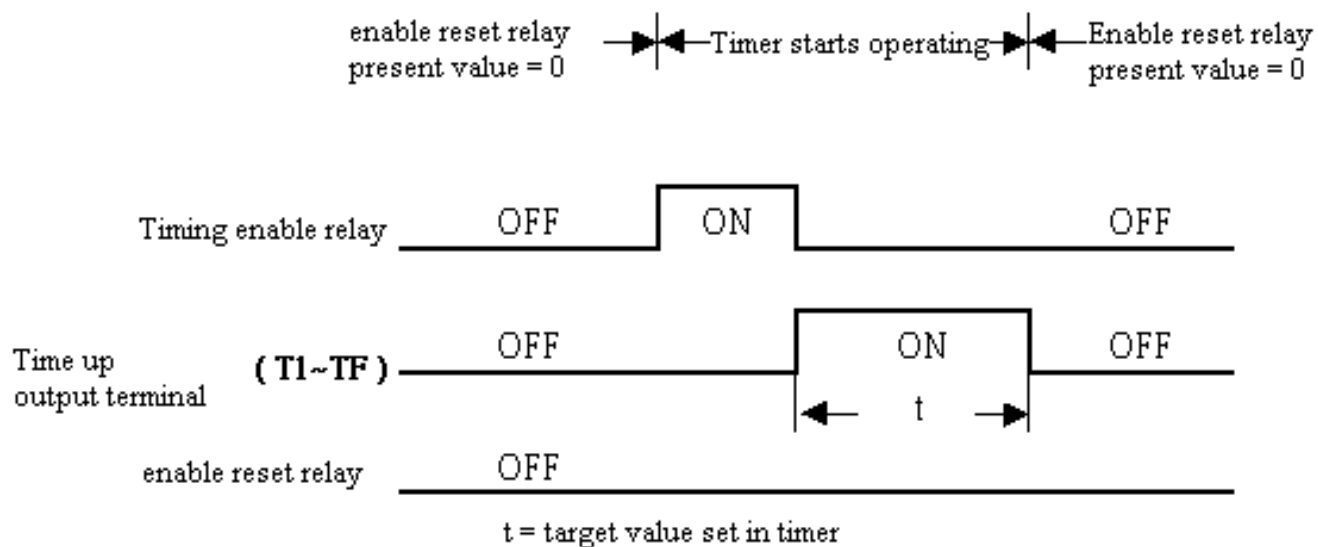


Note: timing begins, the action time of the Relay less than the Minimum unit, will be neglected.

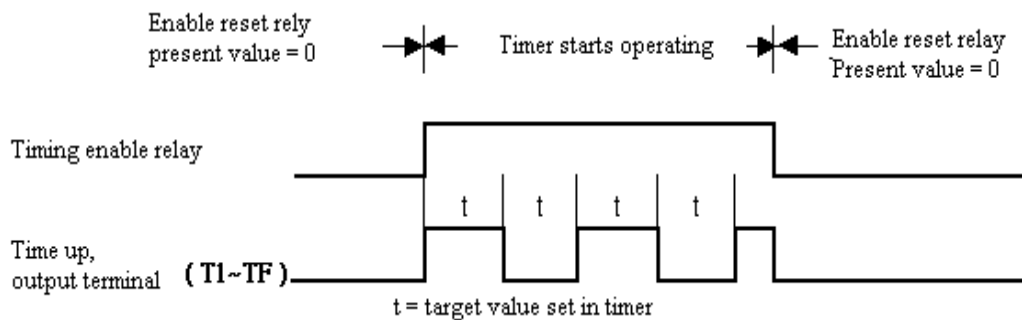
(3) Timer Mode 3(OFF-Delay A Mode)



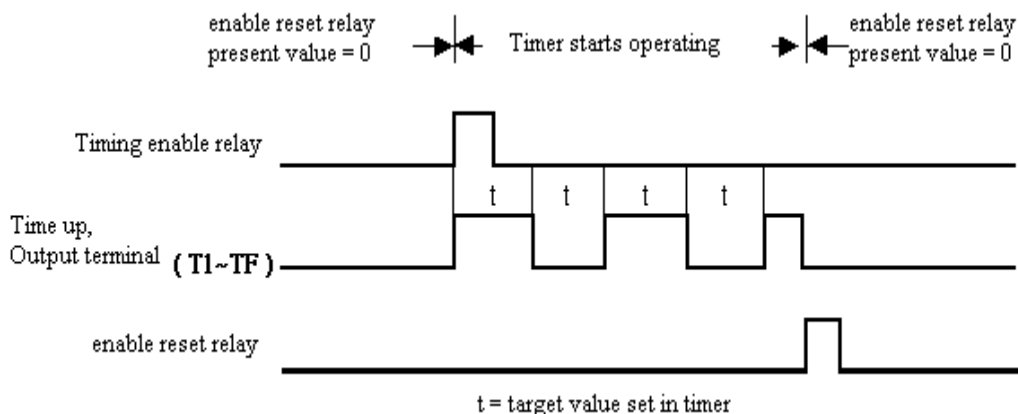
(4) Timer Mode 4(OFF-Delay B Mode)



(5) Timer Mode 5(FLASH A Mode)



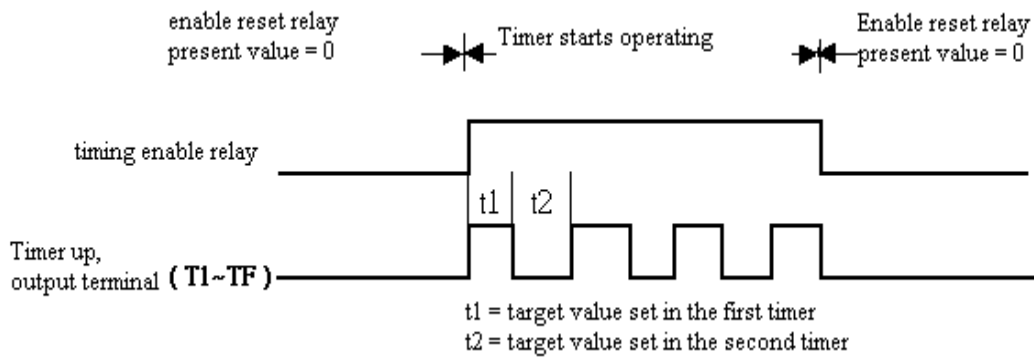
(6) Timer Mode 6(FLASH B Mode)



(7) Timer Mode 7(FLASH C Mode)

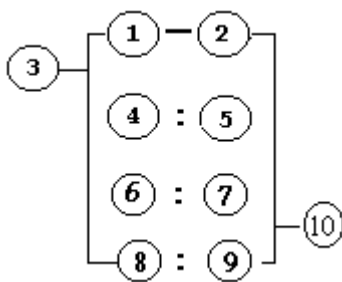
□Note: This is rather special Mode which series connects two timer, t1 and t2. In addition, add PTn, where n=1, 2, 3, 4,, E. but Tn + 1 Timer can not be used for other purpose.

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



□ **RTC Instruction**

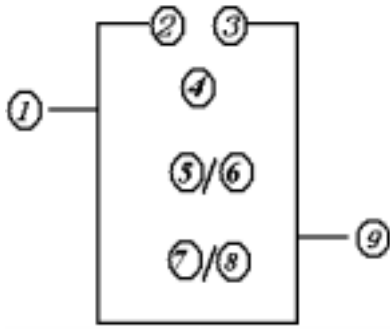
□ Weekly Mode



Sym bol	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
□	Code of RTC (R1~RF Total: 15Group)

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

★ Year-Month-Day Mode

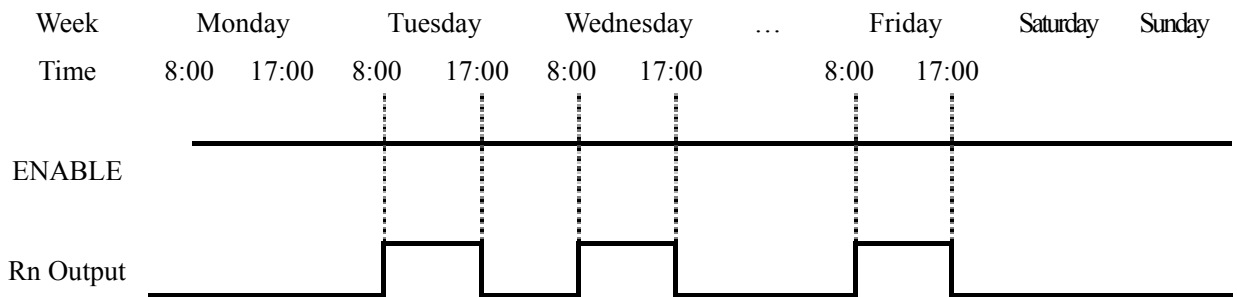


Symbol	Description
①	RTC mode 3, Year-Month-Day
②	Setting RTC Year ON
③	Setting RTC Year OFF
④	Display RTC Present time: Year-Month-Day
⑤	Setting RTC month ON
⑥	Setting RTC Day ON
⑦	Setting RTC month OFF
⑧	Setting RTC Day OFF
⑨	RTC Code (R1~RF, total 15 group)

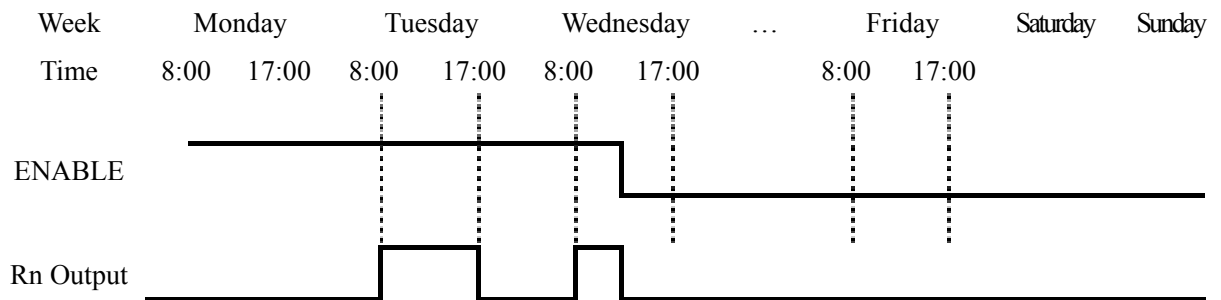
(1) RTC Mode 1

Sample 1 :

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

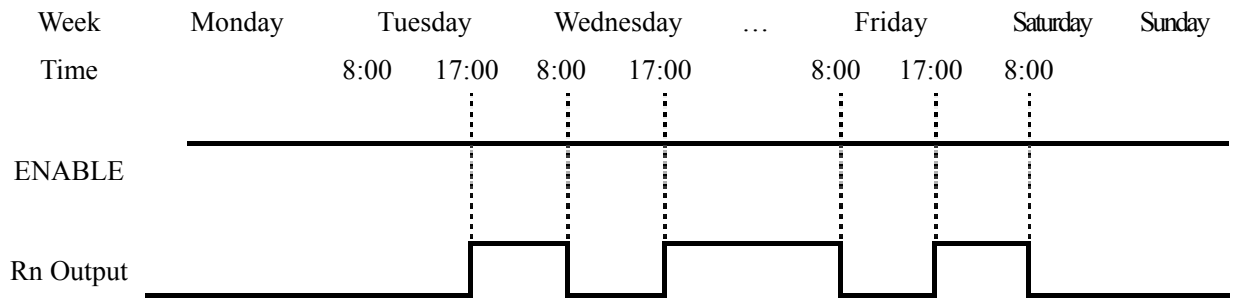


** Note : If ENABLE fails, output is OFF.



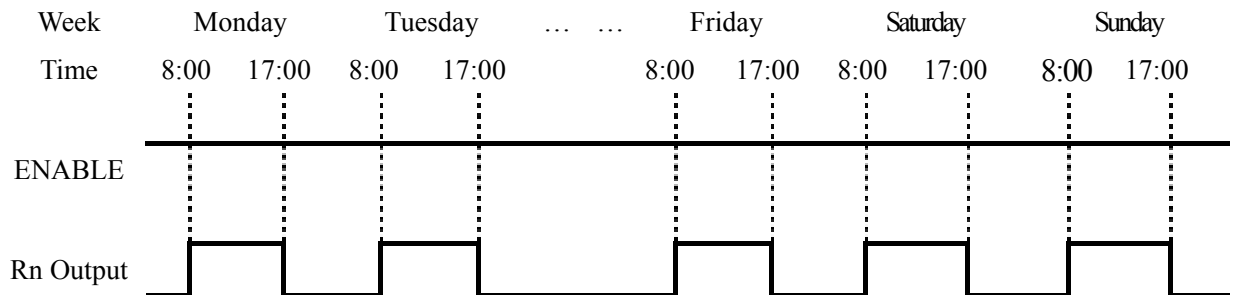
Sample 2 :

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



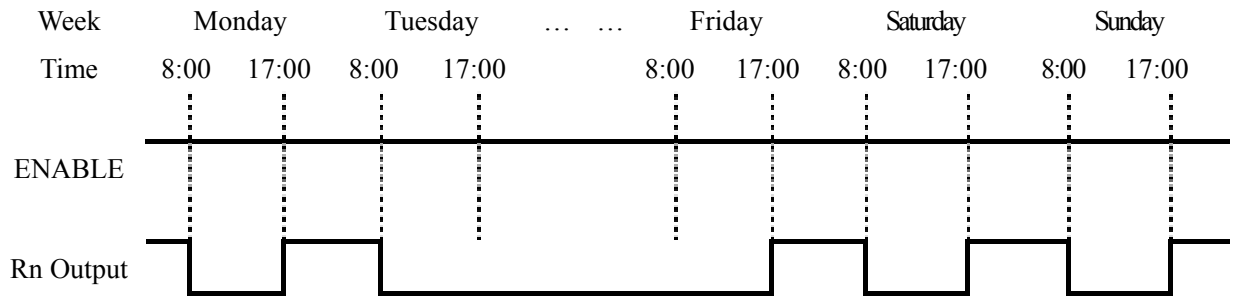
Sample 3 :

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



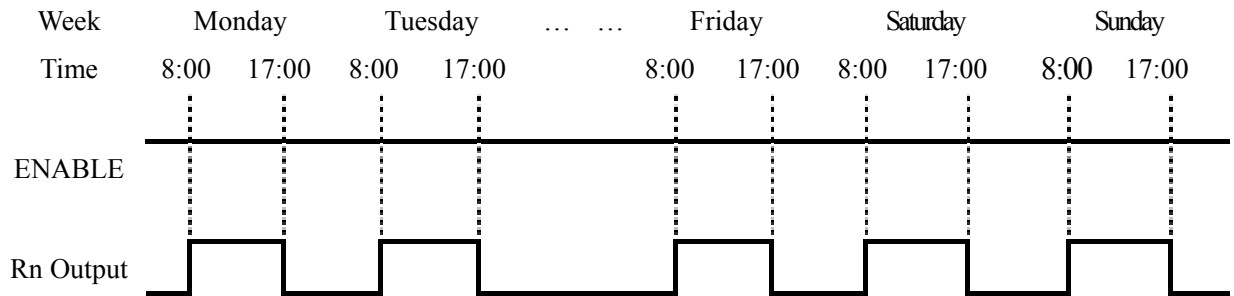
Sample 4 :

③	1
① : ②	FR-MO
⑥ : ⑦	17:00
⑧ : ⑨	8:00



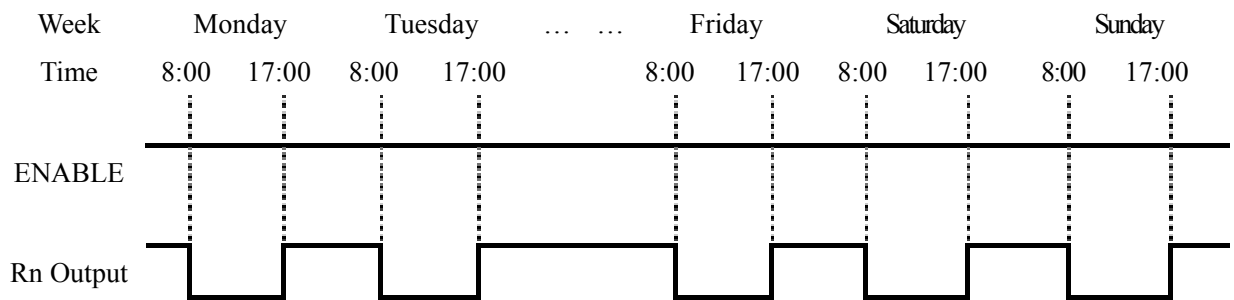
Example 5:

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



Example 6:

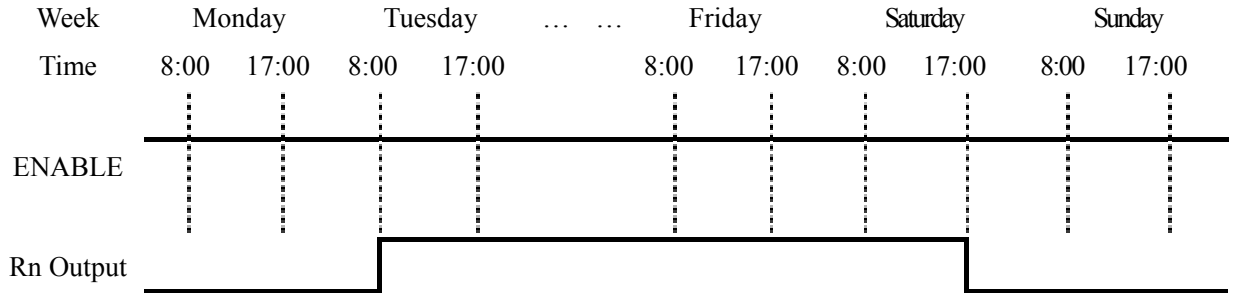
③	1
① : ②	SU-SU
⑥ : ⑦	17:00
⑧ : ⑨	8:00



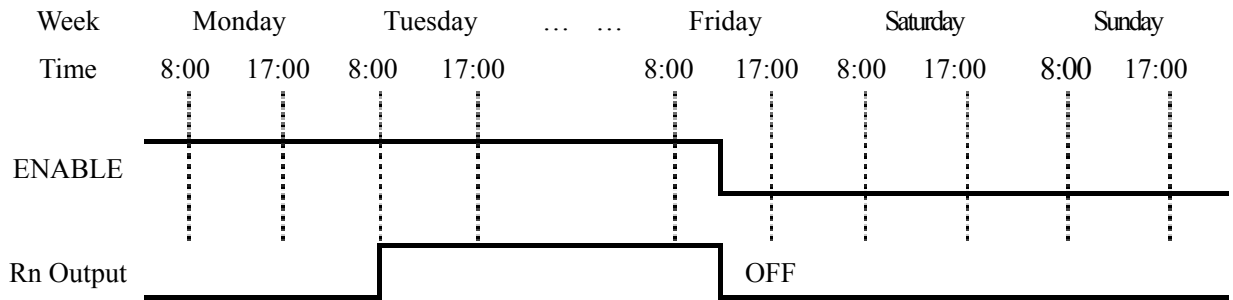
(2) RTC Mode 2

Example 1:

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

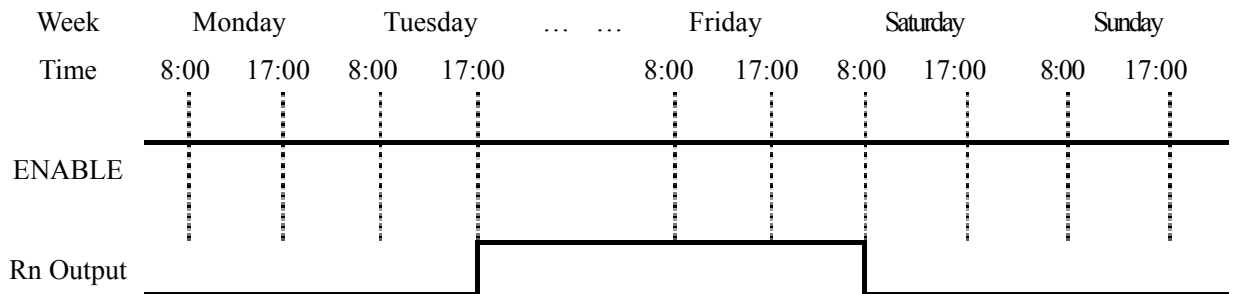


** Note: When ENABLE is unavailable, the output is OFF.



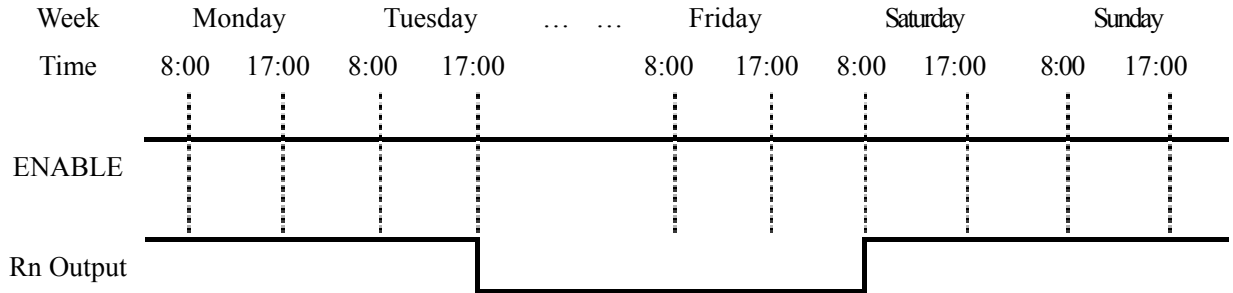
Example 2:

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



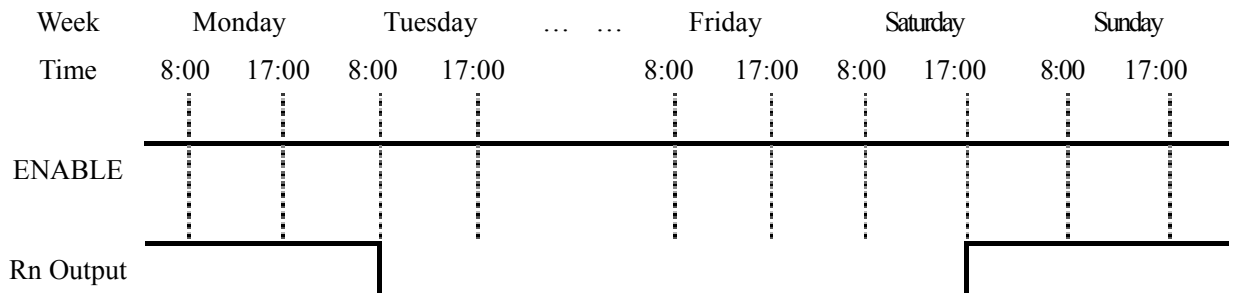
Example 3:

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



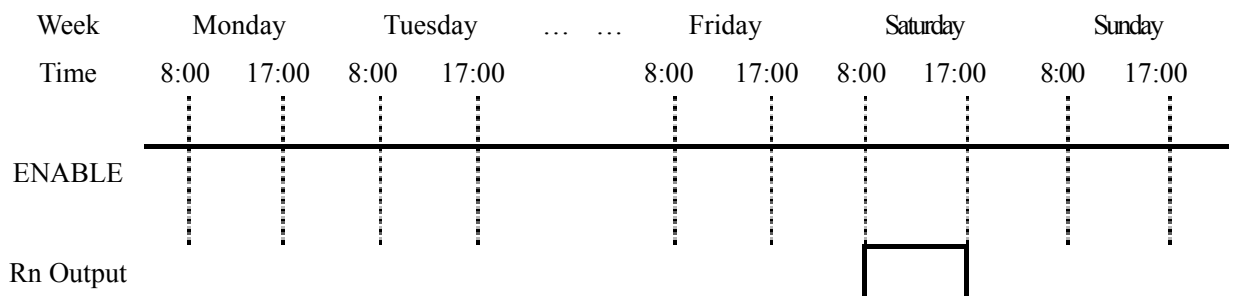
Example 4:

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



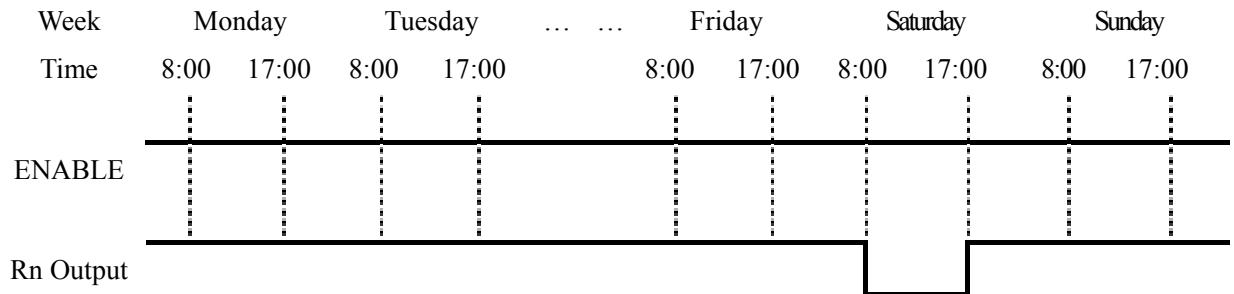
Sample 5 :

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



Sample 6 :

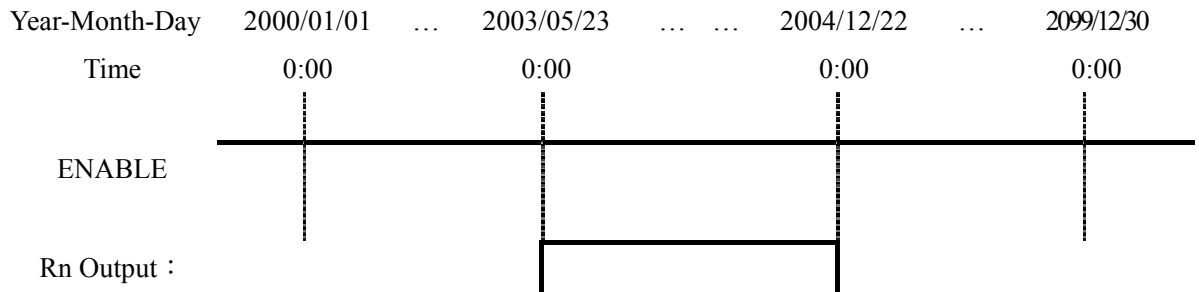
③	2
① : ②	SA-SA
⑥ : ⑦	17:00
⑧ : ⑨	08:00



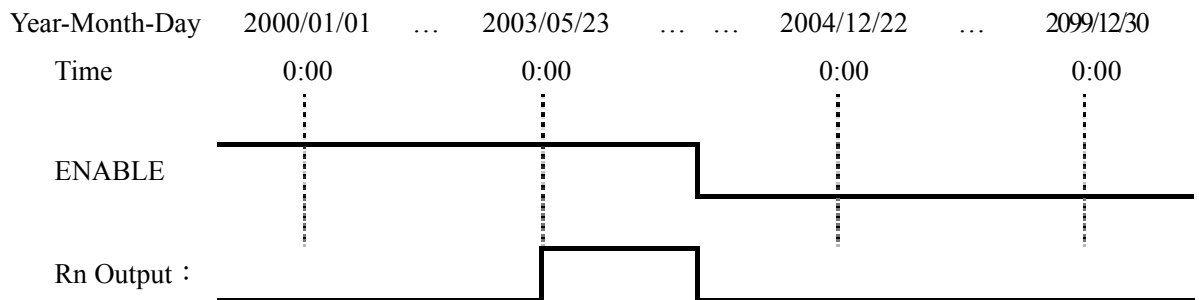
(3) RTC Mode 3

Sample 1 :

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

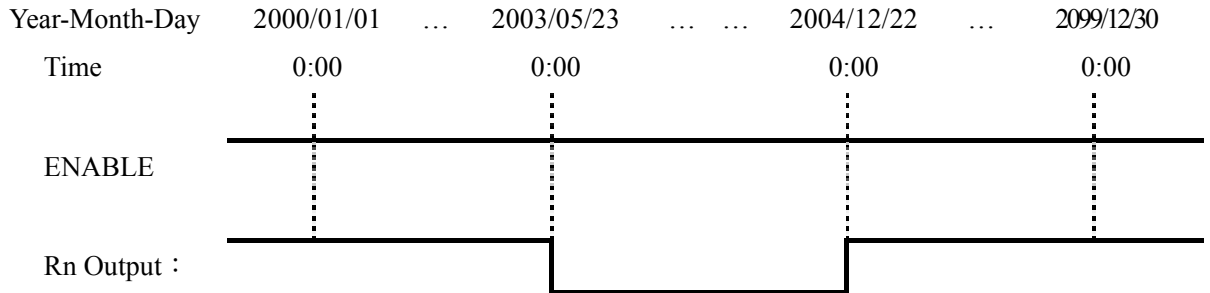


** Note : If ENABLE is fails, the output is OFF.



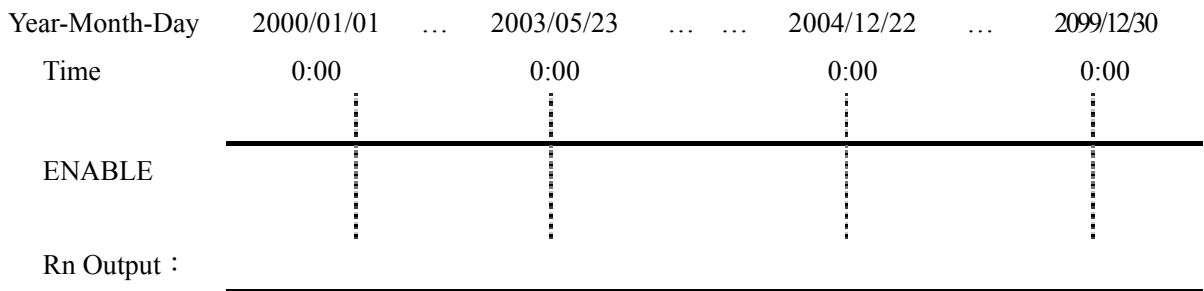
Sample 2 :

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

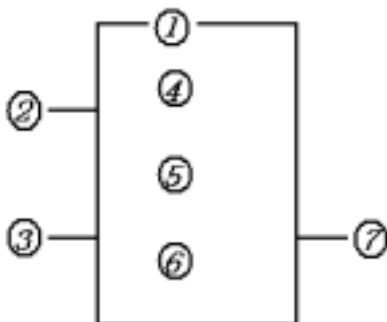


Sample 3 :

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)

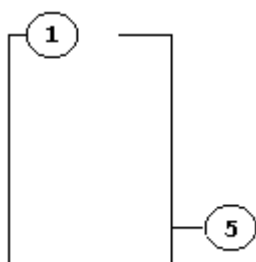
※ The ON or Off of analog output terminals (G1~GF) is determined by the comparison of the analog inputs of Ax and Ay.

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

- (1) Analog Comparator mode 1 ($A_Y - \textcircled{6} \leq A_X \leq A_Y + \textcircled{6}$, $\textcircled{7}$ ON)
- (2) Analog Comparator mode 2 ($A_X \leq A_Y$, $\textcircled{7}$ ON)
- (3) Analog Comparator mode 3 ($A_X \geq A_Y$, $\textcircled{7}$ ON)
- (4) Analog Comparator mode 4 ($\textcircled{6} \geq A_X$, $\textcircled{7}$ ON)
- (5) Analog Comparator mode 5 ($\textcircled{6} \leq A_X$, $\textcircled{7}$ 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, to modify the target value of timer, counter and analog comparator via HMI is available. HMI can display the status of input terminal (I, X) and Auxiliary relay too.



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

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

※ The displayed information can be only input by means of SMT-CONFIGURATOR. Under running mode, to modify the target value of the timer, counter, RTC and analog comparator is available via HMI of the controlled equipments.

HMI setting function, please refer to SMT-CONFIGURATOR HELP file. The following example covers to modify the preset value of C1 under running mode.

To modify the preset value 000010 of the counter mode7 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.

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

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

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

Step3: Press 'UP'

T 1 = 0 0 . 0 0 S e c
T 1 = 0 0 . 0 5 S e c
C 1 = T 2
0 0 0 0 0 0

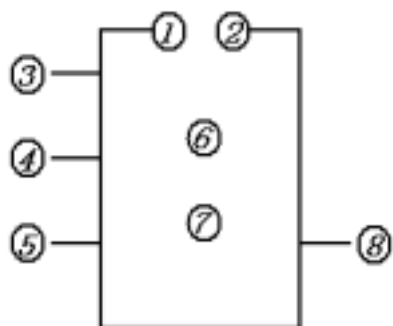
Step4: Press 'OK' to save the setting.

T 1 = 0 0 . 0 0 S e c
T 1 = 0 0 . 0 5 S e c
C 1 = T 2
0 0 0 0 0 0

※

© **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) .

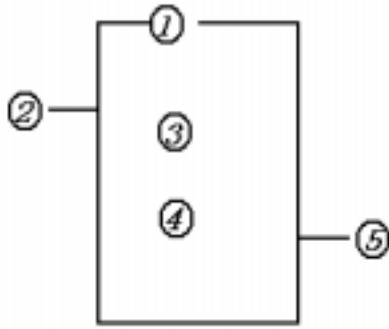
The upper case (I1) is Contact ‘a’ while the lower (i1) case is Contact ‘b’.

※ 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:

- ※ ① Only one sending mode can be set among L1~L8, others are for receiving mode.
- ※ ② Selecting input points: I1~IC(I1~I12), output points: Q1~Q8, expansive input points: X1~XC(X1~X12), expansive output points: Y1~YF(Y1~Y12), auxiliary points: M1~MF (M1~M15) .
- ※ ③ Receiving mode is determined by the controller ID which can not be changed, as the left list shows. The receiving mode can be selected: 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:

① = 1 ② = 5 ③ : I3 ~ I7 ID = 3 (④ : W17 ~ W24)

Memory List Position	W17	W18	W19	W20	W21	W22	W23	W24
	↑	↑	↑	↑	↑	↑	↑	↑
Corresponding receiving and sending terminal	I3	I4	I5	I6	I7	0	0	0

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.

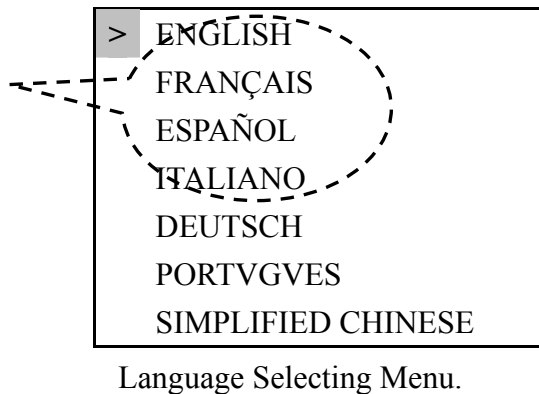
① = 1 ② = 5 ③ : I3 ~ I7 ④ : W17 ~ W21

Memory List Position:	W17	W18	W19	W20	W21
Corresponding Receiving and Sending Terminal:	↓	↓	↓	↓	↓
	I3	I4	I5	I6	I7

7-4 Operation Method

□ The Original Screen as Power is ON.

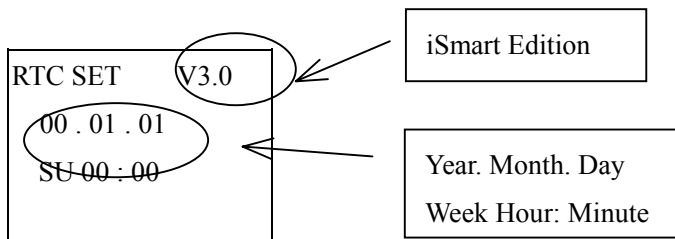
(1) Language Setting Screen:



Press the buttons :

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

(2) Present Time Setting Screen

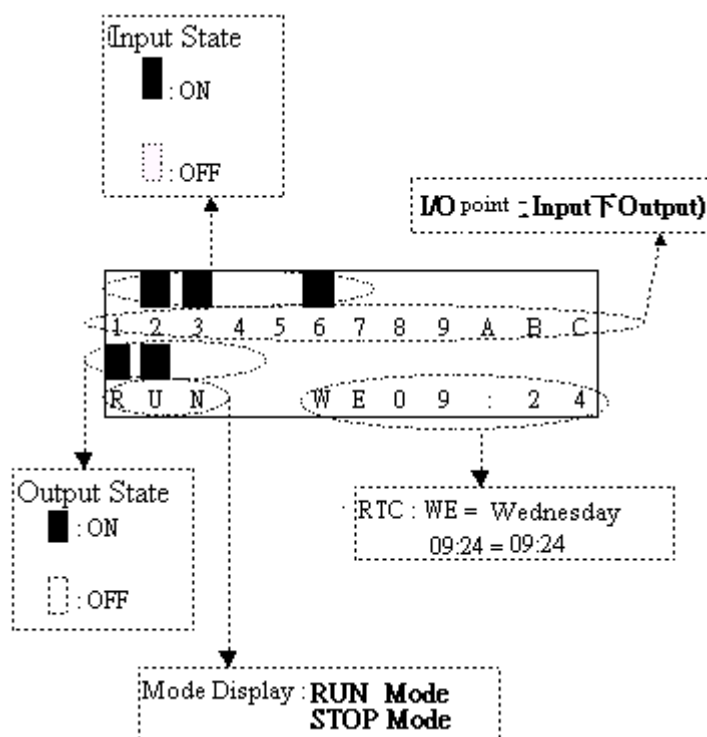


Press the button:

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.

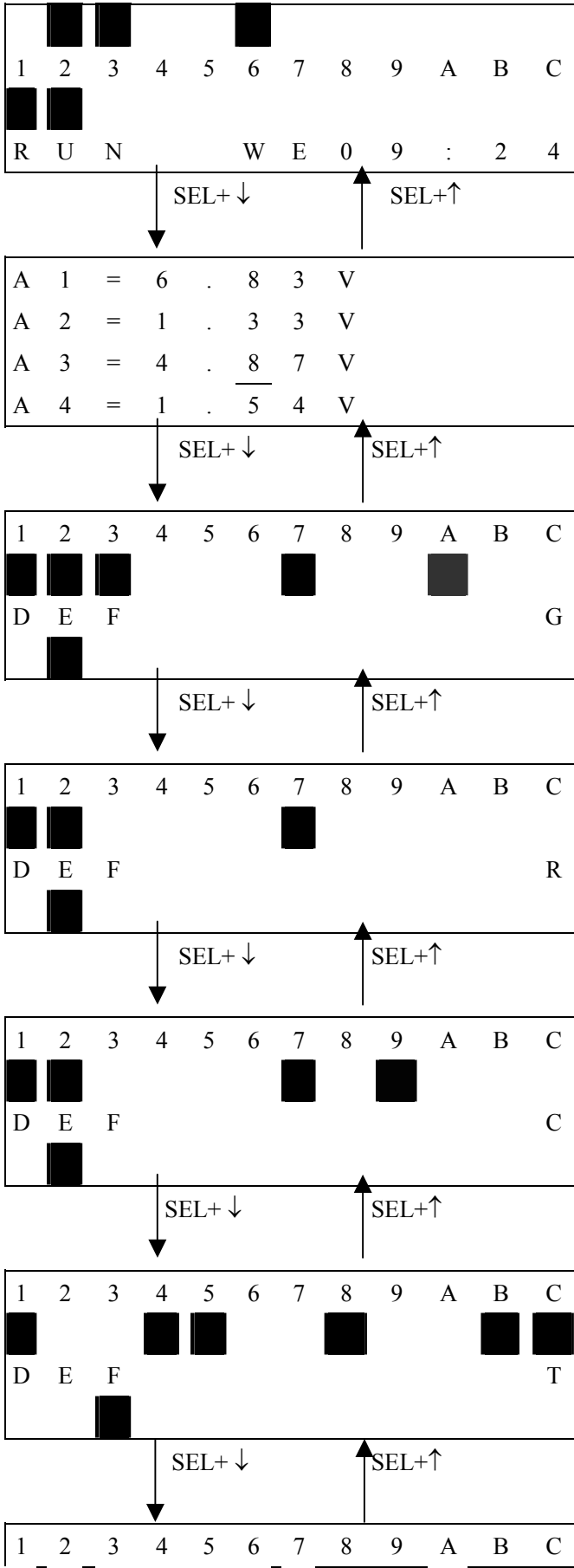


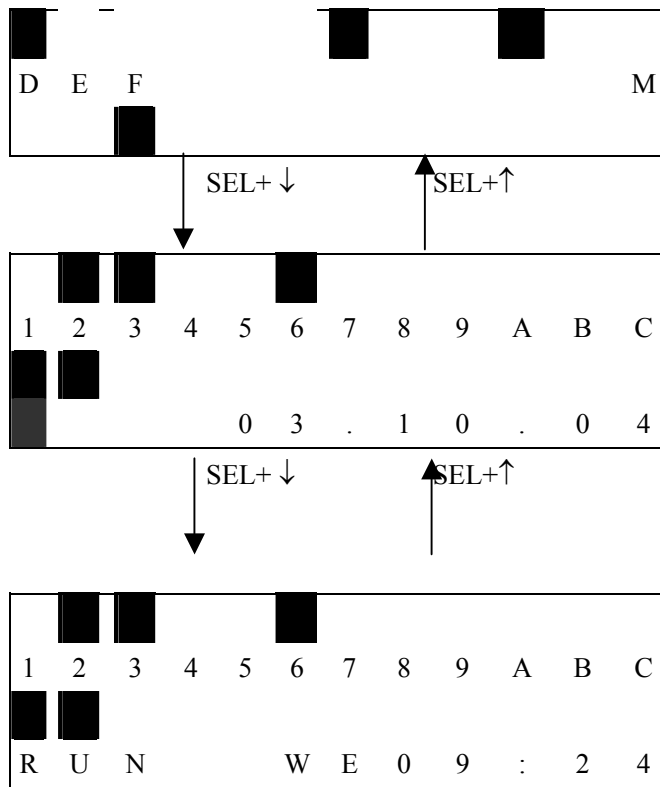
Press the button:

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.

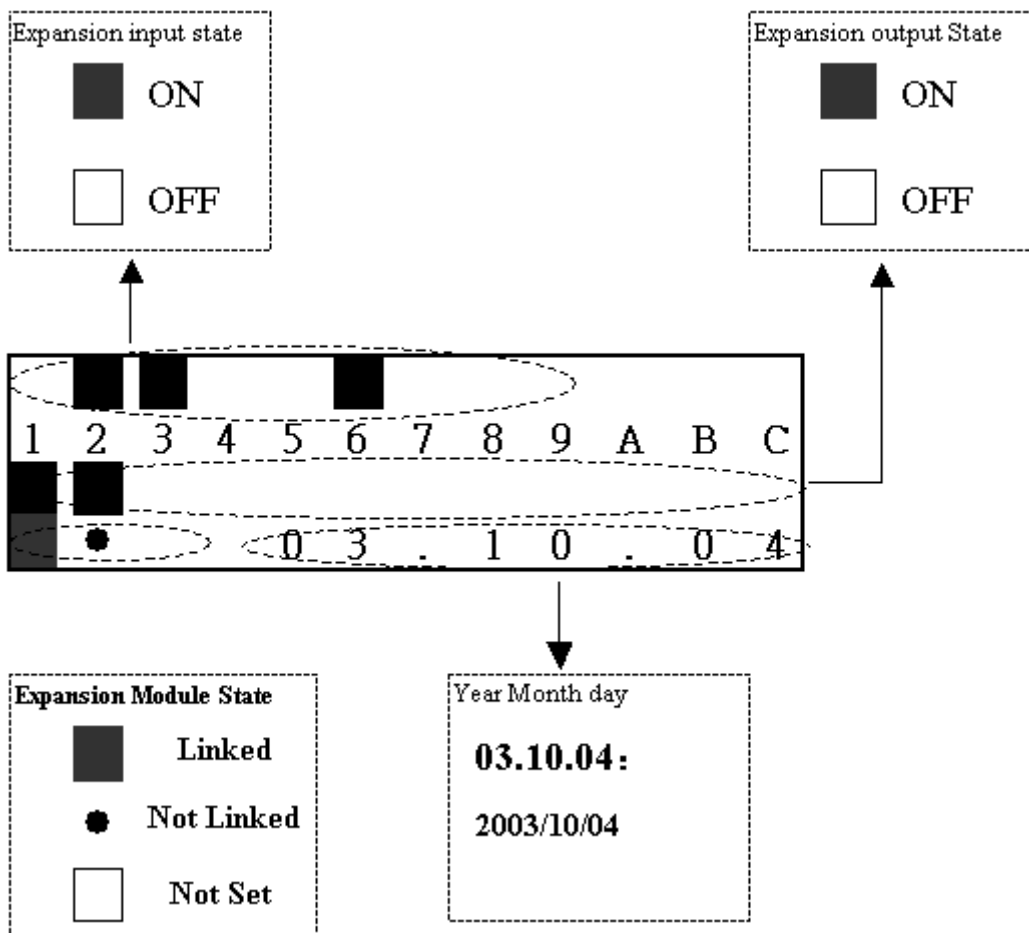
Sample:

a) Display other relay operation:



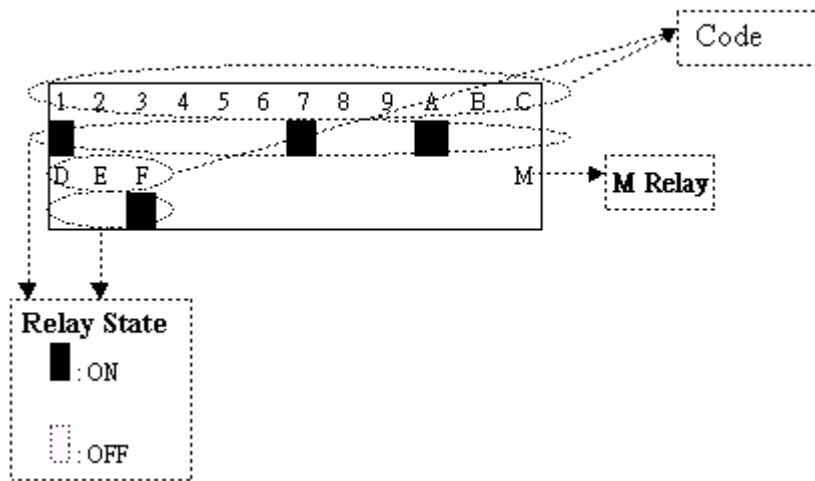


① Expansion display State

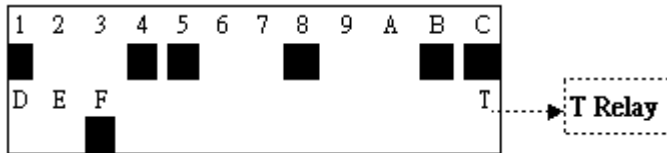


② M Display Status:

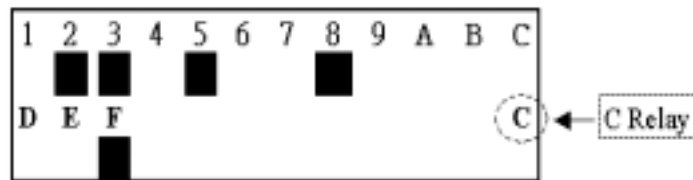
Code of Relay



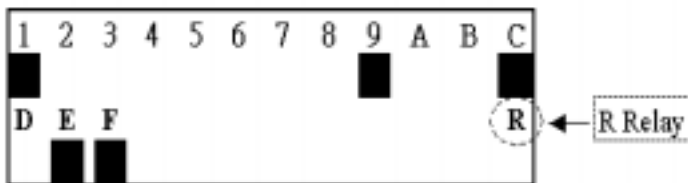
③ T Display State:



④ C Display State:



⑤ R Display State:



⑥ G Display State:



⑦ Analog Input Value:

A 1	=	0	.	6	9	V
A 2	=	9	.	9	9	V
A 3	=	0	.	0	0	V
A 4	=	4	.	5	5	V

A1,A2,A3,A4 Analog Input Value

b) Operation to Display H Function:

1	2	3	4	5	6	7	8	9	A	B	C
R	U	N			W	E	0	9	:	2	4

Press SEL for 3s ESC

Display H1

H	1
---	---

↓Button ↑Button

Display H2

T 1	=	1	0	0	0	M i n
C 1	=	0	0	4	0	0
C 2	=	0	0	2	0	0

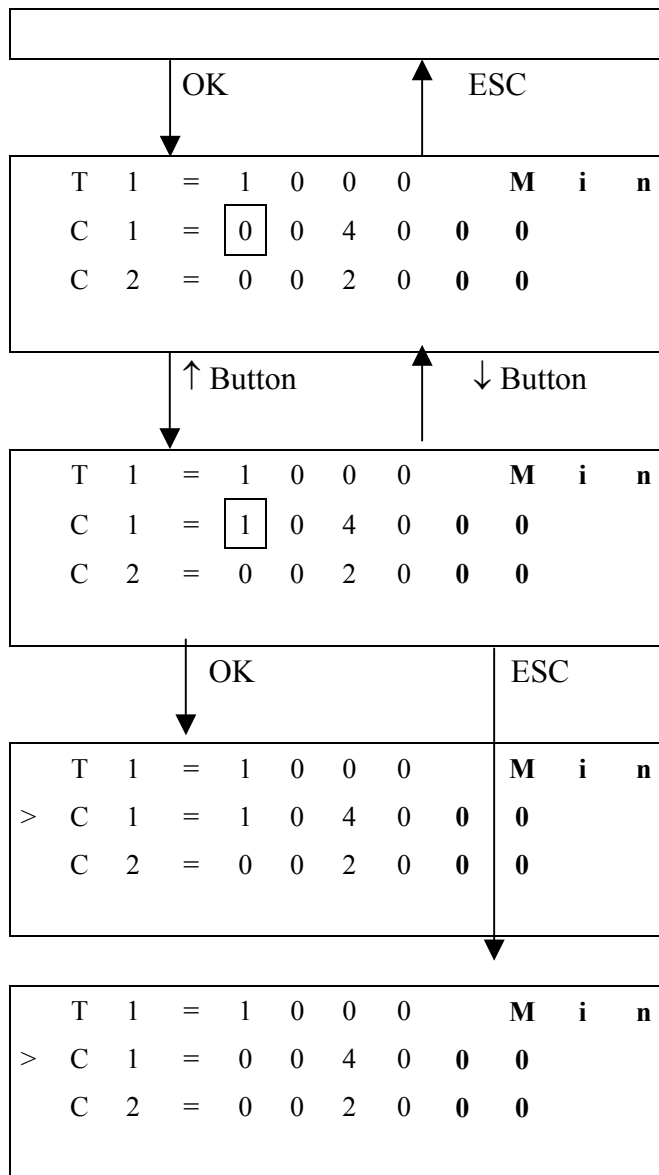
SEL ESC

If the target value is displayed, it can be modified.

>	T 1	=	1	0	0	0	M i n
	C 1	=	0	0	4	0	0
	C 2	=	0	0	2	0	0

↓Button ↑Button

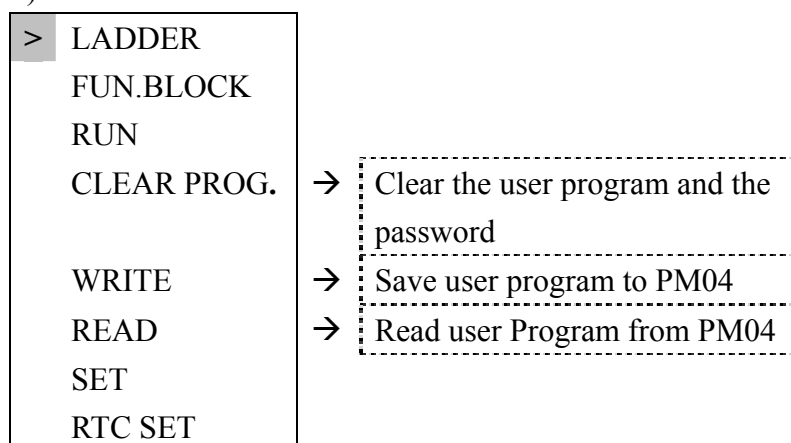
T 1	=	1	0	0	0	M i n	
>	C 1	=	0	0	4	0	0
	C 2	=	0	0	2	0	0



◎Main Menu

LCD displays 4-line Main Menu

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



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

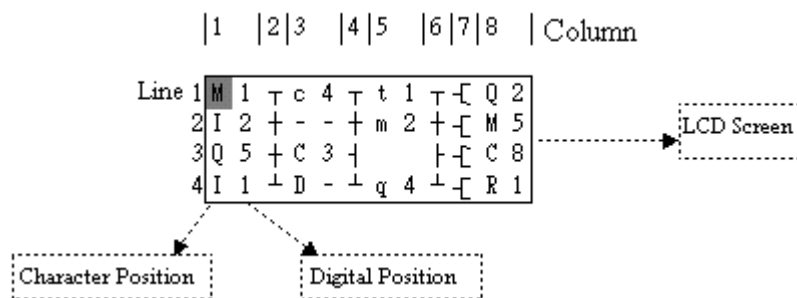
Press the Button

↑ ↓	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. T ⇒ space ⇒ T (all available but the 2,4,6 column of the first line) ⊥ ⊥

	x : Digital: 1~F
SEL + ↑/↓	<p>1. 1..F, – (When the cursor locates the digital position, the range of digital is restricted by the relay type.</p> <p>2. I ↔ X ↔ Q ↔ Y ↔ M ↔ D ↔ T ↔ C ↔ R ↔ G ↔ I (When the cursor located at 1,3,5 Column).</p> <p>3. Q ↔ Y ↔ M ↔ T ↔ C ↔ R ↔ G ↔ H ↔ L ↔ P ↔ Q (When the cursor located at 8 Column)</p> <p>4. (↔ ^ ↔ v ↔ P ↔ ((When the cursor located at 7 Column, and the 8 Column is set as Q,Y,M)</p> <p>5. (↔ P ↔ (((When the cursor located at 7 Column, and the 8 Column is set as T)</p>
SEL + ←/→	Confirm the input data and move the cursor
↑/↓	Vertically move the cursor
←/→	Horizontally move the cursor
DEL	Delete an instruction
ESC	<p>1. Cancel the Instruction or action under Edition.</p> <p>2. Back to Main Menu after query the program.</p>
OK	<p>1. Confirm the data and automatically save, the cursor moves to next input position.</p> <p>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)。</p>
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 :

	<table border="1"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>Column</td> </tr> <tr> <td>Line 1</td> <td>></td> <td>L</td> <td>A</td> <td>D</td> <td>D</td> <td>E</td> <td>R</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td>F</td> <td>U</td> <td>N</td> <td>.</td> <td>B</td> <td>L</td> <td>O</td> <td>C</td> </tr> <tr> <td>3</td> <td></td> <td>R</td> <td>U</td> <td>N</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td>C</td> <td>L</td> <td>E</td> <td>A</td> <td>R</td> <td>P</td> <td>R</td> <td>O</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		1	2	3	4	5	6	7	8	Column	Line 1	>	L	A	D	D	E	R			2		F	U	N	.	B	L	O	C	3		R	U	N						4		C	L	E	A	R	P	R	O										
	1	2	3	4	5	6	7	8	Column																																																				
Line 1	>	L	A	D	D	E	R																																																						
2		F	U	N	.	B	L	O	C																																																				
3		R	U	N																																																									
4		C	L	E	A	R	P	R	O																																																				

<p>Procedure 1:</p> <p>Press 'OK'</p> <p>Enter LADDER Edition</p>	<table border="1"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>Column</td> </tr> <tr> <td>Line 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		1	2	3	4	5	6	7	8	Column	Line 1										2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1																																																			
2																																																			
3																																																			
4																																																			

Procedure 2 : Press 'SEL' (When cursor located at character or digital, press the button to show I1)	1	2	3	4	5	6	7	8	Column
	Line 1	I	1						
	2								
	3								
	4								

Procedure 3 : Press '↑' twice. (Press 'SEL' + '↑↓', and the digital cursor located will change from I to Q).	1	2	3	4	5	6	7	8	Column
	Line 1	Q	1						
	2								
	3								
	4								

Procedure 4 : Press 'SEL' (start /end modifying parameter)	1	2	3	4	5	6	7	8	Column
	Line 1	q	1						
	2								
	3								
	4								

Procedure 5 : Press '→' ("Press 'SEL' + '← →', the cursor located in digital)	1	2	3	4	5	6	7	8	Column
	Line 1	q	1						
	2								
	3								
	4								

Procedure 6 : Press '↑' for 3 times ("Press 'SEL' + '↑↓' the digital the cursor located will change from 1 to 4)	1	2	3	4	5	6	7	8	Column
	Line 1	q	4						
	2								
	3								
	4								

Procedure 7 : Press '←' (Press 'SEL' + '← →' to move the cursor to the position Required revision.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 12.5%;">1</th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">5</th> <th style="width: 12.5%;">6</th> <th style="width: 12.5%;">7</th> <th style="width: 12.5%;">8</th> <th style="width: 12.5%;">Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4								2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1	q	4																																																	
2																																																			
3																																																			
4																																																			

Automatically Link

OR

Procedure 7 : Press 'OK' (Move the cursor to character in column 3)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 12.5%;">1</th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">5</th> <th style="width: 12.5%;">6</th> <th style="width: 12.5%;">7</th> <th style="width: 12.5%;">8</th> <th style="width: 12.5%;">Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td style="background-color: gray;">—</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4	—							2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1	q	4	—																																																
2																																																			
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Automatically Link

OR

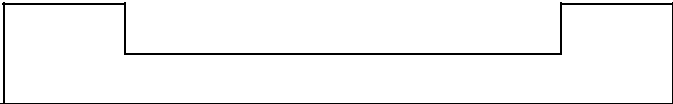
Procedure 7 : Press '→' (move the cursor to the link location in column 2)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 12.5%;">1</th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">5</th> <th style="width: 12.5%;">6</th> <th style="width: 12.5%;">7</th> <th style="width: 12.5%;">8</th> <th style="width: 12.5%;">Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td style="background-color: gray;">—</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	—	4							2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1	q	—	4																																																
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)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 12.5%;">1</th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">5</th> <th style="width: 12.5%;">6</th> <th style="width: 12.5%;">7</th> <th style="width: 12.5%;">8</th> <th style="width: 12.5%;">Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td>—</td> <td>M</td> <td>1</td> <td>—</td> <td>I</td> <td>3</td> <td style="background-color: gray;">—</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4	—	M	1	—	I	3	—	2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1	q	4	—	M	1	—	I	3	—																																										
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Procedure 9 : Press 'SEL' (when the cursor located at character	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 12.5%;">1</th> <th style="width: 12.5%;">2</th> <th style="width: 12.5%;">3</th> <th style="width: 12.5%;">4</th> <th style="width: 12.5%;">5</th> <th style="width: 12.5%;">6</th> <th style="width: 12.5%;">7</th> <th style="width: 12.5%;">8</th> <th style="width: 12.5%;">Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td>—</td> <td>M</td> <td>1</td> <td>—</td> <td>I</td> <td>3</td> <td>—</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4	—	M	1	—	I	3	—	2										3										4									
	1	2	3	4	5	6	7	8	Column																																										
Line 1	q	4	—	M	1	—	I	3	—																																										
2																																																			
3																																																			
4																																																			

and digital, press 'SEL'
to show '-(Q1)'



Auto Add “-(”

Procedure 10 :
Press 'OK'

Save the input program data, the
position of the cursor will not move.

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	—	M	1	—	I	3	—(Q 1
2									
3									
4									

Procedure 11 :
Press '→' twice

(move the cursor to column 1
and Line 2.)

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	—	M	1	—	I	3	—(Q 1
2	█								
3									
4									

Procedure 12 :
Press '→' twice

(move the cursor to column 2)

Note: never press 'SEL' before hand

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	—	M	1	—	I	3	—(Q 1
2		█							
3									
4									

Change Wire '—' to '⊥'

Procedure 13 :
Press 'SEL'

(A vertical line emerges)

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	⊥	M	1	—	I	3	—(Q 1
2			⊥						
3			—						
4									

Procedure 14 :
Press 'OK'

(Move the cursor to character in

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	⊥	M	1	—	I	3	—(Q 1
2			⊥						
3									

column 3.)	4
------------	---

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

Procedure 15 :	1 2 3 4 5 6 7 8 Column
Press 'OK' in column 5	Line 1 q 4 T M 1 — I 3 — (Q 1
(move the cursor to the character in Column 8)	2 ⊥ r 3 ————— (■ 1
	3
	4

Procedure 16 :	1 2 3 4 5 6 7 8 Column
Press 'SEL'	Line 1 q 4 T M 1 — I 3 — (Q 1
(When the cursor located in digital or character, press 'SEL', 'Q1' will emerges)	2 ⊥ r 3 ————— (<u>Q</u> 1
	3
	4

Auto Add " "

Procedure 17 :	1 2 3 4 5 6 7 8 Column
Press '↑' for 4 times	Line 1 q 4 T M 1 — I 3 — (Q 1
(Press 'SEL' + '↑ ↓')	2 ⊥ r 3 ————— (<u>C</u> 1
(The character Q the cursor locating will change to C.)	3
	4

Procedure 18 :	1 2 3 4 5 6 7 8 Column
Press '→'	Line 1 q 4 T M 1 — I 3 — (Q 1
	2 ⊥ r 3 ————— (C <u>1</u>
	3
	4

Procedure 19 :	1 2 3 4 5 6 7 8 Column
Press '↑' for 7 times	Line 1 q 4 T M 1 — I 3 — (Q 1
	2 ⊥ r 3 ————— (C <u>7</u>

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

3
4

Auto Enter Function
Block Edition

Procedure 20 :

Press 'OK'

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

	1	2	3	4	5	6	7	8	Column
Line 1		r	1				r		
2	I	1	|				|		
3		|	0	0	0	0	|	C 7	
4	I	1	|				|		

Procedure 21 :

Press 'ESC' back to

LADDER edition screen

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	r	M	1	—	I	3	— (Q 1
2		|	r	3	—	—	—	— (C 7	
3									
4									

Delete the Program Element

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	r	M	1	—	I	3	— (Q 1
2		|	r	3	—	—	—	— (C 7	
3									
4									

Procedure :

Press 'DEL'

(to delete the element C7 the cursor
locating)

	1	2	3	4	5	6	7	8	Column
Line 1	q	4	r	M	1	—	I	3	— (Q 1
2		|	r	3	—	—	—	—	
3									
4									

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

<p>Procedure :</p> <p>Press 'SEL+ESC' (simultaneously)</p> <p>(The Line 4 displays where the cursor locating and operation state of iSmart)</p>	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td>⌈</td> <td>M</td> <td>1</td> <td>—</td> <td>I</td> <td>3</td> <td>—</td> <td>(</td> <td>Q</td> <td>1</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>⌋</td> <td>r</td> <td>3</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>(</td> <td>C</td> <td>7</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>S</td> <td>T</td> <td>O</td> <td>P</td> <td></td> <td>L</td> <td>I</td> <td>N</td> <td>E</td> <td>0</td> <td>0</td> <td>2</td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4	⌈	M	1	—	I	3	—	(Q	1	2			⌋	r	3	—	—	—	—	(C	7	3													4	S	T	O	P		L	I	N	E	0	0	2
	1	2	3	4	5	6	7	8	Column																																																						
Line 1	q	4	⌈	M	1	—	I	3	—	(Q	1																																																			
2			⌋	r	3	—	—	—	—	(C	7																																																			
3																																																															
4	S	T	O	P		L	I	N	E	0	0	2																																																			

Delete the whole Line

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3																																																															
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<p>Procedure :</p> <p>Press 'SEL+DEL' (Simultaneously)</p> <p>('ESC' Cancel , 'OK' Execute)</p>	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td>q</td> <td>4</td> <td>⌈</td> <td>M</td> <td>1</td> <td>—</td> <td>I</td> <td>3</td> <td>—</td> <td>(</td> <td>Q</td> <td>1</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>⌋</td> <td>r</td> <td>3</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>(</td> <td>C</td> <td>7</td> </tr> <tr> <td>3</td> <td>C</td> <td>L</td> <td>E</td> <td>A</td> <td>R</td> <td></td> <td>L</td> <td>n</td> <td></td> <td>0</td> <td>0</td> <td>2</td> </tr> <tr> <td>4</td> <td>E</td> <td>S</td> <td>C</td> <td>?</td> <td></td> <td></td> <td>O</td> <td>K</td> <td></td> <td>?</td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1	q	4	⌈	M	1	—	I	3	—	(Q	1	2			⌋	r	3	—	—	—	—	(C	7	3	C	L	E	A	R		L	n		0	0	2	4	E	S	C	?			O	K		?		
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Step: Press "SEL+OK" (at the same time)		1	2	3	4	5	6	7	8	column				
	Line 1	q	4	⌈	M	1	—	I	3	—	(Q	1	
	2													
	3			⌋	r	3	—	—	—	—	—	(C	7
	4													

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

		1	2	3	4	5	6	7	8	column			
line	1	q	4	⌈	M	1	—	I	3	—	(	Q	1
	2			⌋	r	3	—	—	—	—	(	C	7
	3												
	4												
	5												

step: Press 'SEL+↑ ↓' (at the same time)		1	2	3	4	5	6	7	8	column			
	line	q	4	⌈	M	1	—	I	3	—	(	Q	1
		2			⌋	r	3	—	—	—	(	C	7
		3											
		4											
	5												

2. FUNCTION BLOCK program input

		1	2	3	4	5	6	7	8	Column	
Line	1	L	A	D	D	E	R				
	2	>	F	U	N	.	B	L	O	C	K
	3	R	U	N							
	4	C	L	E	A	R	P	R	O	G	.

The present value will appear when **iSmart** is under 'RUN'

Procedure 1: Press 'OK' (Enter FUNCTION BLOCK edition)	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td></td> <td>┌</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>┐</td> <td></td> </tr> <tr> <td>2</td> <td>1</td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> </tr> <tr> <td>3</td> <td></td> <td> </td> <td>0 0</td> <td>.</td> <td>0 0</td> <td></td> <td></td> <td> </td> <td>T 1</td> </tr> <tr> <td>4</td> <td></td> <td>└</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>┘</td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1		┌	1					┐		2	1									3			0 0	.	0 0				T 1	4		└						┘	
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<div style="display: flex; justify-content: space-around;"> <div style="border: 1px dashed black; padding: 2px;">Preset action area</div> <div style="border: 1px dashed black; padding: 2px;">Preset action value area</div> </div>																																																			

Never press '→' to move to the digital position. (If T2 is required to be changed, Press '↑'/'↓' and 'SEL' to execute.)	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td></td> <td>┌</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>┐</td> <td></td> </tr> <tr> <td>2</td> <td>1</td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> </tr> <tr> <td>3</td> <td></td> <td> </td> <td>0 0</td> <td>.</td> <td>0 0</td> <td></td> <td></td> <td> </td> <td>T 1</td> </tr> <tr> <td>4</td> <td></td> <td>└</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>┘</td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1		┌	1					┐		2	1									3			0 0	.	0 0				T 1	4		└						┘	
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Step 2: modify ① preset target value ② preset the action relay

① Preset the target value

① Procedure 2-1: Press '←' (move the cursor to the preset action area)	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td></td> <td>┌</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>┐</td> <td></td> </tr> <tr> <td>2</td> <td>1</td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> </tr> <tr> <td>3</td> <td></td> <td> </td> <td>0 0</td> <td>.</td> <td>0 0</td> <td></td> <td></td> <td> </td> <td>T 1</td> </tr> <tr> <td>4</td> <td></td> <td>└</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>┘</td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1		┌	1					┐		2	1									3			0 0	.	0 0				T 1	4		└						┘	
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4		└						┘																																											

① Procedure 2-2: Press 'SEL' (begin input the target value)	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Column</th> </tr> </thead> <tbody> <tr> <td>Line 1</td> <td></td> <td>┌</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>┐</td> <td></td> </tr> <tr> <td>2</td> <td>1</td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> </tr> <tr> <td>3</td> <td></td> <td> </td> <td>0 0</td> <td>.</td> <td>0 0</td> <td></td> <td></td> <td> </td> <td>T 1</td> </tr> <tr> <td>4</td> <td></td> <td>└</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>┘</td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	6	7	8	Column	Line 1		┌	1					┐		2	1									3			0 0	.	0 0				T 1	4		└						┘	
	1	2	3	4	5	6	7	8	Column																																										
Line 1		┌	1					┐																																											
2	1																																																		
3			0 0	.	0 0				T 1																																										
4		└						┘																																											

① Procedure 2-3: Press '↑' for 3 times (Press 'SEL' and followed by '↑,↓' The digital '0' is changed to '3')	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	1	├					|	
	3		|	0	0	.	0	<u>3</u>	| T 1
4		└					┘		

① Procedure 2-4: Press 'OK' (Save the input data)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	1	├					|	
	3		|	0	0	.	0	3	| T 1
4		└					┘		

① Procedure 2-5: Press '←'	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	1	├					|	
	3		|	0	0	.	0	3	| T 1
4		└					┘		

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

① Procedure 2-6:	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	1	├					|	
	3		|	3	3	.	3	3	| T 1
4		└					┘		

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'	1	2	3	4	5	6	7	8	column
	line 1		┌	1				┐	
	2	1	├					|	
	3		|	A	<u>1</u>			| T 1	
4		└					┘		

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

① step 2-3B: press 'SEL'		1	2	3	4	5	6	7	8	column
	line 1		┌	1					┐	
	2	1	├						|	
	3		|	T	<u>1</u>				└	T 1
	4		└						┘	

① step 2-3C: Press 'SEL'		1	2	3	4	5	6	7	8	column
	line 1		┌	1					┐	
	2	1	├						|	
	3		|	C	<u>1</u>				└	T 1
	4		└						┘	

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

① step 2-4A: Press '↑'		1	2	3	4	5	6	7	8	column
	line 1		┌	1					┐	
	2	1	├						|	
	3		|	A	<u>2</u>				└	T 1
	4		└						┘	

Repeat step 2—4A (press '↓' is also available), the preset value of A1~A4 will be periodically changed. And so on. 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.		1	2	3	4	5	6	7	8	column
	line 1		┌	1					┐	
	2	1	├						|	
	3		|	A	<u>2</u>				└	T 1
	4		└						┘	

① Procedure 2-7: Press '↑'	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	1	├					|	
	3		|	3	3	.	3	3	┐ T 1
	4		└					┘	

② Procedure 2-8: Press 'SEL' (begin to edit data)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	<u>1</u>	├					|	
	3		|	3	3	.	3	3	┐ T 1
	4		└					┘	

② Procedure 2-9: Press '↑' (Press 'SEL' + '↑, ↓' to change '1' to '2')	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	<u>2</u>	├					|	
	3		|	3	3	3	.	3	┐ T 1
	4		└					┘	

② Procedure 2-10: Press 'OK' (save the input data)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	<u>2</u>	├					|	
	3		|	3	3	3	.	3	┐ T 1
	4		└					┘	

② Procedure 2-11: Press '↑' (move the cursor to '1' position)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	<u>1</u>				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┐ T 1
	4	M 4	└					┘	

② Procedure 2-12: Press 'SEL' (begin to edit data)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	1				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4		└					┘		

② c 2-13: Press '↑' for 3 times (Press 'SEL' and followed by '↑↓' to change 1 to 5)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4	I	1	└				┘		

② Procedure 2-14: Press 'OK' (save input data)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4	I	1	└				┘		

② Procedure 2-15: Press '↓' for 3 times (this step leads to editing the action relay)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4	I	1	└				┘		

② Edit action program and preset the action relay

② Procedure 2-16: Press 'SEL' (Begin to modify)	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4	I	1	└				┘		

<p>② Procedure 2-17: Press '↑' for 4 times (Press 'SEL' + '↑↓' to change I to M)</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	┌					┐	
	3		|	3	3	3	.	3	┐ T 1
	4	M	1	└				┘	

<p>② Procedure 2-18: Press '→' (Press 'SEL' + '← →' to move the cursor to digital location)</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	┌					┐	
	3		|	3	3	3	.	3	┐ T 1
	4	M	1	└				┘	

<p>② Procedure 2-19: Press '↑' for 3 times (Press 'SEL' + '↑↓' to change '1' to '4')</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	┌					┐	
	3		|	3	3	3	.	3	┐ T 1
	4	M	4	└				┘	

<p>② Procedure 2-20: Press 'OK' (save the input data)</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	┌					┐	
	3		|	3	3	3	.	3	┐ T 1
	4	M	4	└				┘	

<p>① Procedure 2-21: Press '↑' (Move the cursor to preset action value area to repeat the step 2-1)</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	┌					┐	
	3		|	3	3	3	.	3	┐ T 1
	4	M	4	└				┘	

<p>② Procedure 2-22: Press '↑' (Move the cursor to position '2' to repeat the 2-8)</p>	1	2	3	4	5	6	7	8	Column
	Line 1		┌	4				┐	
	2	2	├					|	
	3		|	3	3	3	.	3	┤ T 1
4	M	4	└					┘	

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

<p>② step 2-22A: Press '↑' (Move the cursor to 2, or repeat the next step. Select A1~A4)</p>	1	2	3	4	5	6	7	8	column
	line 1		┌	4				┐	
	2	A	1	├				|	
	3	A	3	|				┤	G 1
4		└	0	3	.	3	3	┘	

<p>② Step 2-22B: Press 'SEL' (Move the cursor to 2 to repeat the above step. Select A2-T1-C1-A1)</p>	1	2	3	4	5	6	7	8	column
	line 1		┌	4				┐	
	2	A	1	├				|	
	3	T	1	|				┤	G 1
4		└	0	3	.	3	3	┘	

<p>② Step 2-22C: Press '↑' (Move the cursor to 2 to repeat the above step. Select T1~TF,C1~CF,A1~A4)</p>	1	2	3	4	5	6	7	8	column
	line 1		┌	4				┐	
	2	A	1	├				|	
	3	T	2	|				┤	G 1
4		└	0	3	.	3	3	┘	

<p>② Step 2-22D: Press 'OK' Save the present data</p>	1	2	3	4	5	6	7	8	column
	line 1		┌	4				┐	
	2	A	4	├				|	
	3	T	F	|	0	3	.	3	3
4		└						┘	

② Procedure 2-23: Press '↑' (Move the cursor to position '4' to repeat the step 2-12)	1	2	3	4	5	6	7	8	Column			
	Line 1		┌	4				┐				
	2		2	┆				┆				
	3			┆	3	3	3	.	3	┆	T	1
	4	M	4	┆					┆			

Continue to input Function Block

① Next Function Block

	1	2	3	4	5	6	7	8	Column			
	Line 1		┌	4				┐				
	2		2	┆				┆				
	3			┆	3	3	3	.	3	┆	T	1
	4	M	4	┆					┆			

Procedure 1: Press 'SEL+↑' (Simultaneously)	1	2	3	4	5	6	7	8	Column			
	Line 1		┌	2				┐				
	2		1	┆				┆				
	3			┆	0	1	0	.	0	┆	T	2
	4	I	2	┆					┆			

② Last Function Block

	1	2	3	4	5	6	7	8	Column			
	Line 1		┌	4				┐				
	2		2	┆				┆				
	3			┆	3	3	3	.	3	┆	T	1
	4	M	4	┆					┆			

Procedure : Press 'SEL+↓' (Simultaneously)		1	2	3	4	5	6	7	8	Column
	v 1		┌	3				┐		
	2	2	|					|		
	3		|	0	5	0	.	0	|	T F
	4	R 1	└					┘		

Delete Function Block

Procedure : Press 'SEL+DEL' (Simultaneously) (‘ESC’: Cancel ; ‘OK’: Execute)		1	2	3	4	5	6	7	8	Column		
	Line 1		┌	5				┐				
	2	2	|					|				
	3	C	L	E	A	R		B	L	O	C	K
	4	E	S	C	?			O	K	?		

Back to Main Menu:

Press 'ESC'		1	2	3	4	5	6	7	8	Column		
	Line 1		L	A	D	D	E	R				
	2	>	F	U	N	.	B	L	O	C	K	
	3		R	U	N							
	4		C	L	E	A	R		P	R	O	G

Change Function Block Category:

		1	2	3	4	5	6	7	8	Column
	Line 1		┌	3				┐		
	2	3	|					|		
	3		|	0	0	0	0	|	T	2
	4	M 4	└					┘		

Move the cursor to change to T , C , R , G , H

Step 1: Press 'SEL'		1	2	3	4	5	6	7	8	Column
	Line	1		2						
	2	M 1	|							
	3		|	9	9	9	9	9	9	| C 1
	4	M 2	|							

3. RUN or STOP

(1) RUN Mode

(2) STOP Mode

RUN PROG.
<input type="checkbox"/> YES
<input checked="" type="checkbox"/> NO

STOP PROG.
<input type="checkbox"/> YES
<input checked="" type="checkbox"/> NO

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

4. Other Menu Items

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

CLEAR PROG.
YES
<input checked="" type="checkbox"/> NO

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

WRITE
YES
<input checked="" type="checkbox"/> NO

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

READ
YES
<input checked="" type="checkbox"/> 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 / O	N	→	Remote I/O Mode (N: none M: Master S: Slave)
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:

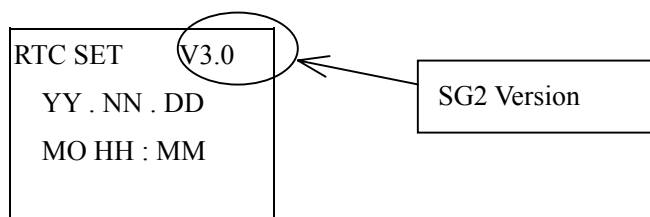
↑ ↓ ← →	Move the cursor
SEL	Begin to edit.
Press 'SEL' and '← →'	Move the cursor for 'ID SET item'
Press 'SEL' and '↑ ↓'	1. ID SET=00~99 ; I/O NUMBER=0~3 2. REMOTE I/O= N↔M↔S↔N 3. BACK LIGHT ; C KEEP =×↔√ 4. M KEEP; I/O ALARM =√/√↔××
OK	Confirm the Edition Data
ESC	1. Cancel the setting when pressed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

Note:

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

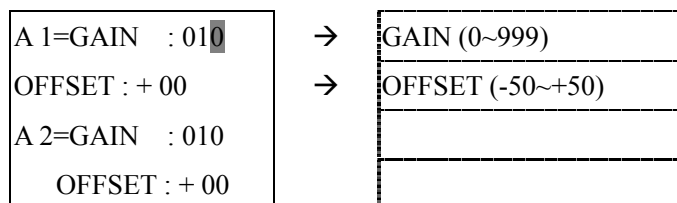
(5) RTC Setting



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.

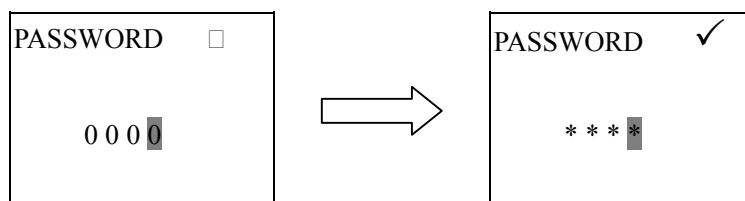
(6) ANALOG SETTING



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.

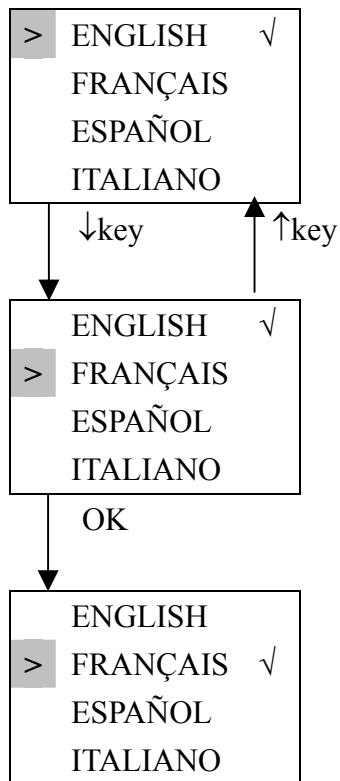
(8) LANGUAGE Selection



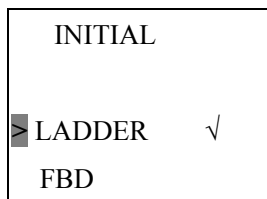
Now Press

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

Sample:



(8) INITIAL



Now Press:

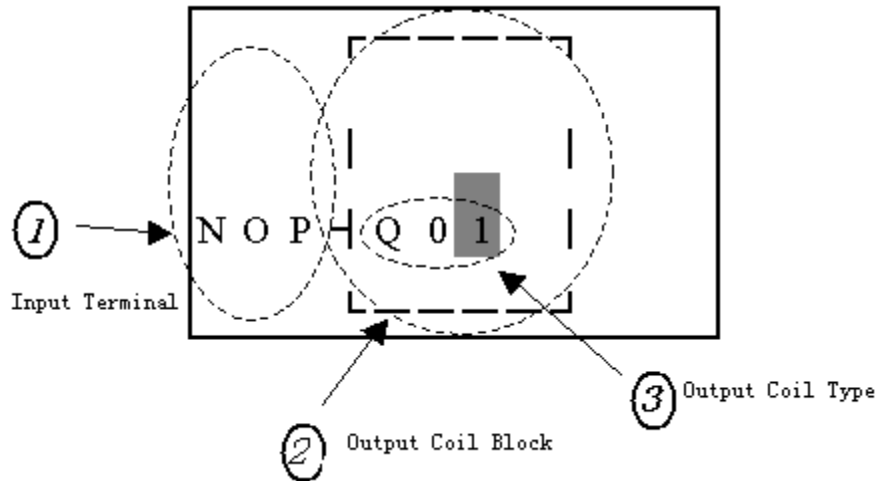
Press '↑↓'	Vertically move the Cursor
OK	Select the language the cursor located
ESC	Back to Main Menu



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

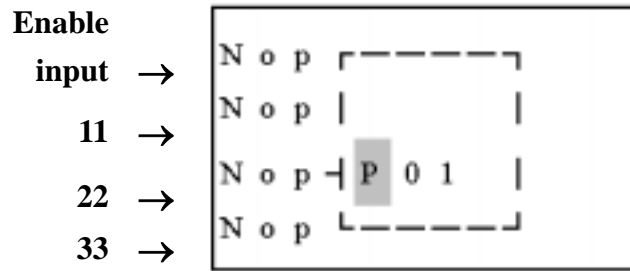
Chapter 8 FBD Block Description

8-1 Coil Block Diagram



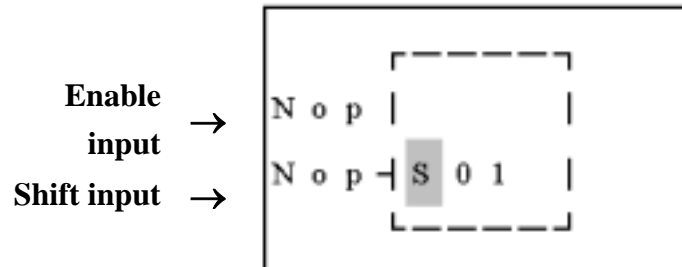
	①Input Terminal	③Output Coil	Range
Input	I		I01~I0C(12)
Expansion Input	X		X01~X0C(12)
Output	Q	Q	Q01~Q08(8)
Expansion Output	Y	Y	Y01~Y0C(12)
auxiliary	M	M	M01~M0F(15)
Knob	N	N	N01~N0F(15)
HMI		H	H01~H0F(15)
PWM		P	P01(1)
SHIFT		S	S01(1)
DATALINK		L	L01~L08(8)
Logic /Function Block	B		B01~B99(99)
Normal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

(2)PWM Function Block Description



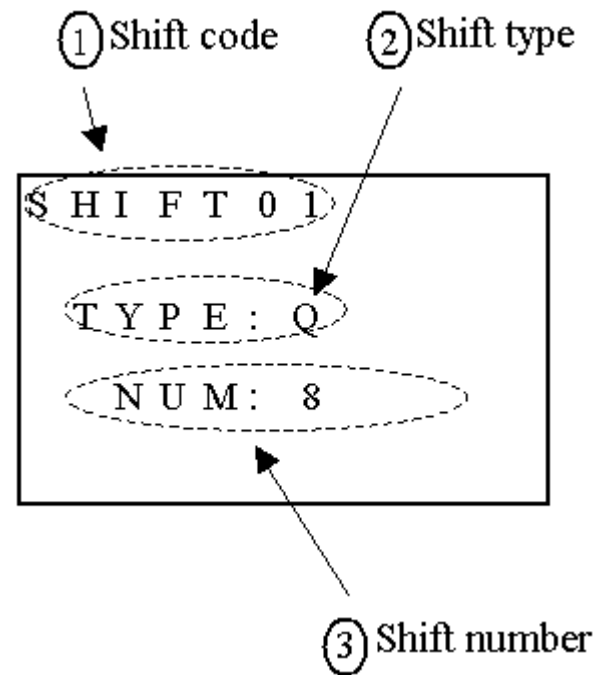
(3)SHIFT Function Block Description

Input terminal description



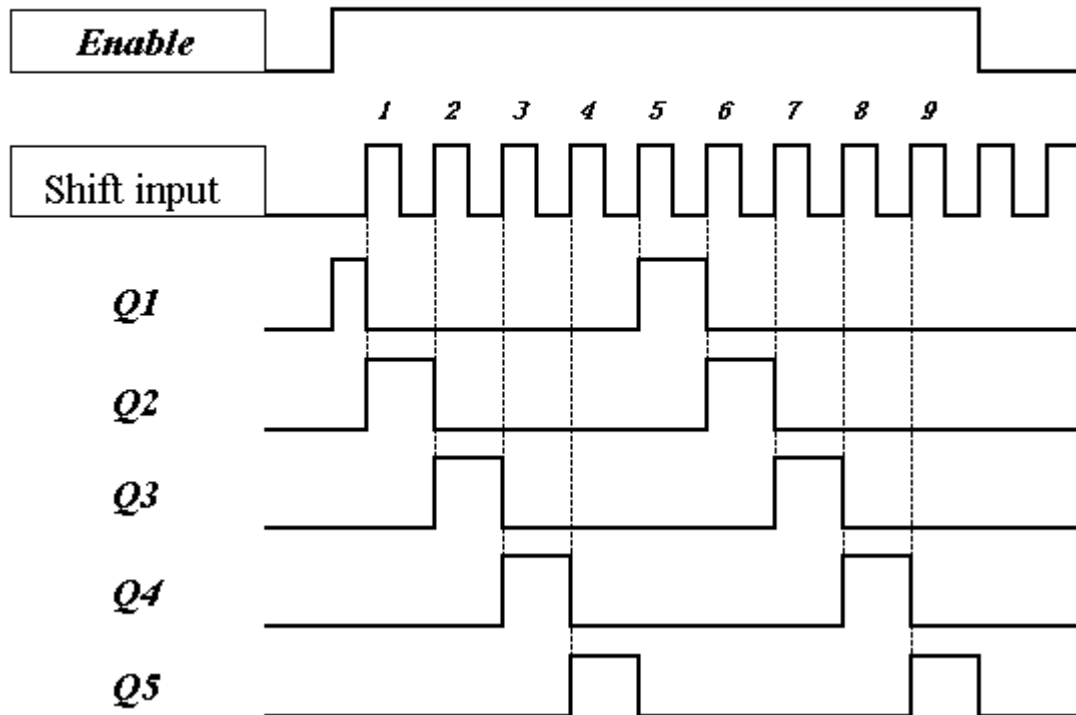
Setting parameter description:

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



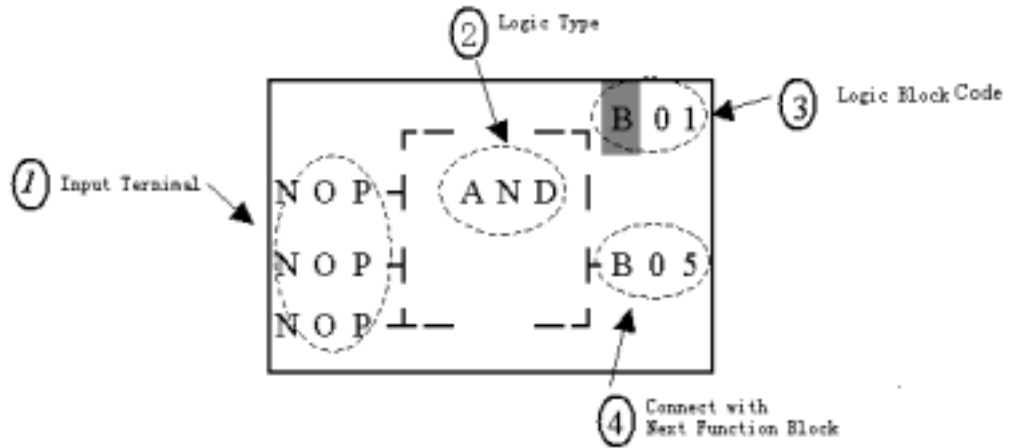
Example:

② = Q , ③ = 5 Shift output range: Q1~Q5



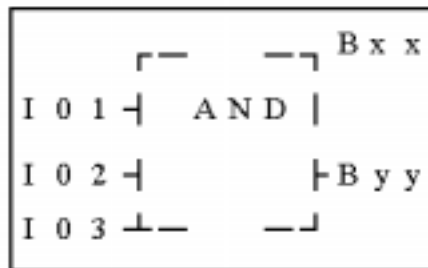
Note: When Enable is available, Q1 ON, Q2~Q4 will be OFF, till the first shift input raise edge, Q2 ON, Q1 and Q3~Q5 OFF. The next output coil will be on when meeting the each raise edge and others are OFF.

8-2 Edit Block



(1) AND Logic Diagram

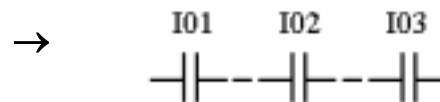
FBD:



I01 And I02 And I03

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

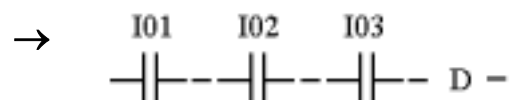
LADDER:

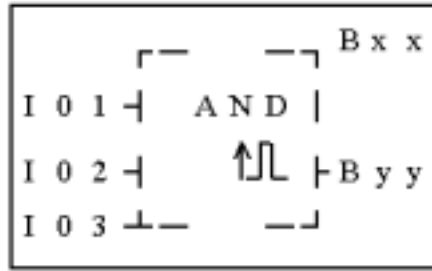


(2) AND (EDGE) Logic Diagram

FBD:

LADDER:

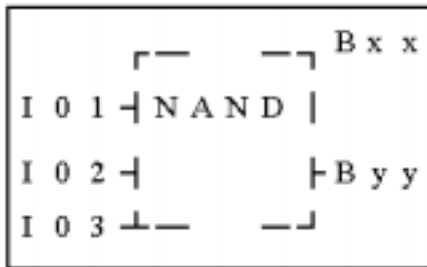




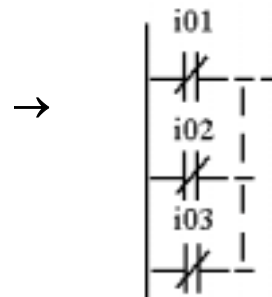
I01 And I02 And I03 And D
 Note : The input terminal is NOP
 which is equivalent to 'Hi'

(3)NAND Logic Diagram

FBD:



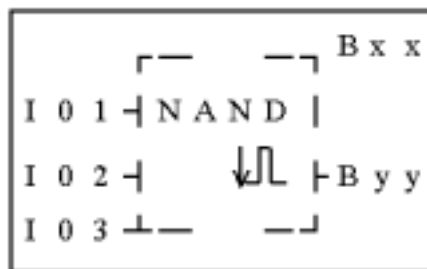
LADDER:



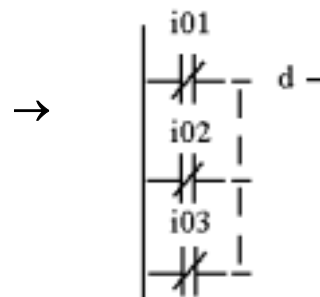
Not(I01 And I02 And I03)
 Note : The input terminal is NOP
 which is equivalent to 'Hi'

(4)NAND (EDGE) Logic Diagram

FBD:



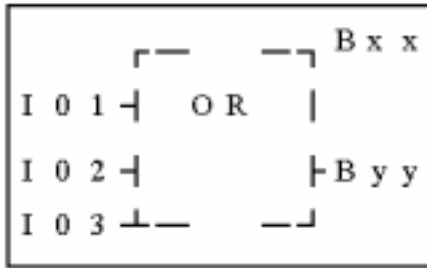
LADDER:



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

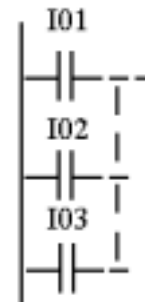
(5)OR Logic Diagram

FBD:



→

LADDER:

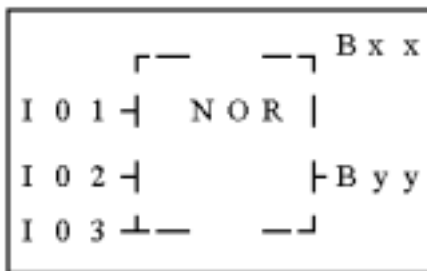


I01 or I02 or I03

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

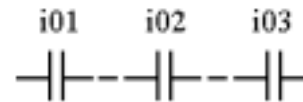
(6)NOR Logic Diagram

FBD:



→

LADDER:

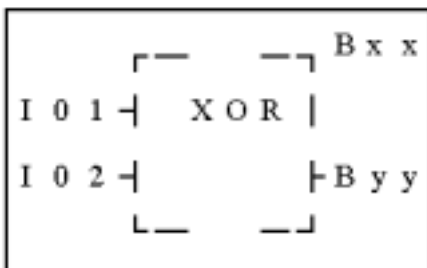


Not (I01 or I02 or I03)

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

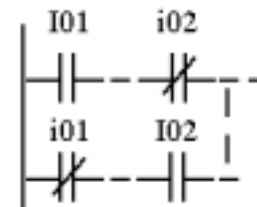
(7)XOR Logic Diagram

FBD:



→

LADDER:

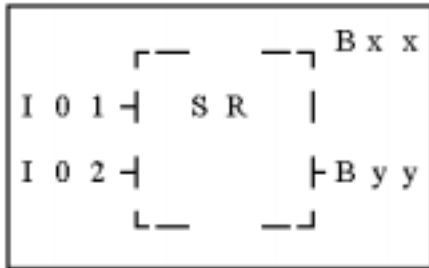


I01 Xor I02

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

(8)SR Logic Diagram

FBD:

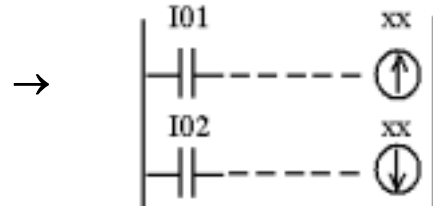


Logic Table

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

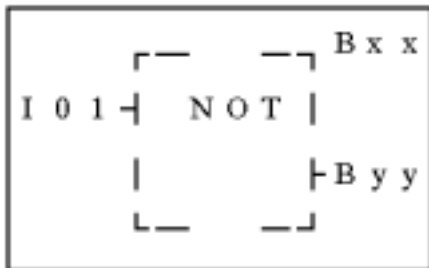
Note : The input terminal is NOP which is equivalent to 'Lo'

LADDER:



(9)NOT Logic Diagram

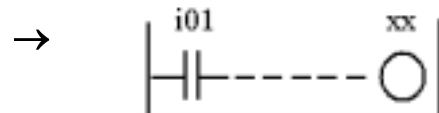
FBD:



Not I01

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

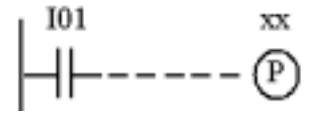
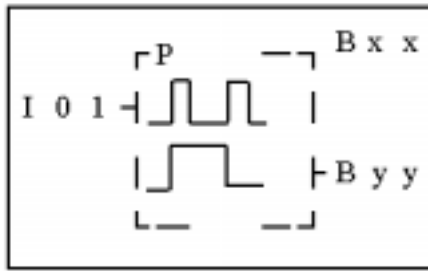
LADDER:



(10)Pulse Logic Diagram

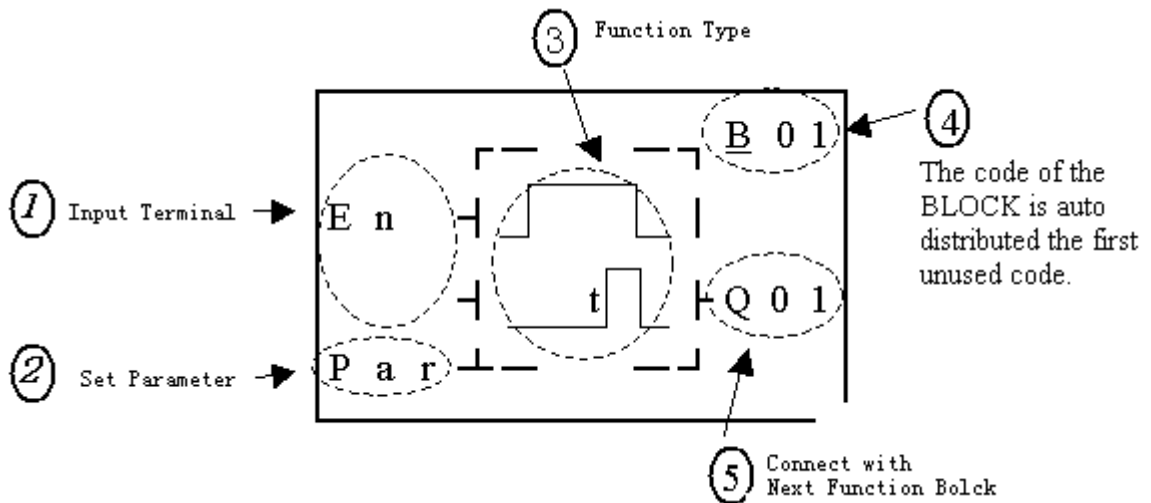
FBD:

→ LADDER:



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

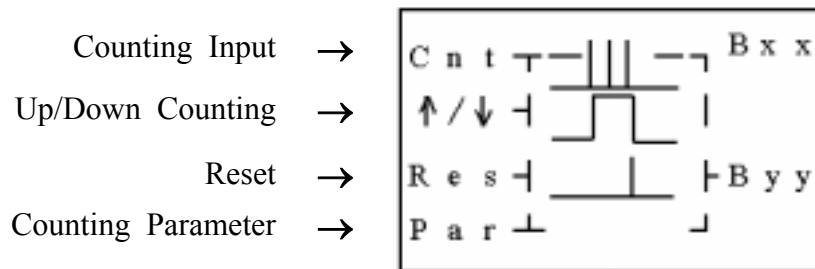
8-3 Function Block



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.

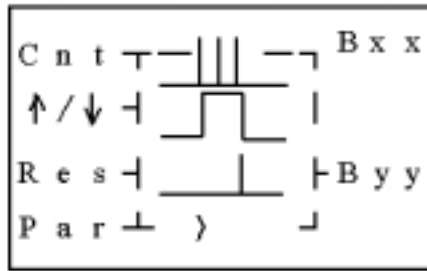
© Common Counter Function Block

(1) Counter Mode 1



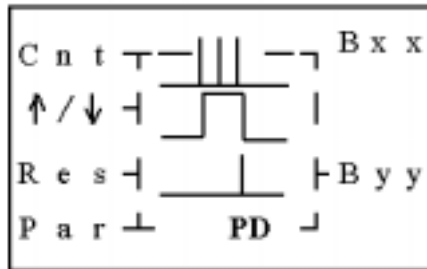
(2) Counter Mode 2

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



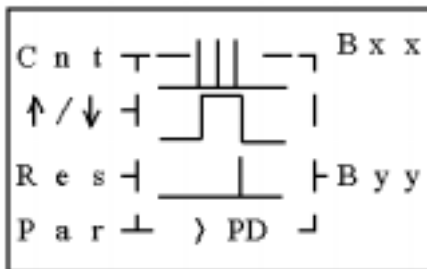
(3) Counter Mode 3

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



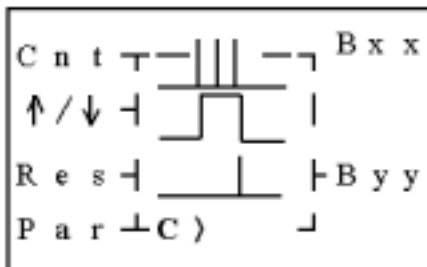
(4) Counter Mode 4

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

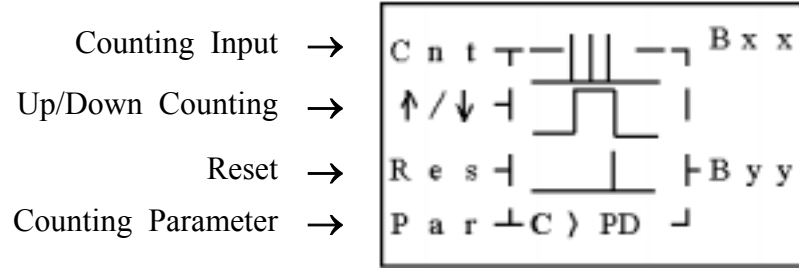


(5) Counter Mode 5

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

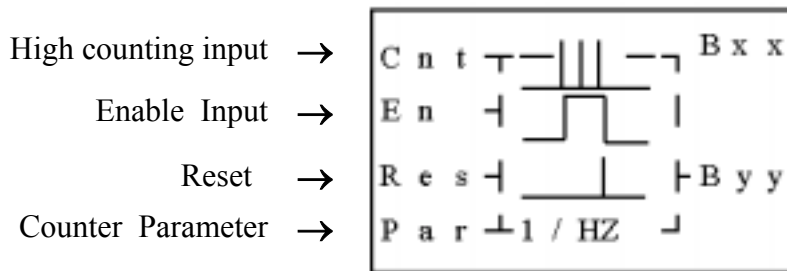


(6) Counter Mode 6



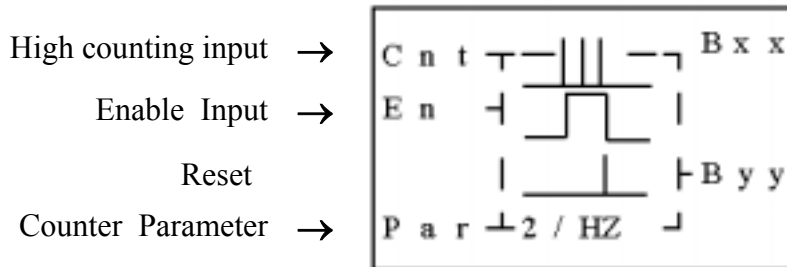
© High Speed Counter Function Block

(1) Counter Mode 7



Note : High speed input terminal I1,I2

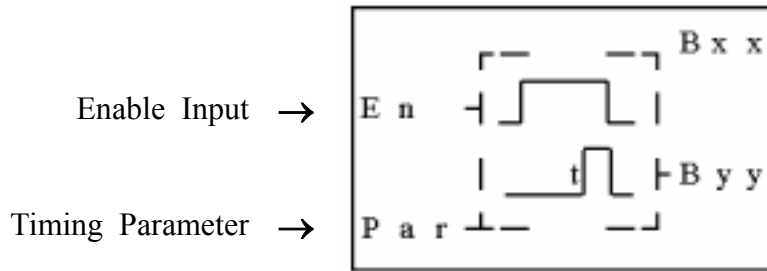
(2) Counter Mode 8



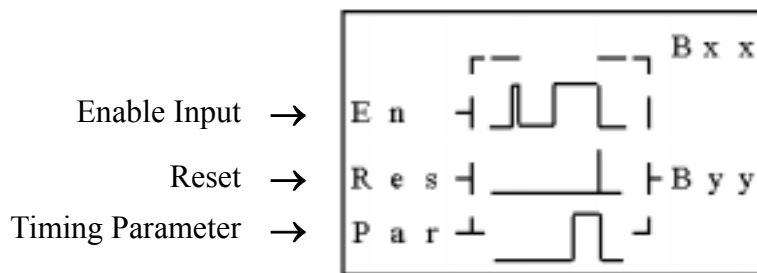
Note : High speed input terminal I1,I2

© Timer Function Block

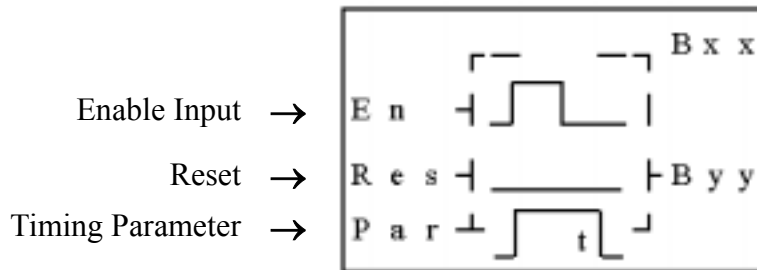
(1) Timer mode 1 (ON-Delay A Mode)



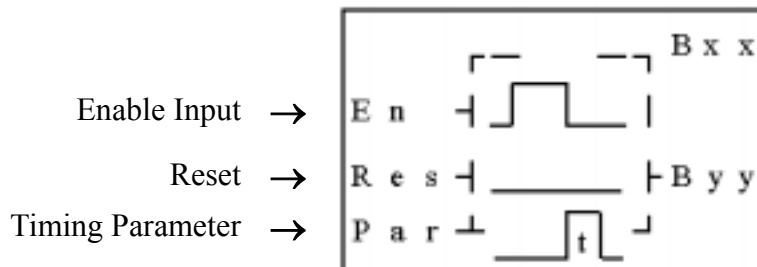
(2) Timer mode 2 (ON-Delay B Mode)



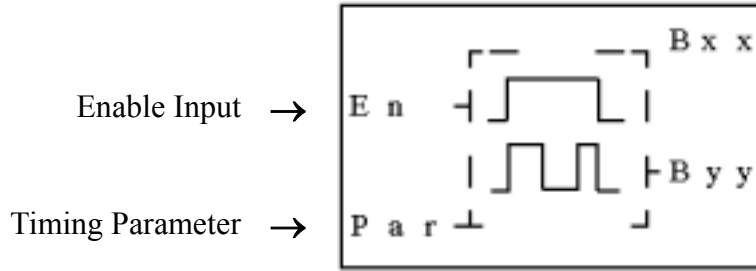
(3) Timer mode 3 (OFF-Delay A Mode)



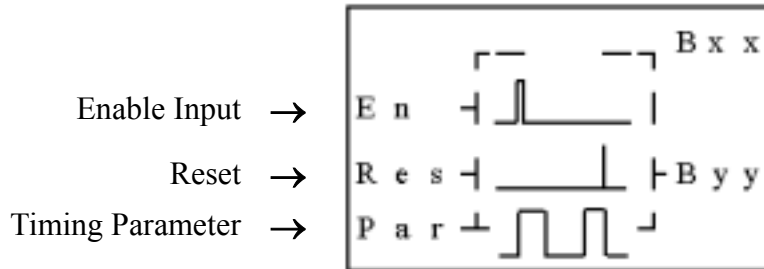
(4) Timer mode 4 (OFF-Delay B Mode)



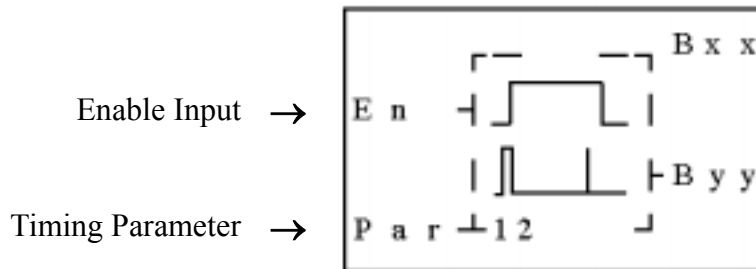
(5) Timer mode 5(FLASH A Mode)



(6) Timer mode 6(FLASH B Mode)

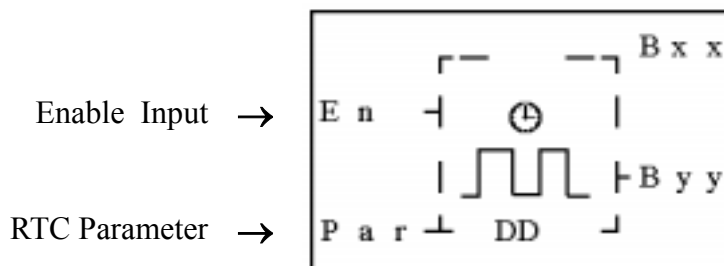


(7) Timer mode 7(FLASH C Mode)

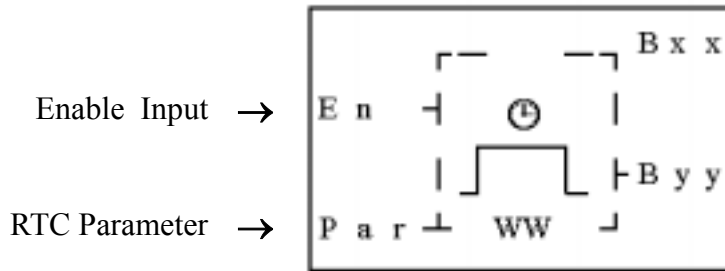


© RTC Comparator Function Block

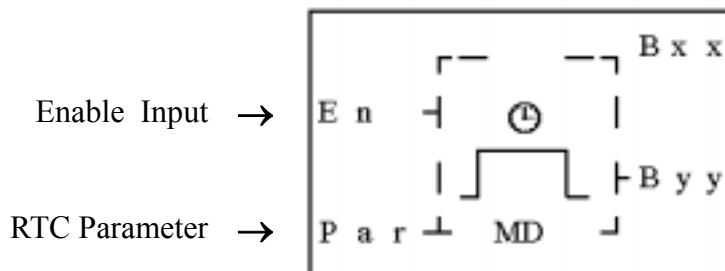
(1) RTC Mode 1(Daily)



(2) RTC Mode (Continuous)

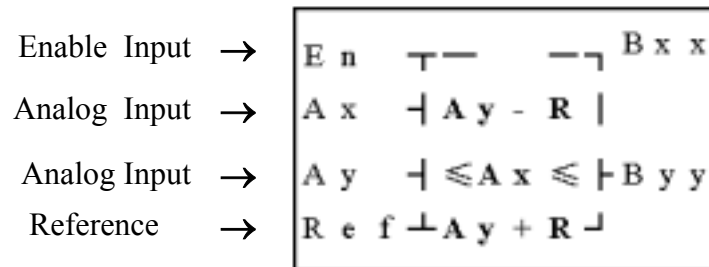


(3) RTC Mode 3 (Year Month Day)

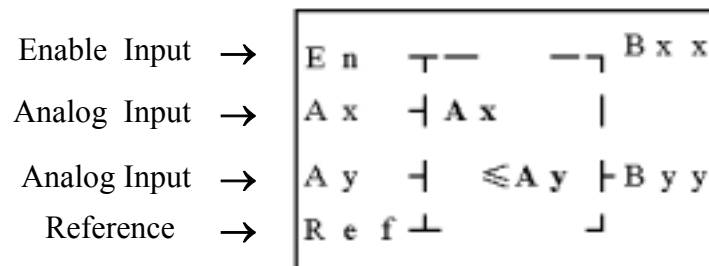


© Analog comparator Function Bloc

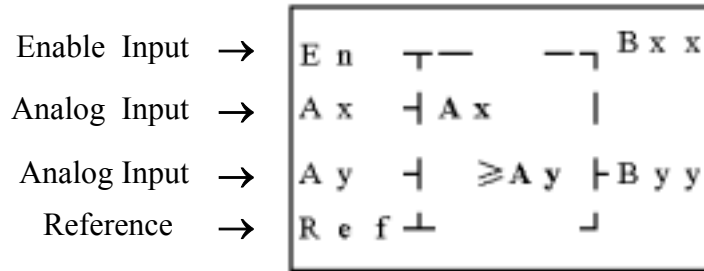
(1) Analog Comparison Mode 1



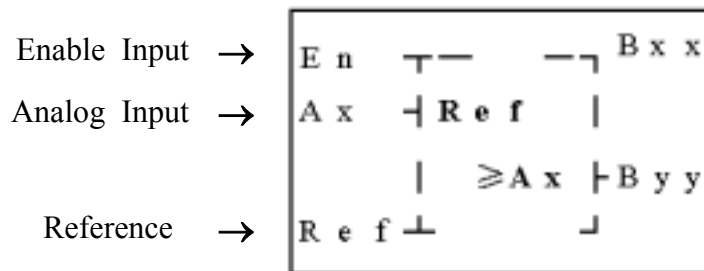
(2) Analog Comparison Mode 2



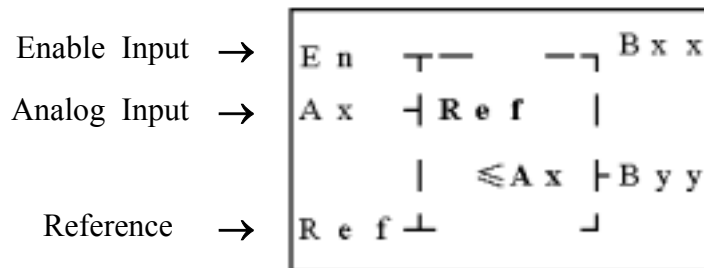
(3) Analog Comparison Mode 3



(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 shared the system memory. The total memory and shared memory is showed 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			

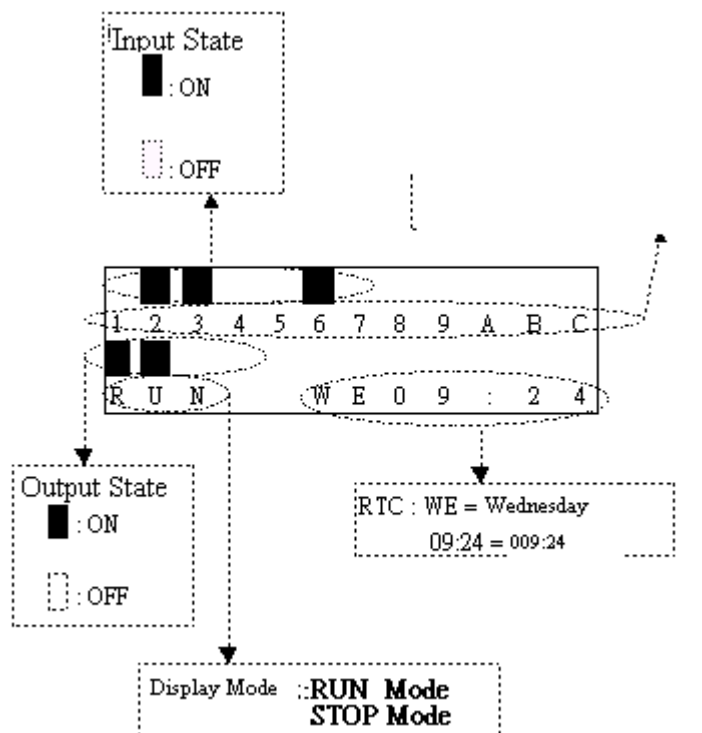
Timer Mode 7	1	2			
Counter Mode 1~8	1		1		
RTC Comparator Mode 1~3	1			1	
Analog Comparator Mode 1~5	1				1

Sample for calculate the memory in using:

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 remained is $99-7=92$. The timer used is $2+2=4$, and the remained is $15-4=11$. The counter used is 1, and the remained is $15-1=14$. The RTC comparator used is 1, and the remained is $15-1=14$. The analog comparator is unused, so the usable are 15.

8-5 FBD Edit Method

◎the origin screen when the power is on.



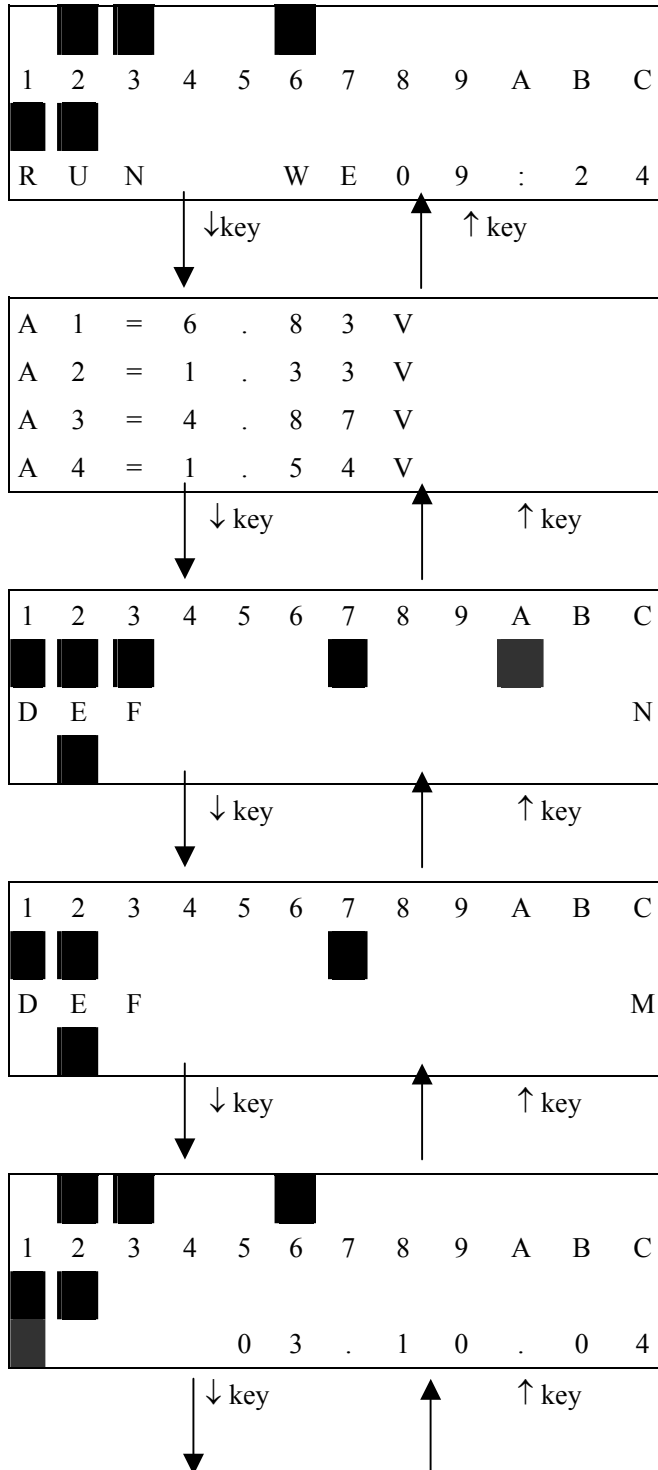
Now Press :

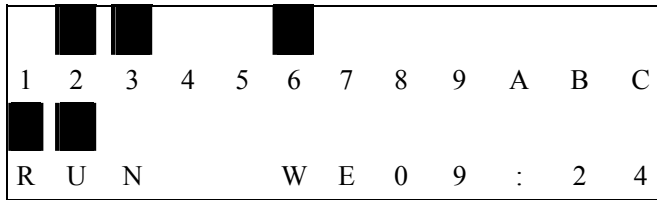
ESC	Back to Main Menu
↑↓	Display the state of the other relays(Expansion X&Y↔M ↔ N↔A) ↔ Original Screen

SEL	Press for 3s, H function content will be displayed, except the Mode 2 is selected in HMI.
-----	---

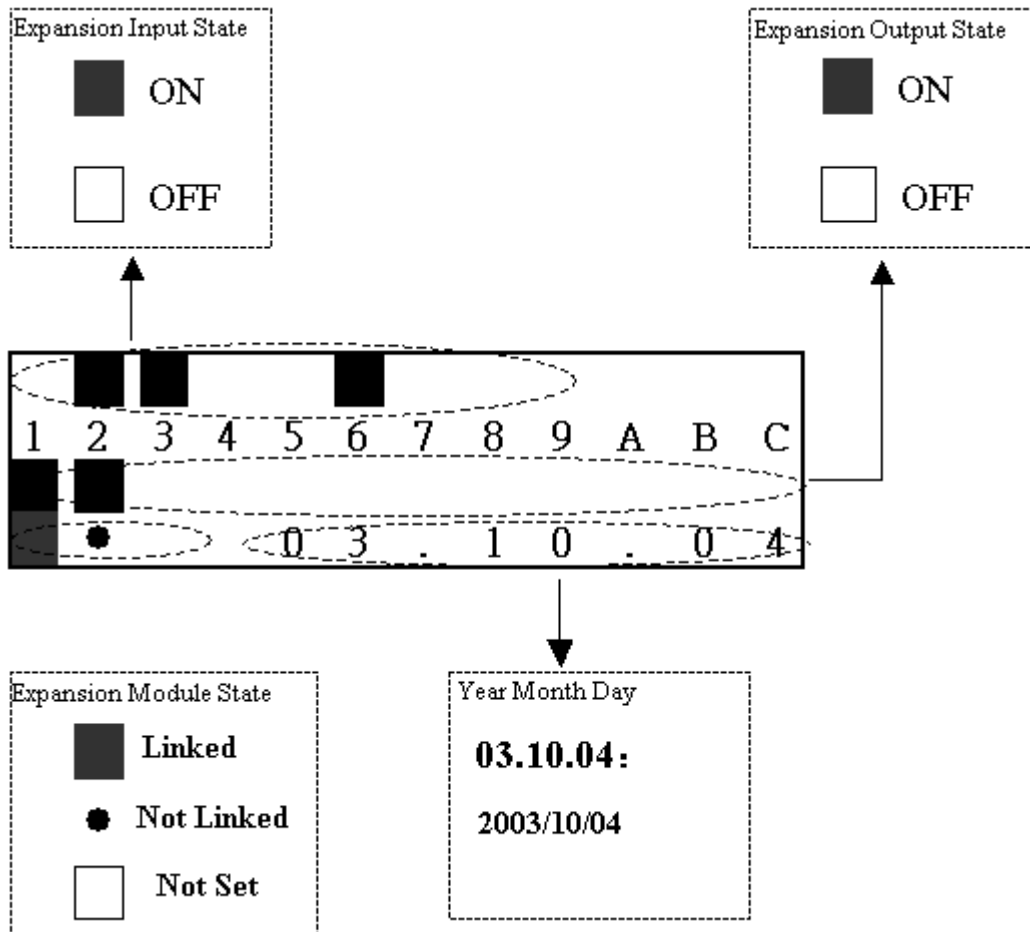
Sample :

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



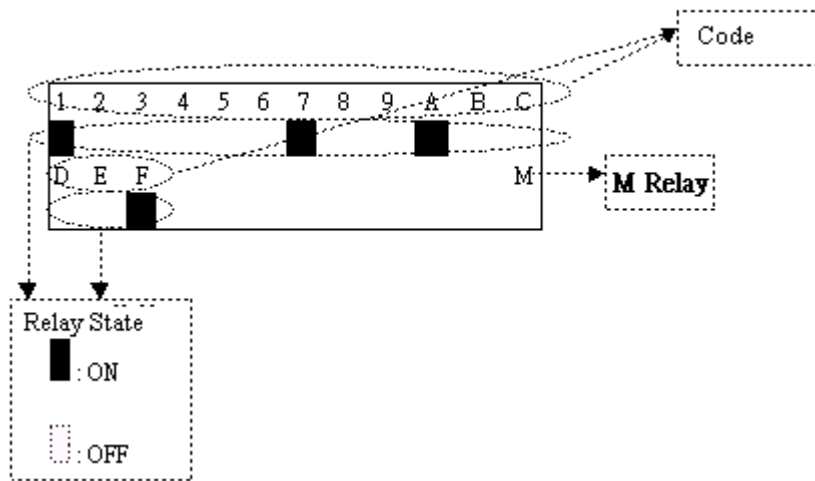


① Expansion Display State

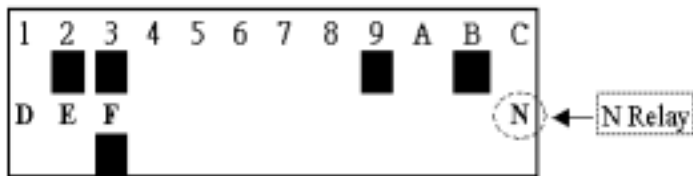


② M Display State :

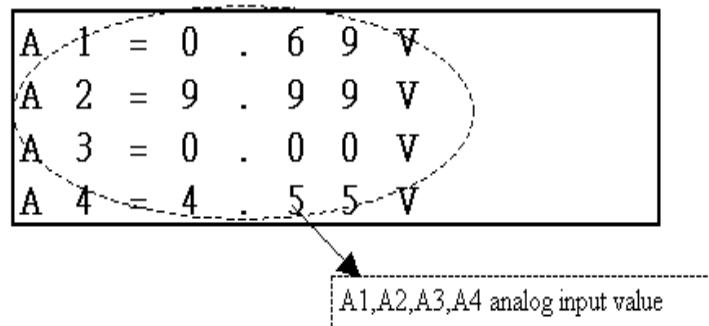
Relay Code



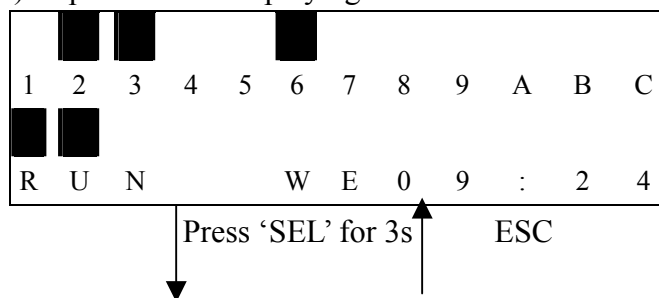
③ N Display State :



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
```

OK

ESC

T	0	1	=	1	0	0	0
> C	1	2	=	1	0	4	0
C	9	9	=	0	0	2	0

T	0	1	=	1	0	0	0
> C	1	2	=	0	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:

>	FBD
	PARAMETER
	RUN
	CLEAR PROG.
	WRITE
	READ
	SET
	RTC SET
	ANALOG SET
	PASSWORD
	LANGUAGE
	INITIAL

→ Similar to Ladder Edit Mode.

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

>	FBD
	PARAMETER
	STOP
	WRITE
	RTC SET
	WRITE
	PASSWORD
	LANGUAGE

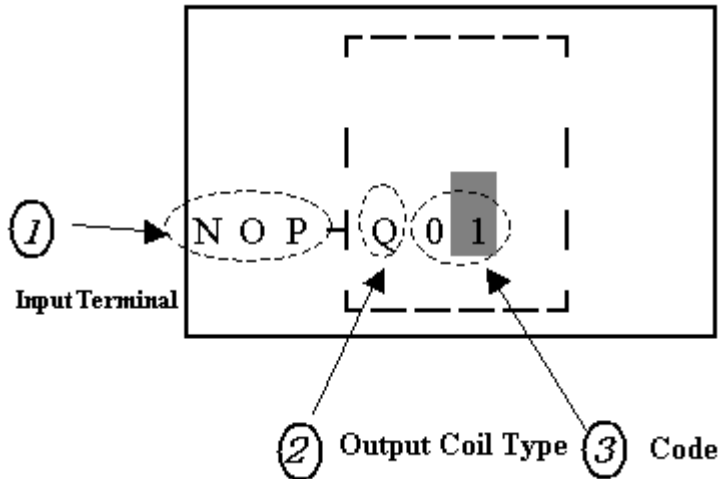
→ Similar to Ladder Edit method.

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

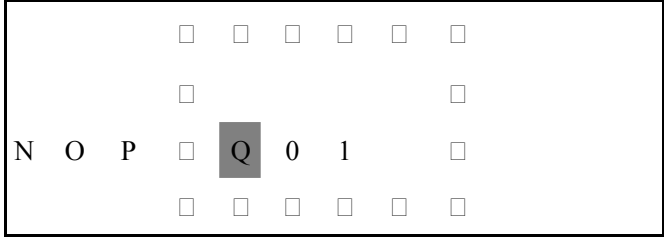


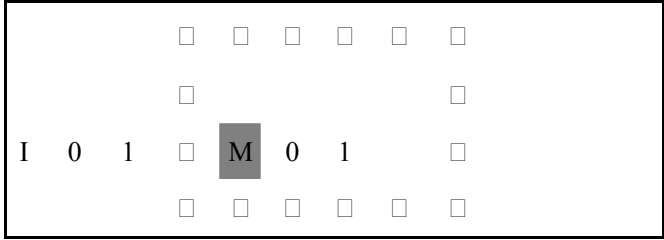
Now Press

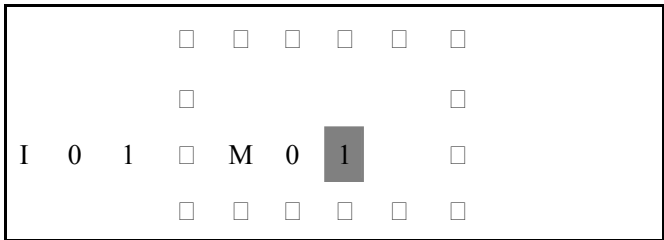
← →	1. Move the cursor①↔②↔③ 2. □ is Bxx, press '←' to enter Bxx screen
↑ ↓	1. Modify the code-□(Q : 01~08 , Y : 01~0C , M ,N , H : 01 ~ 0F , L : 01~08 , P : 01 ,S : 01) 2. modify output coil type-□ (Q↔Y↔M↔N↔H↔L ↔P↔S ↔Q)
OK	1. □, □ confirm the output coil (as Q,Y,M,N,), the cursor move to □. 2. When □ is H,L,P,S, enter H,L,P,S setting screen (6)(7) (8)
ESC	1. Back to Main Menu

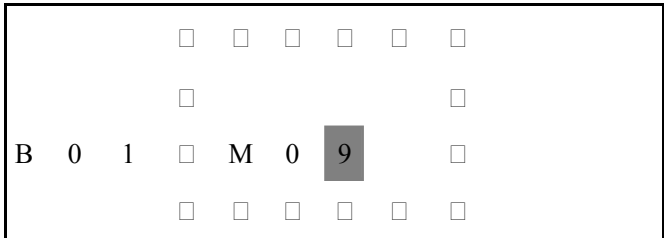
Sample:

Procedure (1)-1	
Original Screen	

<p>Procedure (1)-2</p> <p>Press '←'</p>	
---	--

<p>Procedure (1)-3</p> <p>Press '↑' twice</p> <p>Press '↑↓' to modify Q to M</p>	
--	--

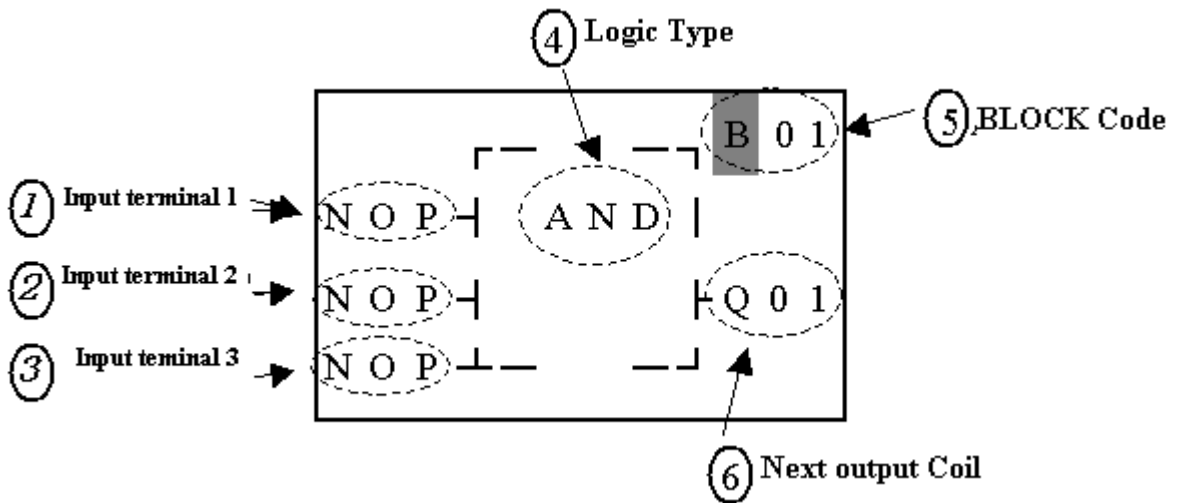
<p>Procedure (1)-4</p> <p>Press '→'</p>	
---	---

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

Procedure (1)-6 Press 'OK' Confirm coil M09, The cursor auto move to input terminal	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> □□□□□□ </div> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> □ □ </div> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> B01□M09□ </div> <div style="display: flex; justify-content: space-around;"> □□□□□□ </div> </div>
---	--

Procedure (1)-7 Press '←' Enter B01 Screen	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> □□□□□□ </div> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> □ □ </div> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> B01□M09□ </div> <div style="display: flex; justify-content: space-around;"> □□□□□□ </div> </div>
--	--

(2) Nr Input terminal Screen



Now Press

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

Sample:

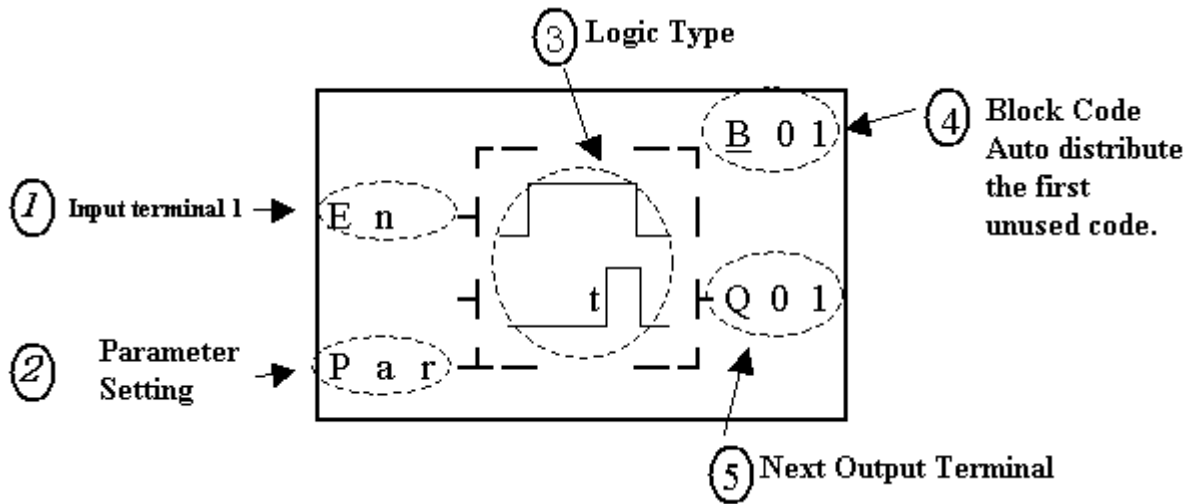
Following step (1)-7:

<p>Procedure (2)-1</p> <p>Press '←' or '↓'</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 40%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 15%;">B 0 1</td> </tr> <tr> <td>M 0 3</td> <td style="text-align: center;">□</td> <td style="text-align: center;">O R</td> <td style="text-align: center;">□</td> <td></td> </tr> <tr> <td>B 0 2</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td>M 0 9</td> </tr> <tr> <td>N O P</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td></td> </tr> </table>		□		□	B 0 1	M 0 3	□	O R	□		B 0 2	□		□	M 0 9	N O P	□		□	
	□		□	B 0 1																	
M 0 3	□	O R	□																		
B 0 2	□		□	M 0 9																	
N O P	□		□																		

<p>Procedure (2)-2</p> <p>Press '↓' once</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 40%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 15%;">B 0 1</td> </tr> <tr> <td>M 0 3</td> <td style="text-align: center;">□</td> <td style="text-align: center;">O R</td> <td style="text-align: center;">□</td> <td></td> </tr> <tr> <td>B 0 2</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td>M 0 9</td> </tr> <tr> <td>N O P</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td></td> </tr> </table>		□		□	B 0 1	M 0 3	□	O R	□		B 0 2	□		□	M 0 9	N O P	□		□	
	□		□	B 0 1																	
M 0 3	□	O R	□																		
B 0 2	□		□	M 0 9																	
N O P	□		□																		

<p>Procedure (2)-3</p> <p>Press '←'</p> <p>Enter B02 screen</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 40%;"></td> <td style="width: 15%; text-align: center;">□</td> <td style="width: 15%;">B 0 1</td> </tr> <tr> <td>M 0 3</td> <td style="text-align: center;">□</td> <td style="text-align: center;">O R</td> <td style="text-align: center;">□</td> <td></td> </tr> <tr> <td>B 0 2</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td>M 0 9</td> </tr> <tr> <td>N O P</td> <td style="text-align: center;">□</td> <td></td> <td style="text-align: center;">□</td> <td></td> </tr> </table>		□		□	B 0 1	M 0 3	□	O R	□		B 0 2	□		□	M 0 9	N O P	□		□	
	□		□	B 0 1																	
M 0 3	□	O R	□																		
B 0 2	□		□	M 0 9																	
N O P	□		□																		

(3) Edit Screen for Bn input terminal



Now press

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

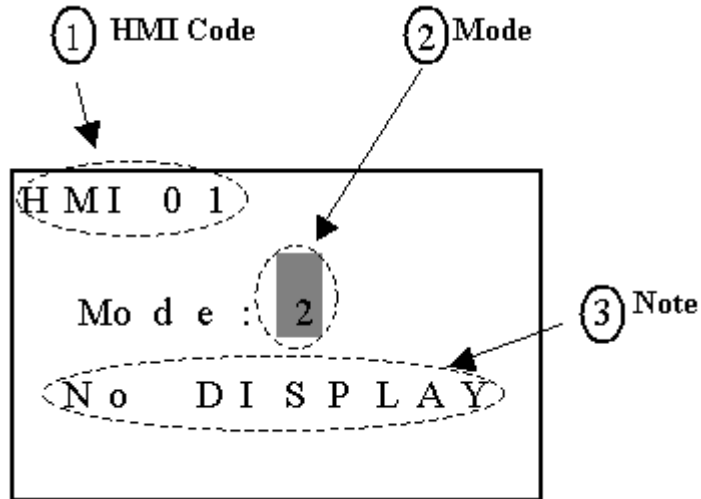
Sample:

Following the procedure (2)-3,

<p>Procedure (3)-1</p> <p>Press '↓' twice</p>	
---	--

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

(4)HMI Setting Screen

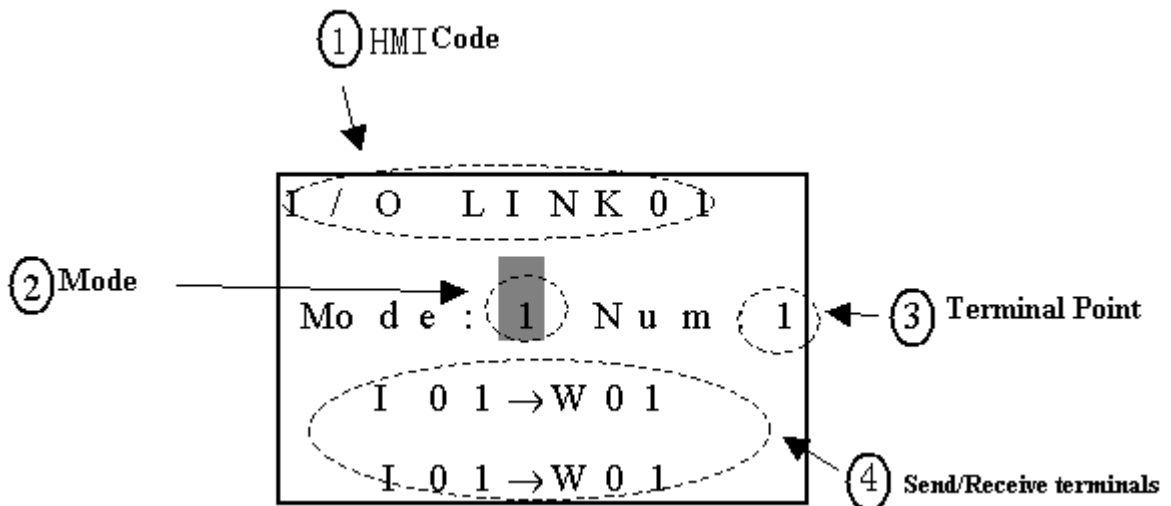


Now press

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.

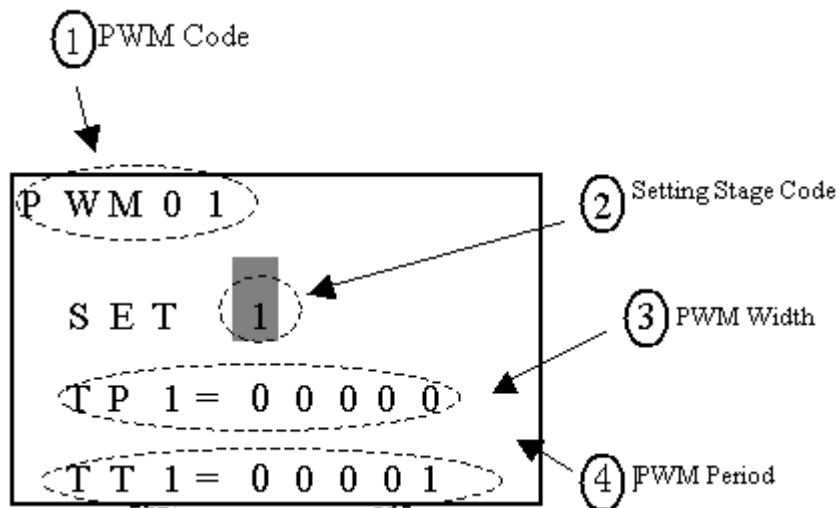
(5)DATALINK setting screen



Now press

← → ↑ ↓	Move the cursor □↔□↔□
SEL	Begin to edit
SEL + ↑ ↓	1. □ Modify the mode (1~2) 2. □ modify the terminals point (1~8) 3. □ 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

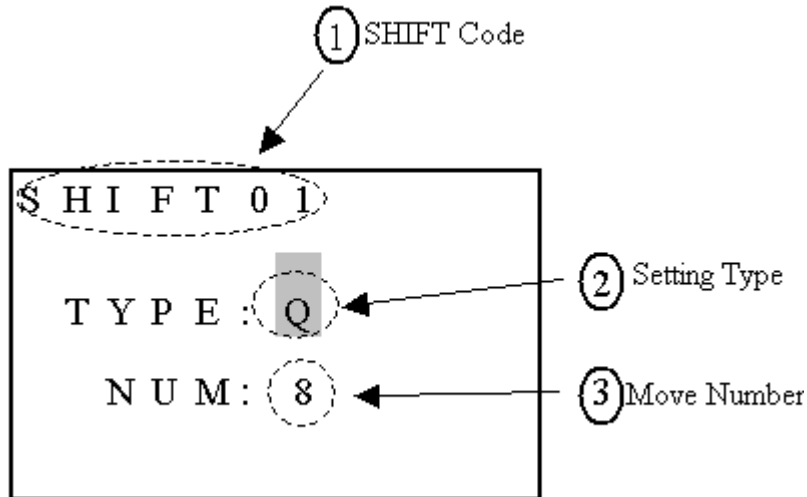
(6)PWM Setting screen



Now press

↑ ↓	Move the cursor □↔□↔□
← →	□,□ move the cursor
SEL	Begin to edit
SEL 後 ↑ ↓ ← →	1. □ modify the setting stage (1~8) 2. □ modify the pulse width(00000~32768) 3. □ 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

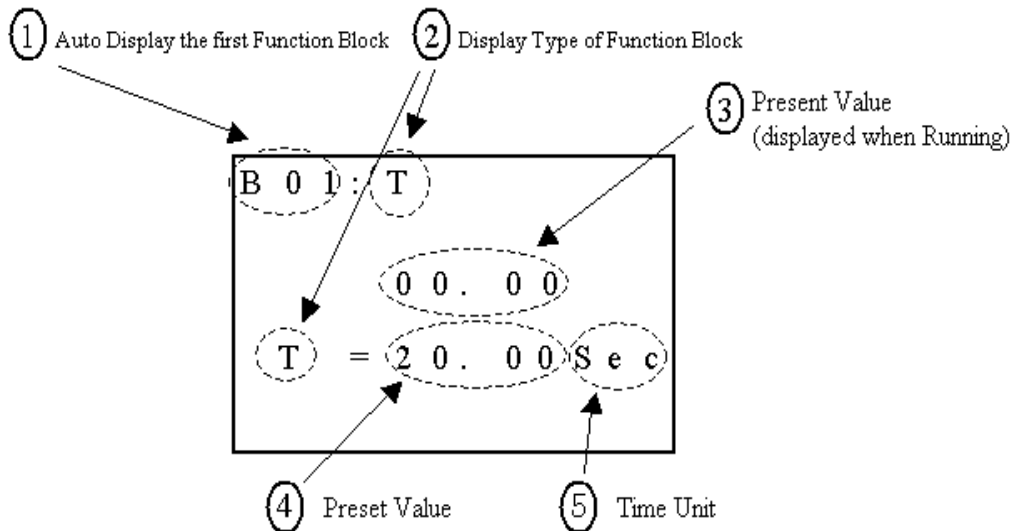
(7)SHIFT setting screen



Now press

↑↓	Move the cursor □↔□
SEL	Begin to edit
SEL, then ↑ ↓	1 · □ modify the output type Q↔Y↔Q 2 · □ 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 (<u>000000-0000-9999999999</u>) 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-FDB 下 PARAMETERPARAMETER modifying step: 的修改步驟:-
Take timer (mode 以定时器为例: 模式 11) as an example: Analog input A4 is set as preset value. Time unit is sA4, 时基 s.

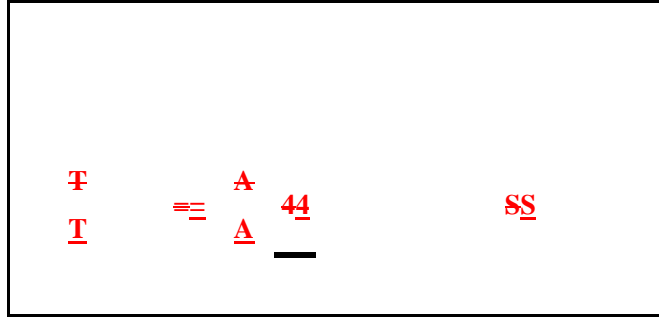
步驟 Step 11
 按 Press '↑ ↓' 移动游標到預設值處 place

Move the cursor to default 將游標移动到預設值處 place

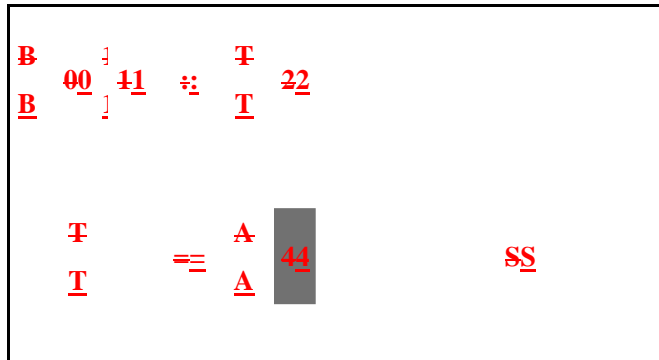
步驟 Step 22
 按 Press 'SELSEL' twice 两次

步驟 Step 33
 按 Press '↑' for three times, change to '三'

次，依次變為
A2~A4A2~A4 in turn

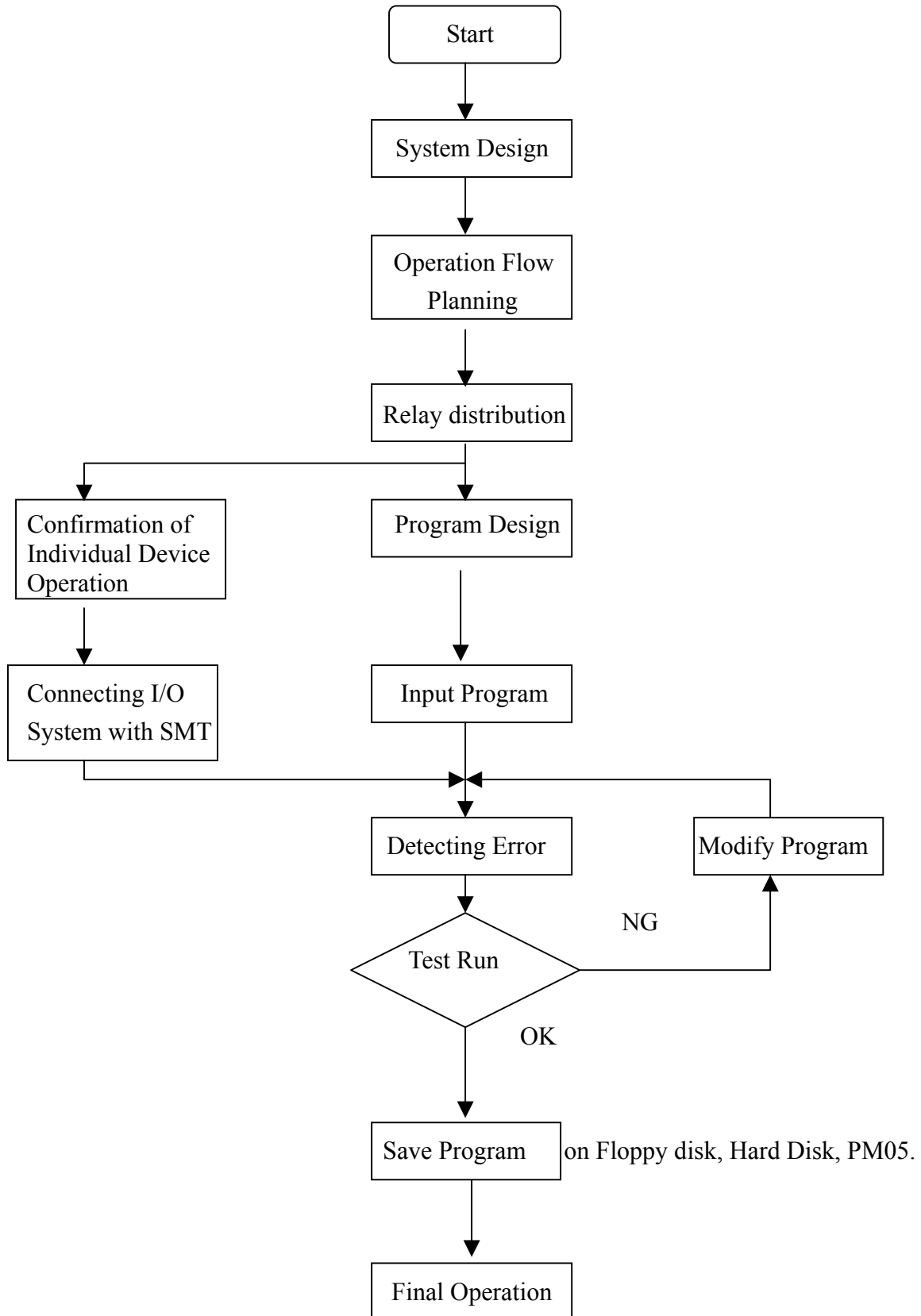


步驟 Step 44
按 Press OKOK to
save present data. 鍵→
保存當前資料



Chapter 9 System Design

9-1 Procedure for system design



9-2 Consideration for System Design

iSmart differs from the traditional Relay in controlling circuit fundamental. iSmart is periodical-loop controlled circuit (series controlled circuit), while Relay is parallel controlled circuit. Consequently, if failer were to take place, it is only single relay invalidation, 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 :

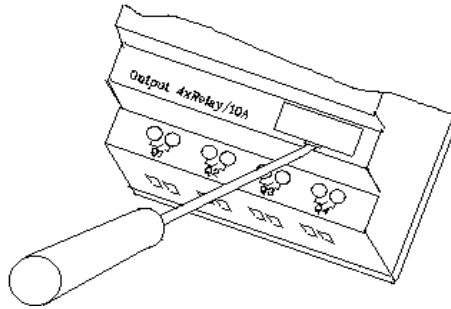
- ① Input Code : X =1~C (12)
- ② Output Code : Y=1~C (12)

Chapter 10 Spare Program

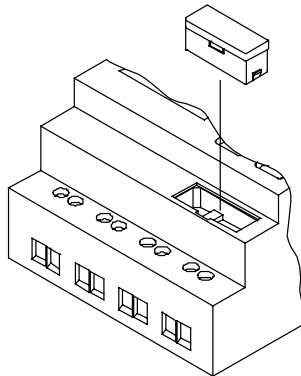
10-1 Spare Program Cartridge (SMT-PM04)

◎. The installation method for PM04 (optional) is as follow

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



Step 2 : Plug SMT-PM04 into the slot, as follow :

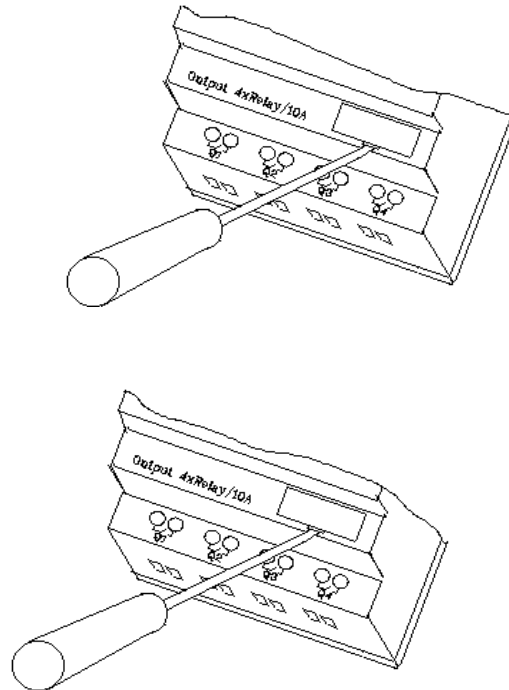


Step 3 : In the operation function list, click WRITE to enter the confirmation interface and click YES to download the spare program.

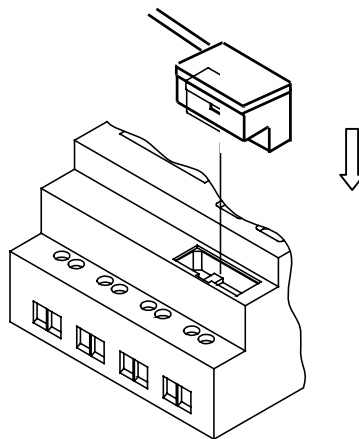
Note : If it is desired to recover the spare program, click READ on the operation function list to enter the confirmation interface and click YES to upload the spare program.

10-2 Computer Write Software (SMT-CONFIGURATOR)

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



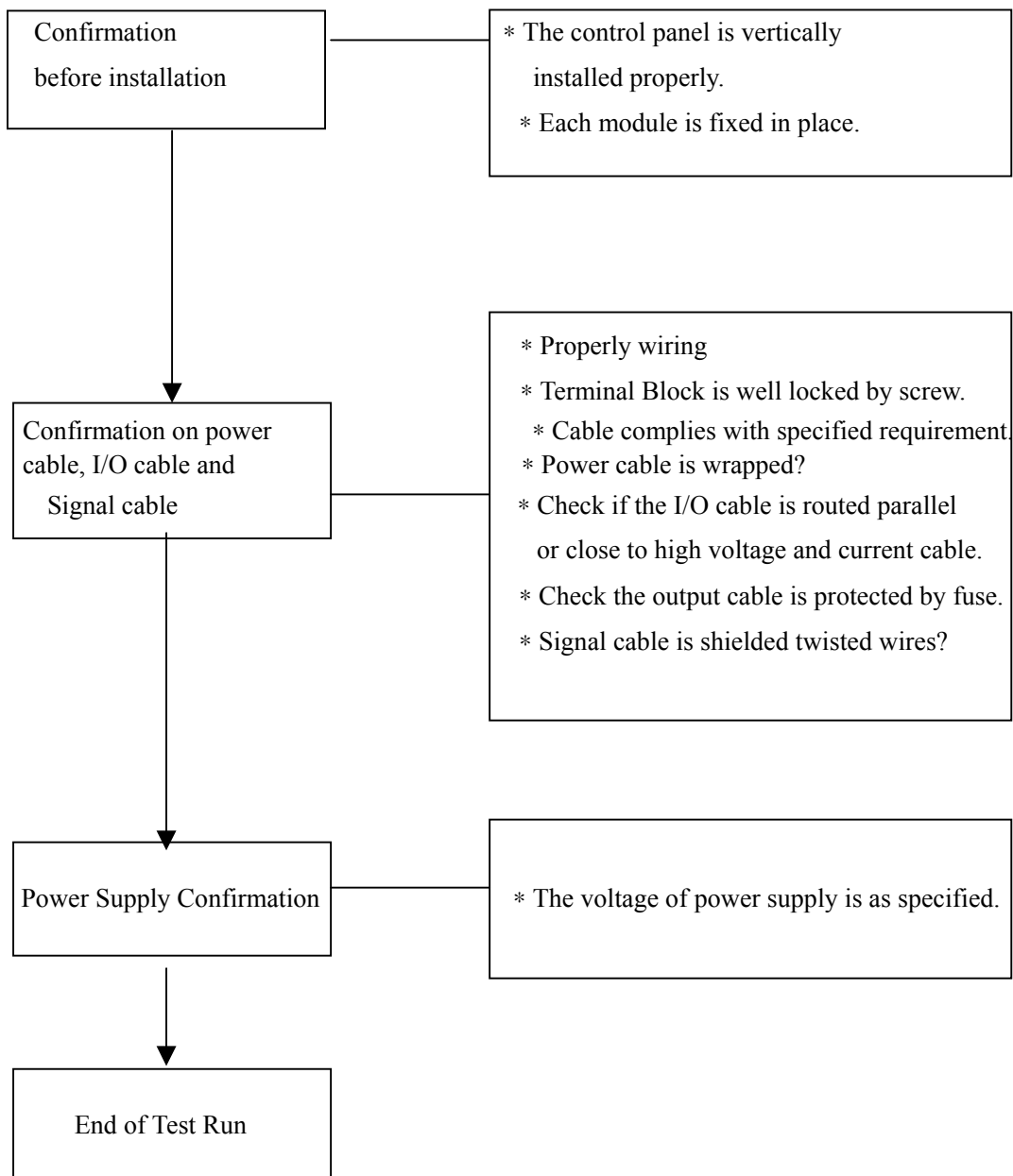
Step 2 : Insert SMT-PC03 (Cable) to the slot, as follow: The other terminal of cable is connected with the RS 232 communication port on computer.



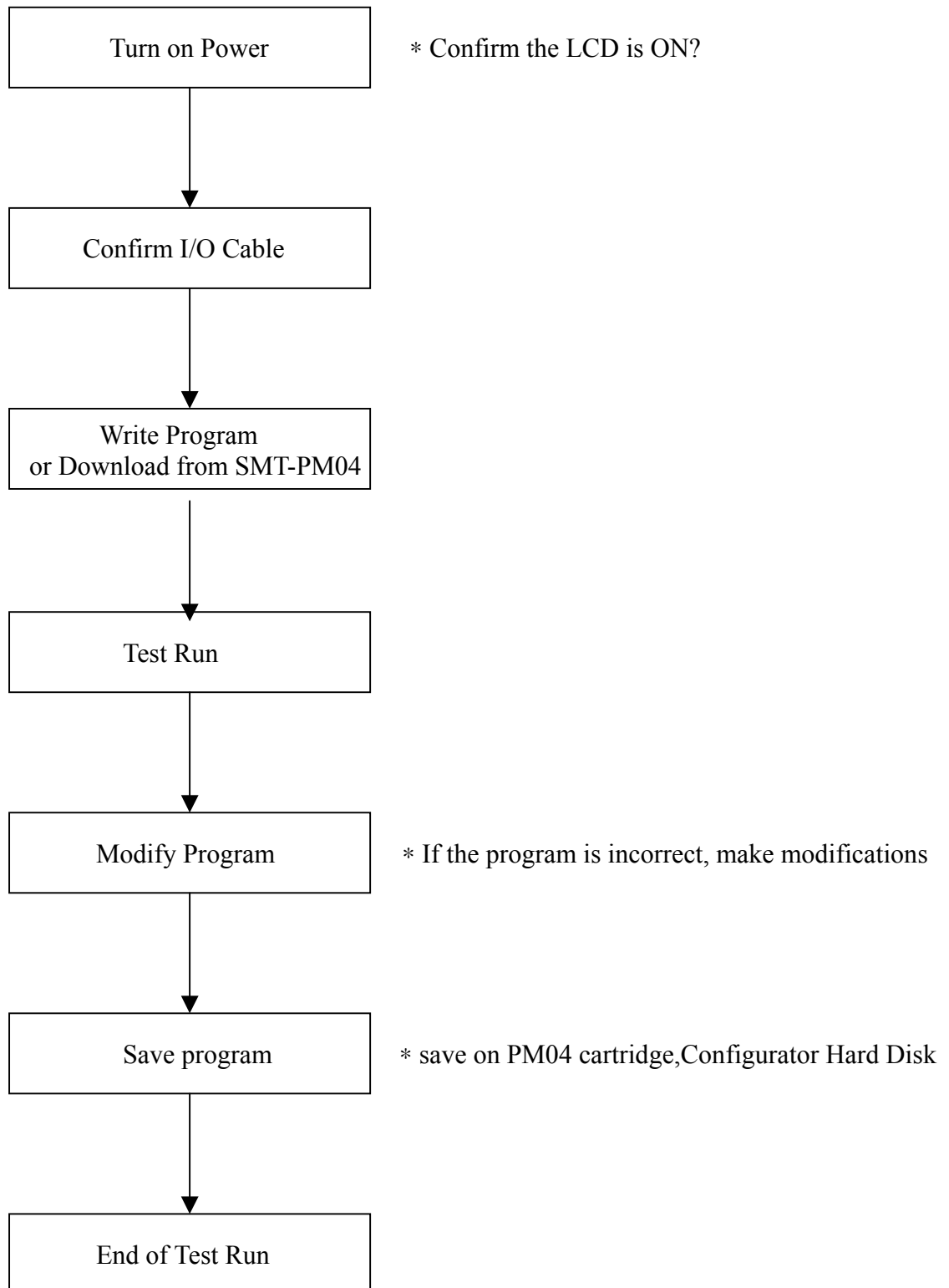
Step 3 : With SMT-CONFIGURATOR software, the computer is ready to read a program from, or write a program to the iSmart.

Chapter 11 Test Run

11-1 Confirmation before Test Run



11-2 Procedure of Test Run



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 °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 Trouble Shooting

- ⊙ When there is no display, but the operation is normal, there be possible LCD failer, 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 temperature	0-55℃
	Storage temperature	-40 - 70℃
	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

10-Point nt 體	MODE	AC 100~240	DC 24V	Input Point	Output Point	Analog Input	RTC	LCD Key	Expansi on	1KHz High Speed Input	PWM Output	Data Link	
+ 標準型 φ 標準 本體	標準型												
	10MR-A	☐		6	4	Relay		☐	☐				
	12MR-D		☐	8*	4	Relay	2	☐	☐	☐			
	12MT-D		☐	8*	4	Transistor	2	☐	☐	☐	☐		
	擴充型-Expansion Variant												
	10HR-A	☐☐		66	4	RelayRel		☐☐	☐☐	☐☐			
	10HR-A				4	ay							
	12HR-D		☐☐	8*8*	4	RelayRel	22	☐☐	☐☐	☐☐	☐☐		
	12HR-D				4	ay							
	12HT-D1		☐☐	8*8*	4	TransistorT	22	☐☐	☐☐	☐☐	☐☐	☐☐	
2HT-D				4	ransistor								
Expansion Variant without control panel 擴充無面板型													
10KR-A	☐☐		66	4	RelayRel		☐☐		☐☐				
10KR-A				4	ay								
12KR-D		☐☐	8*8*	4	RelayRel	22	☐☐		☐☐	☐☐			
12KR-D				4	ay								
12KT-D1		☐☐	8*8*	4	TransistorT	22	☐☐		☐☐	☐☐	☐☐		
2KT-D				4	ransistor								
Standard Variant without up-cover 標準無上蓋型													
10CR-A	☐☐		66	4	RelayRel		☐☐						
10CR-A				4	ay								
12CR-D		☐☐	8*8*	4	RelayRel	22	☐☐			☐☐			
12CR-D				4	ay								
12CT-D1		☐☐	8*8*	4	TransistorT	22	☐☐			☐☐	☐☐		
2CT-D				4	ransistor								
20-Point 標準型 本體	Expansion Variant 標準型												
	20MR-A	☐		12	8	Relay		☐	☐				
	20MR-D		☐	12*	8	Relay	4	☐	☐	☐			
	20MT-D		☐	12*	8	Transistor	4	☐	☐	☐	☐		

<u>20HR-A</u>	<input type="checkbox"/>		<u>12</u> <u>12</u>	<u>8</u>	<u>RelayRel</u>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<u>20HR-A</u>				<u>8</u>	<u>ay</u>							
<u>20HR-D</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>RelayRel</u>	<u>44</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<u>20HR-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ay</u>							
<u>20HT-D2</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>TransistorT</u>	<u>44</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>0HT-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ransistor</u>							
Expansion Variant without control panel												
<u>20KR-A</u>	<input type="checkbox"/>		<u>12</u> <u>12</u>	<u>8</u>	<u>RelayRel</u>		<input type="checkbox"/>		<input type="checkbox"/>			
<u>20KR-A</u>				<u>8</u>	<u>ay</u>							
<u>20KR-D</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>RelayRel</u>	<u>44</u>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
<u>20KR-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ay</u>							
<u>20KT-D2</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>TransistorT</u>	<u>44</u>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>0KT-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ransistor</u>							
Standard Variant without up-cover												
<u>20CR-A</u>	<input type="checkbox"/>		<u>12</u> <u>12</u>	<u>8</u>	<u>RelayRel</u>		<input type="checkbox"/>					
<u>20CR-A</u>				<u>8</u>	<u>ay</u>							
<u>20CR-D</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>RelayRel</u>	<u>44</u>	<input type="checkbox"/>			<input type="checkbox"/>		
<u>20CR-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ay</u>							
<u>20CT-D2</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>TransistorT</u>	<u>44</u>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
<u>0CT-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ransistor</u>							
High-speed communication Variant 高速通訊型												
<u>20VR-D</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>RelayRel</u>	<u>44</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>20VR-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ay</u>							
<u>20VT-D2</u>		<input type="checkbox"/>	<u>12</u> <u>*1</u>	<u>8</u>	<u>TransistorT</u>	<u>44</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>0VT-D</u>			<u>2</u> <u>*</u>	<u>8</u>	<u>ransistor</u>							
Expansion	<u>8ER-A</u>	<input type="checkbox"/>	<u>44</u>	<u>4</u>	<u>RelayRel</u>							
	<u>8ER-A</u>			<u>4</u>	<u>ay</u>							
	<u>8ER-D8</u>		<input type="checkbox"/>	<u>44</u>	<u>4</u>	<u>RelayRel</u>						
	<u>ER-D</u>			<u>4</u>	<u>ay</u>							
<u>8ET-D8E</u>		<input type="checkbox"/>	<u>44</u>	<u>4</u>	<u>Transistor</u>							
<u>T-D</u>				<u>4</u>	<u>ransistor</u>							

◎: YES

*: The input points consist of the ones having analog input function. 輸入點數中包含類比輸入複用點

Power Supply Module

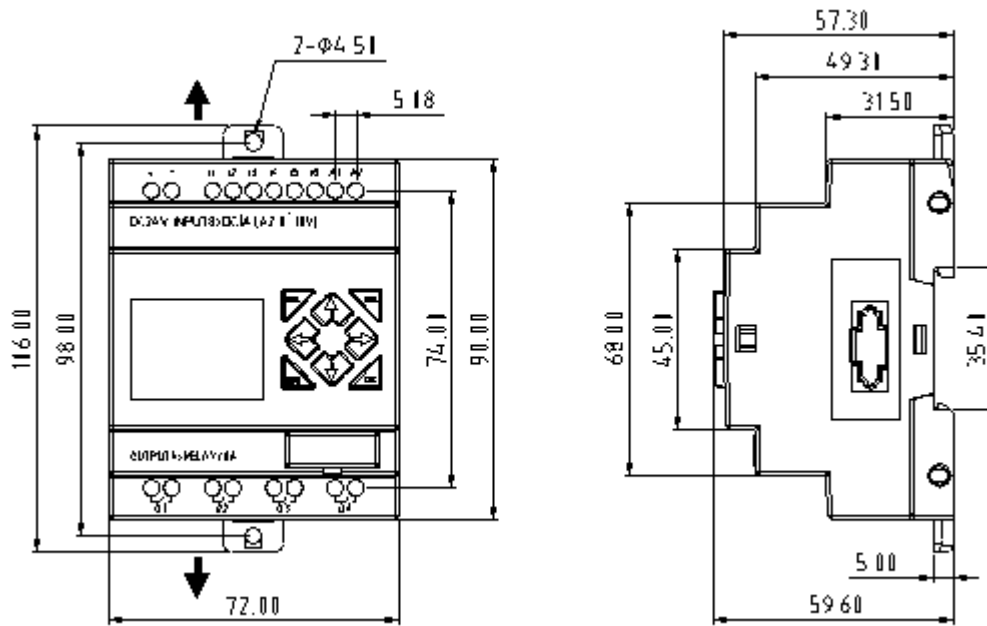
Module	Input/Output
DC +12V	AC 100~240V / DC +12V
DC +24V	AC 100~240V / DC +24V

Optional Devices

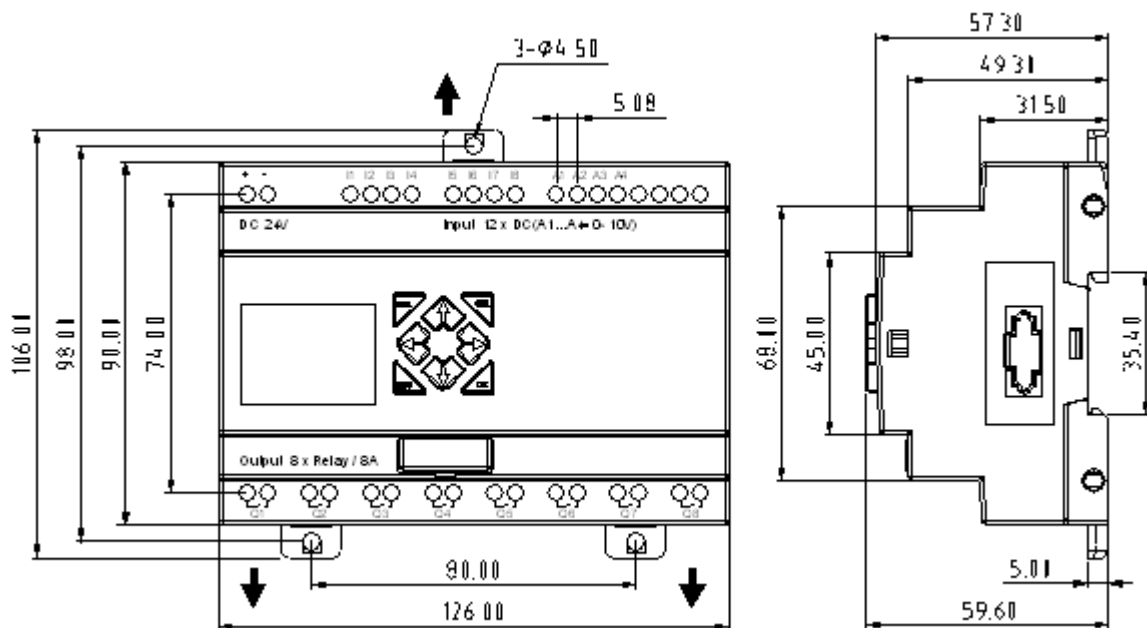
MODE	Description
PM05	Spare Program Cartridge
Client	Computer Edition Software

13-3 Dimension Diagram

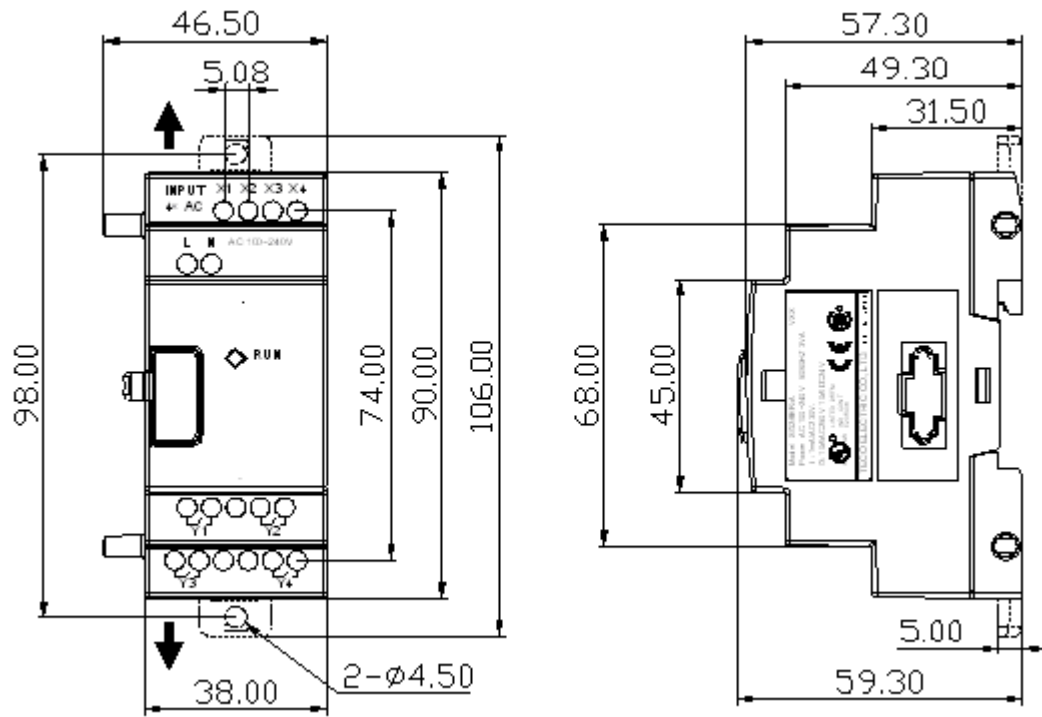
© 10/12 points



© 20 points



◎ Expansion 8 points



Appendix Application Illustration

1. Lighting Control for Staircase

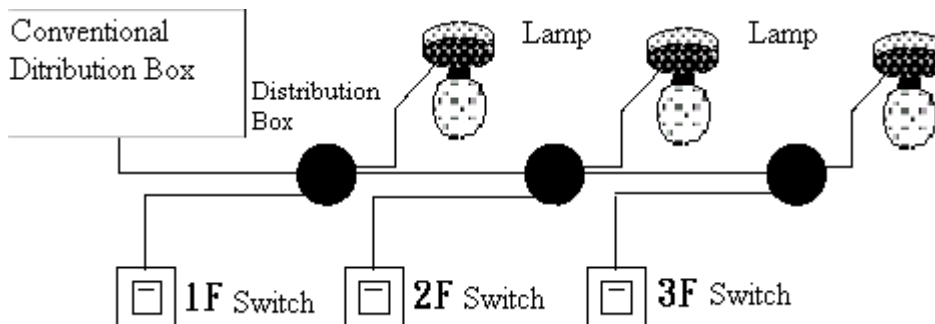
1.1 Requirement for Staircase Lighting

- 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

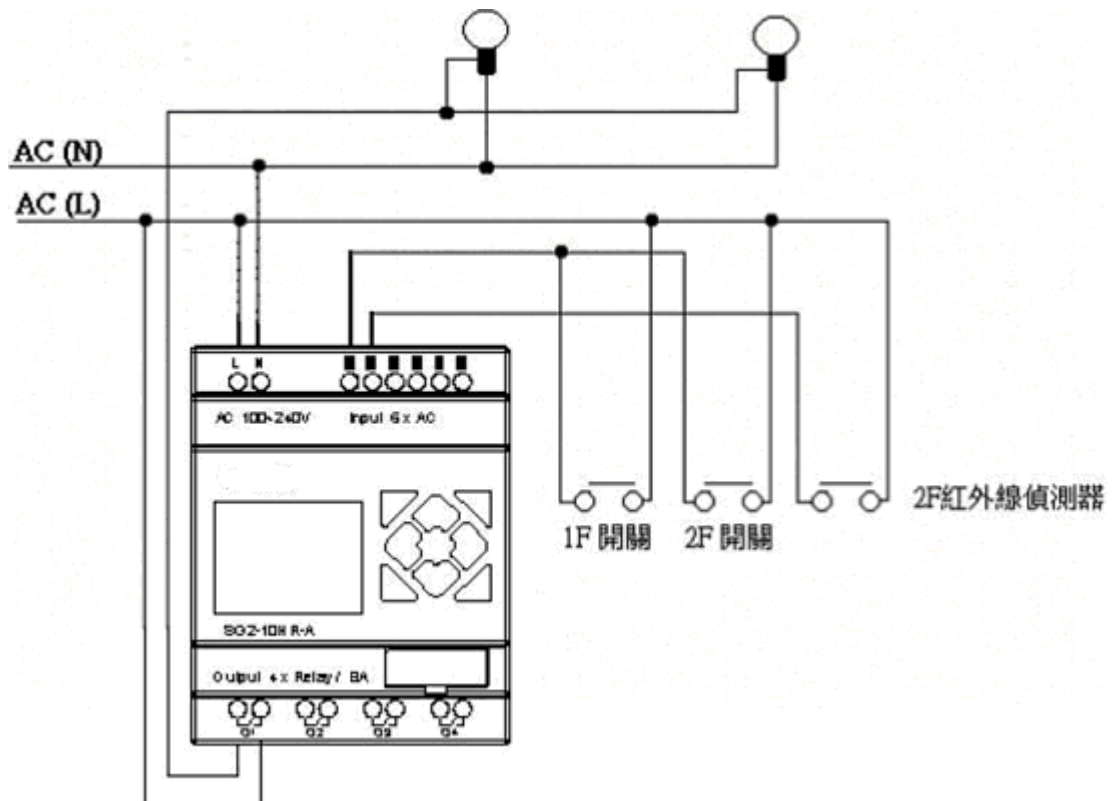
Shortcoming: The user has no way to reset the turn-off time.

1.3 Apply iSmart in Lighting System

Devices Applied

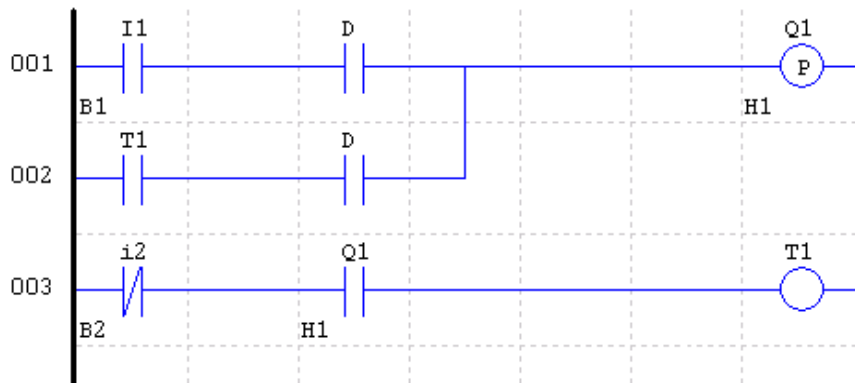
- Q1 Lamp H1
- I1(No terminal) Switch B1
- I2(No terminal) Infrared sensor for climbing

Wiring Diagram for Lighting System

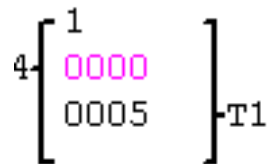


Illustrated program using iSmart in lighting system

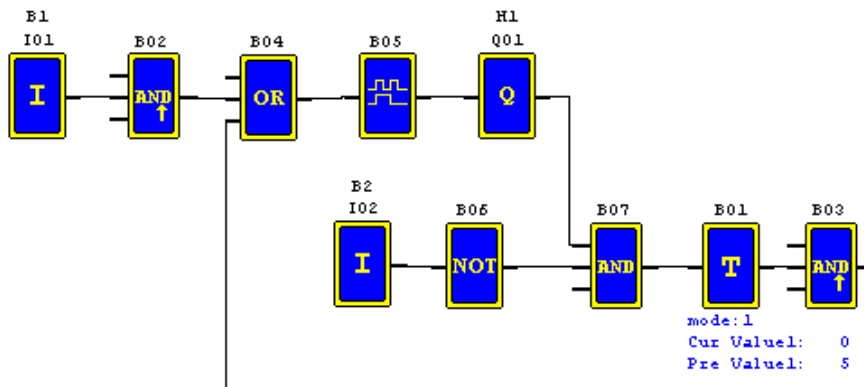
Ladder :



FUNCTION :



FBD :

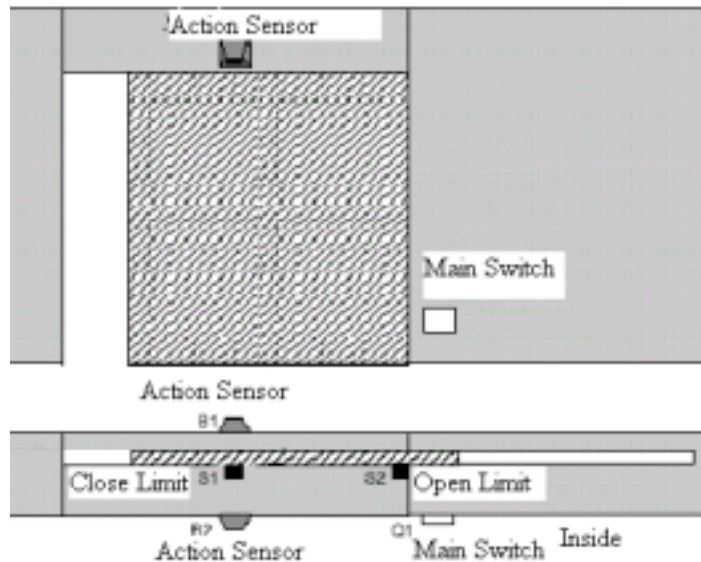


2 Auto Door Control

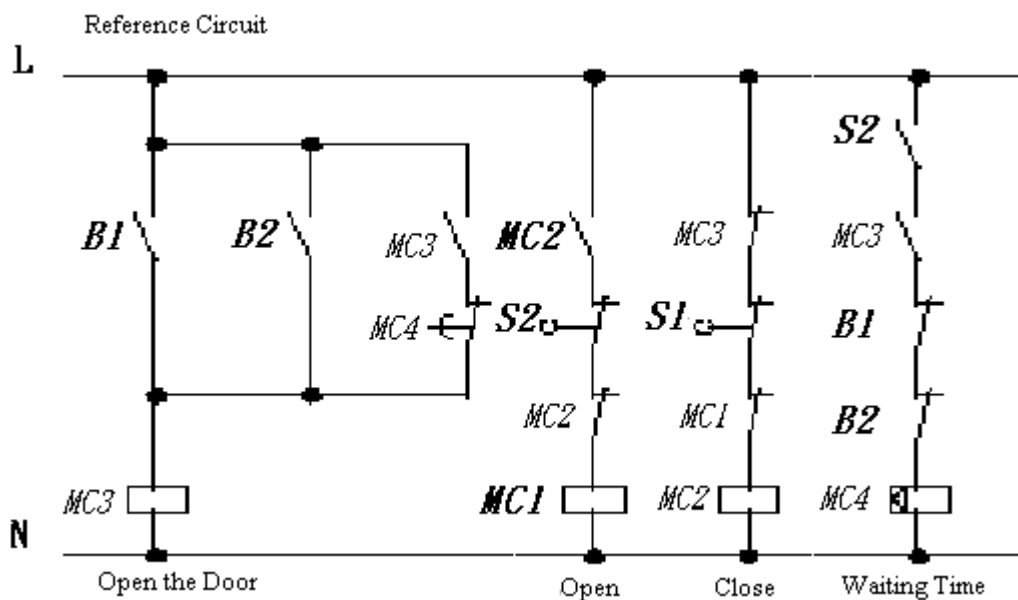
The automatic doors are very popular ie: installed at the entrance of supermarkets, banks and hospitals.

2.1 Requirement 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 B2 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; MC4 will close the door.

2.3 Apply iSmart in Door Control System

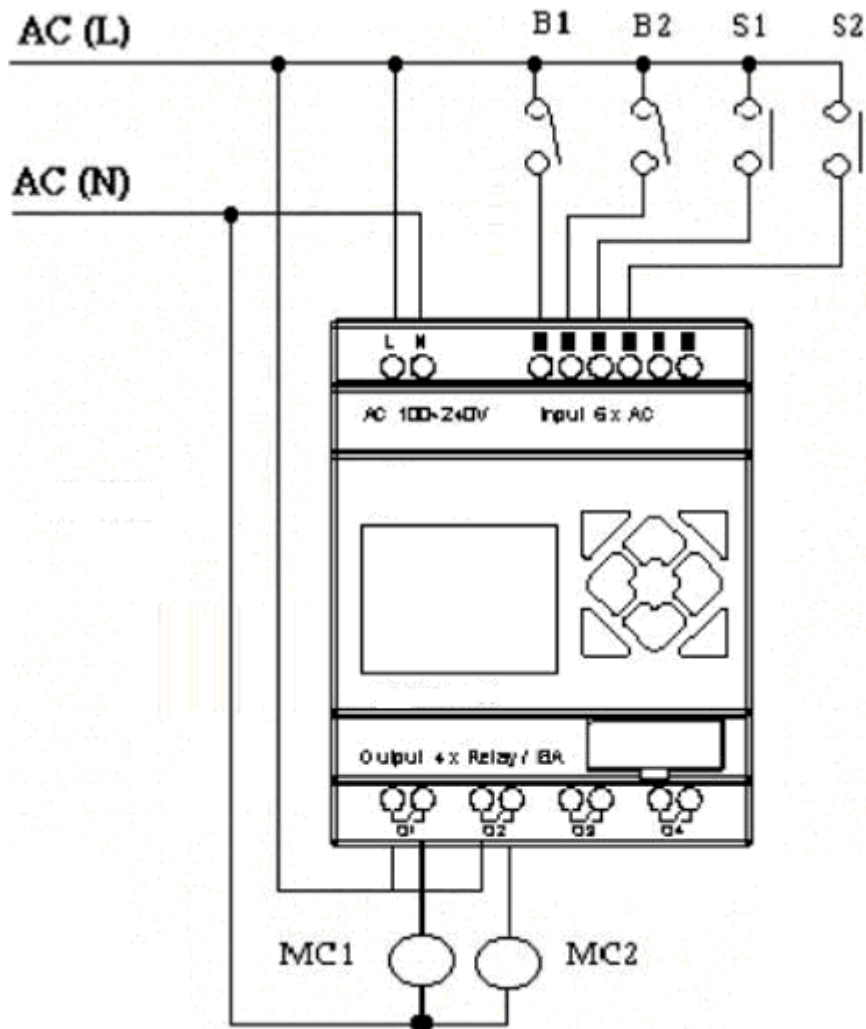
Applying iSmart in door control system can simplify the circuit. All that one need to do is connect the action sensor, limit switch and contactor with iSmart.

Devices Applied

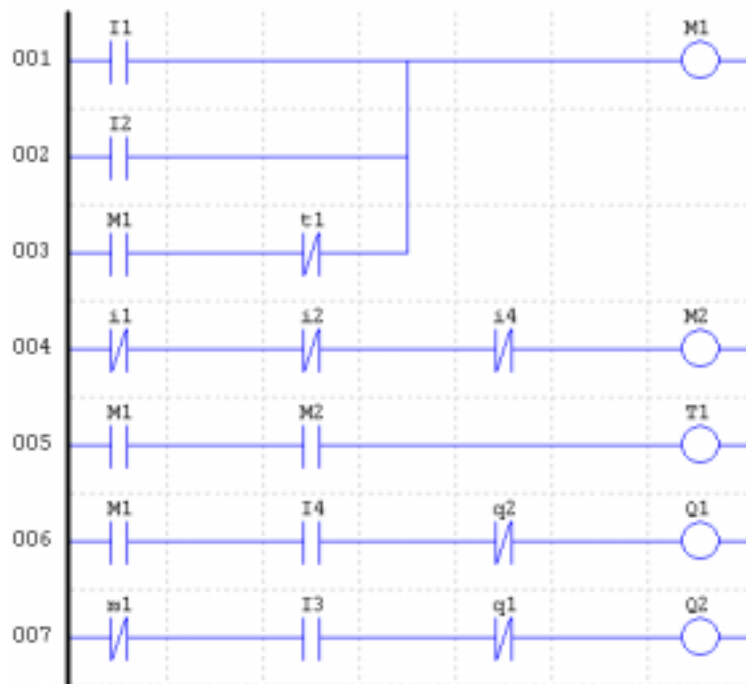
- MC1 main door open contactor
- MC2 main door close contactor

- 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.



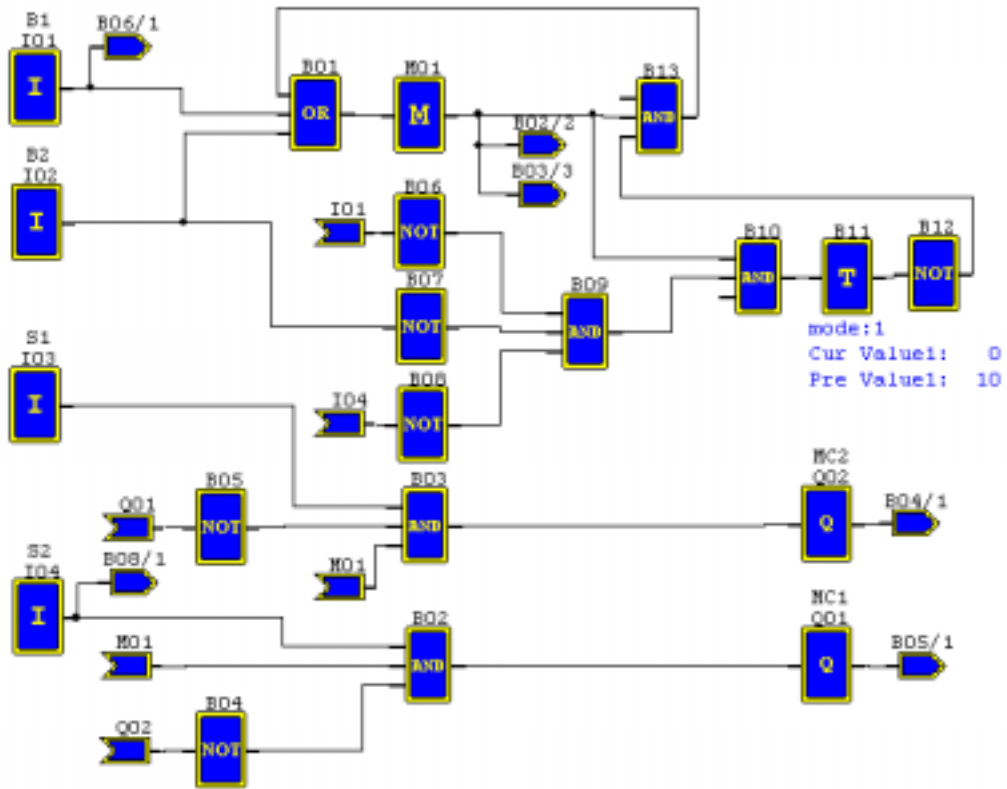
Ladder :



FUNCTION :

$$3 \left[\begin{array}{l} 1 \\ 0000 \\ 0010 \end{array} \right] T1$$

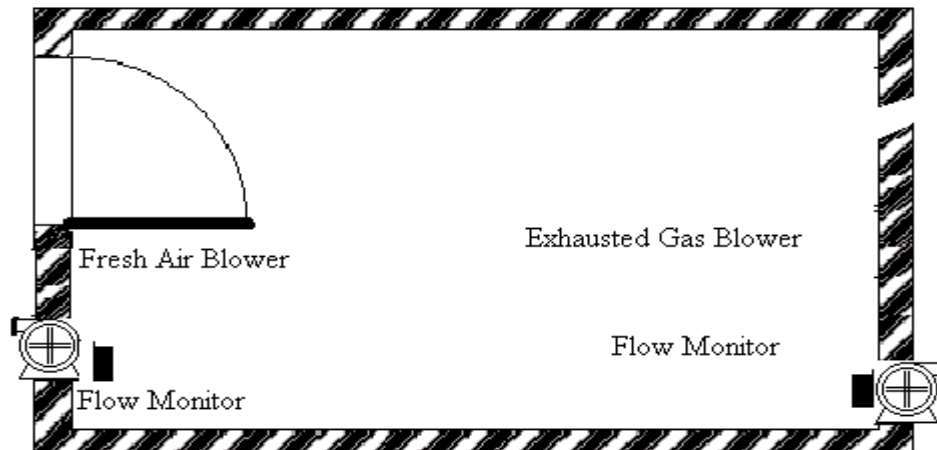
FBD Operation Flow :



3. Ventilation Control

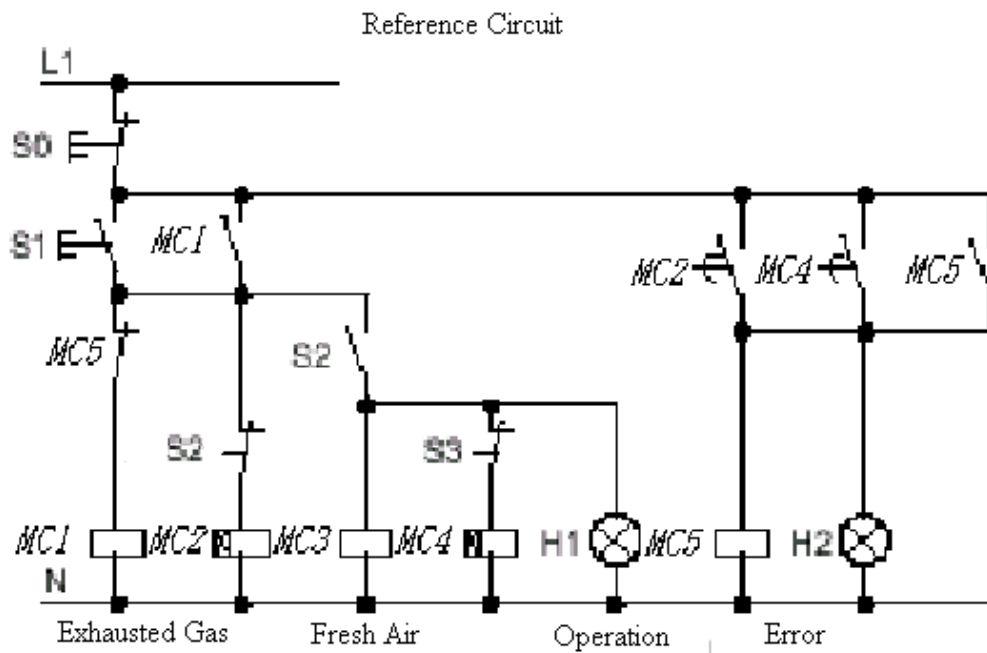
3.1 Ventilation System Requirement

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:

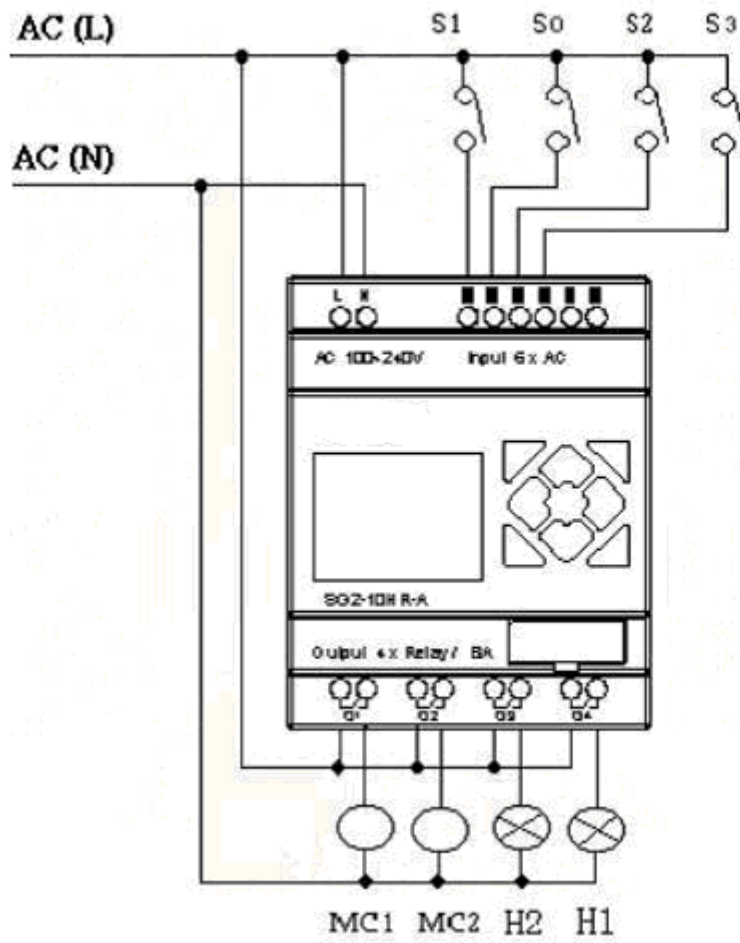


The ventilation system is wholly controlled by the airflow monitor. If there is no flow air in the room after a designated duration of time, the system will activate the warning system so the user shall can shut off the system.

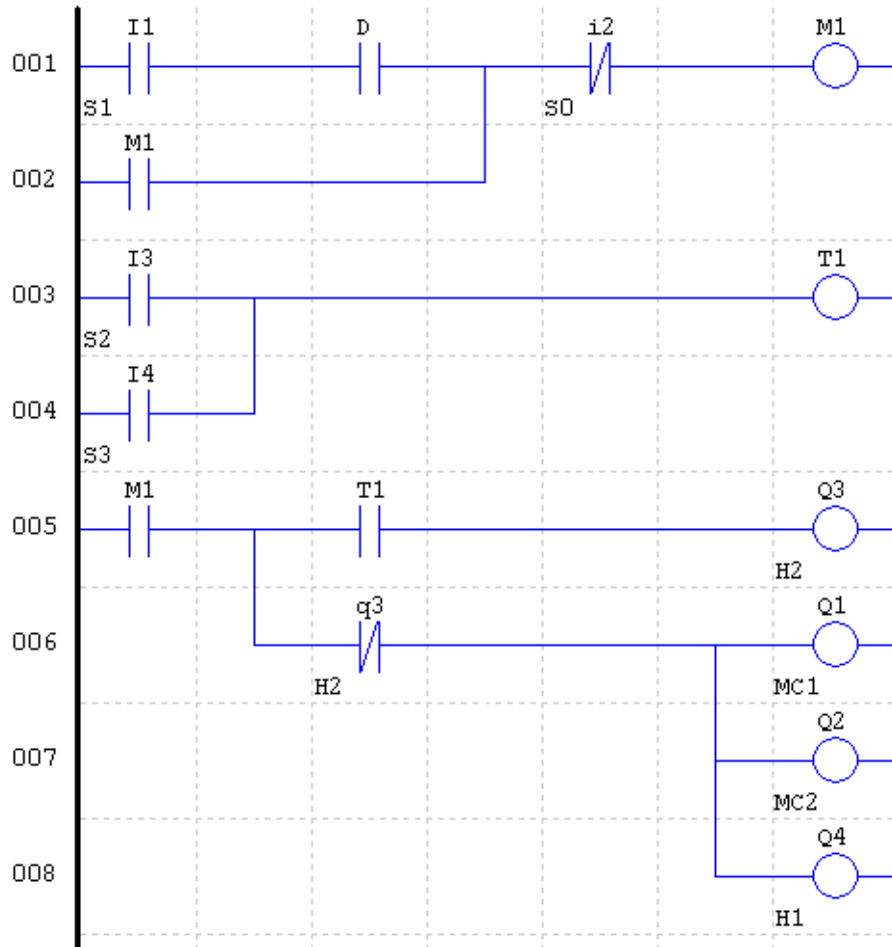
Devices Applied

- 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.



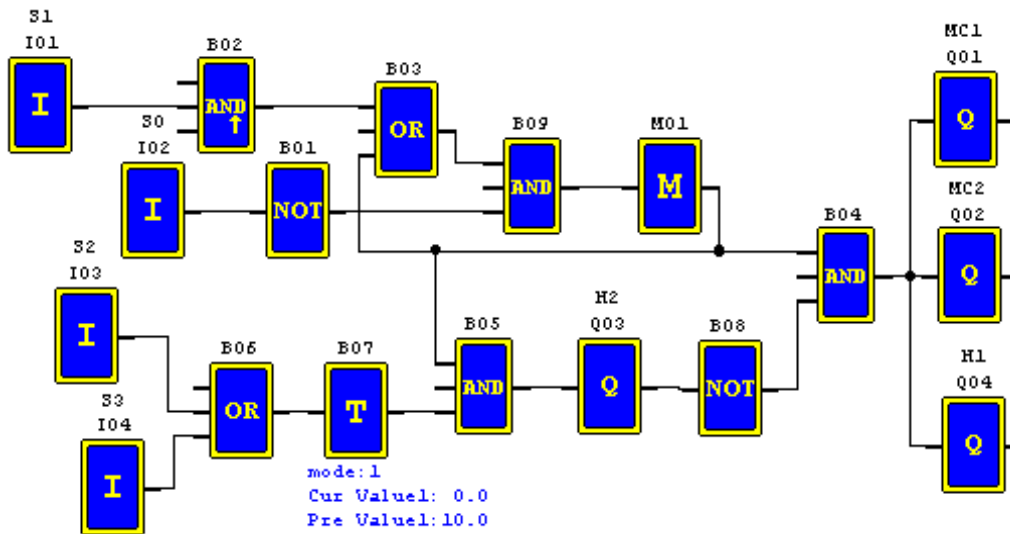
Ladder :



FUNCTION :

$$3 \left[\begin{array}{l} 1 \\ 0000 \\ 0010 \end{array} \right] T1$$

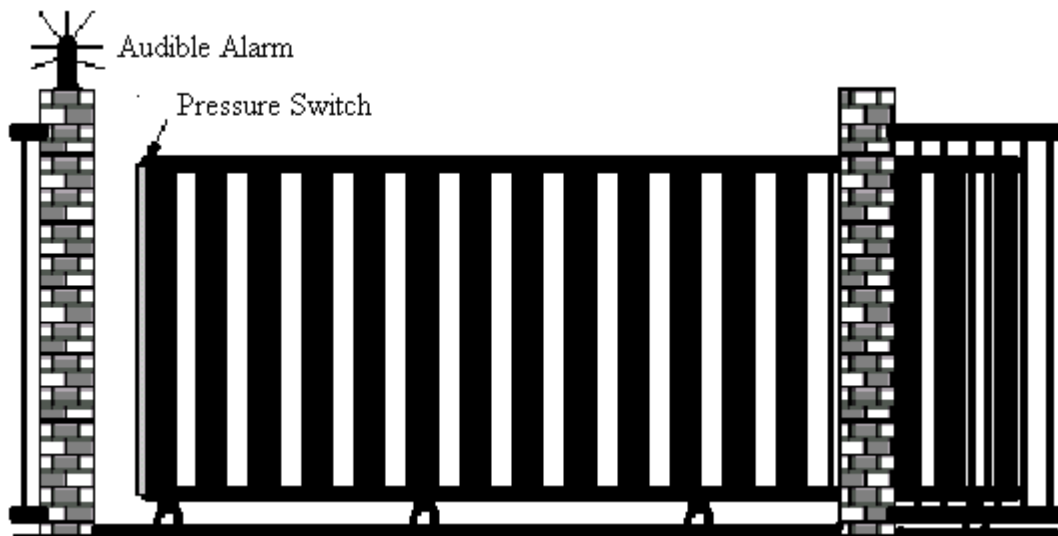
FBD Operation Flow :



4. Plant Gate Control

4.1 Requirements for Plant Gate Control

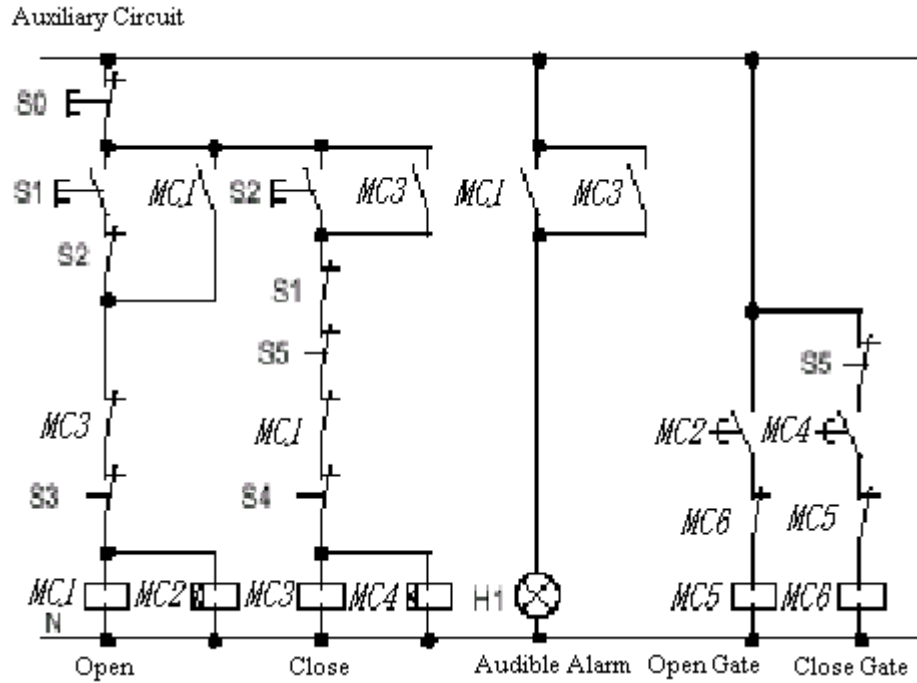
The main purpose of the plant gate is to control the access of vehicals, which is manually operated by the gate guard.



- 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.

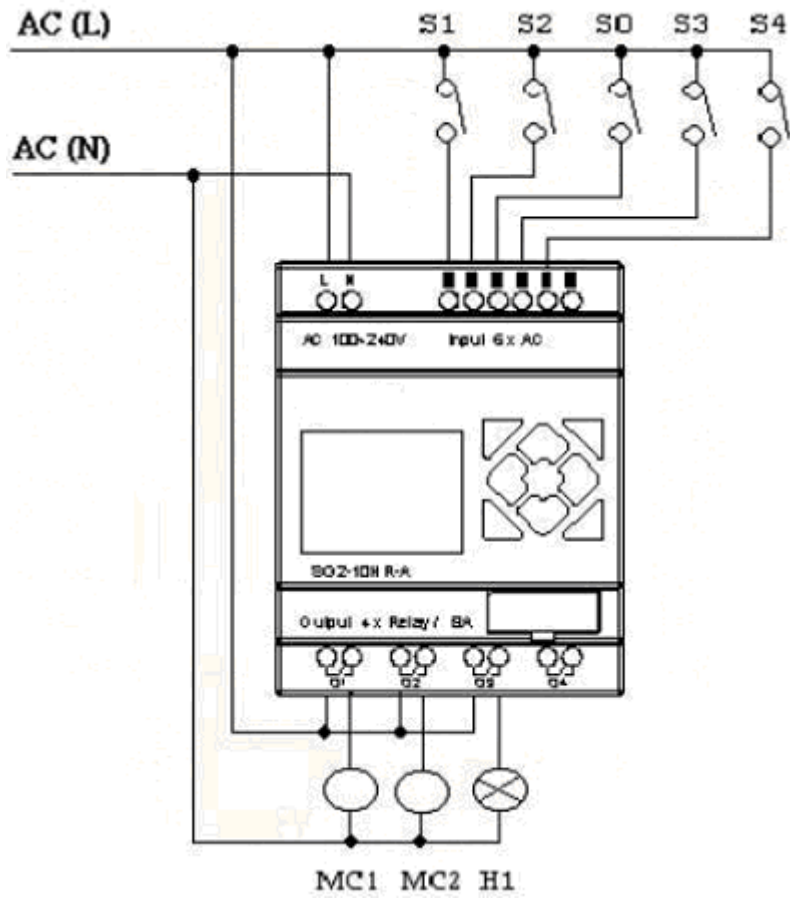
4.2 Traditional Control Circuit for Gate System



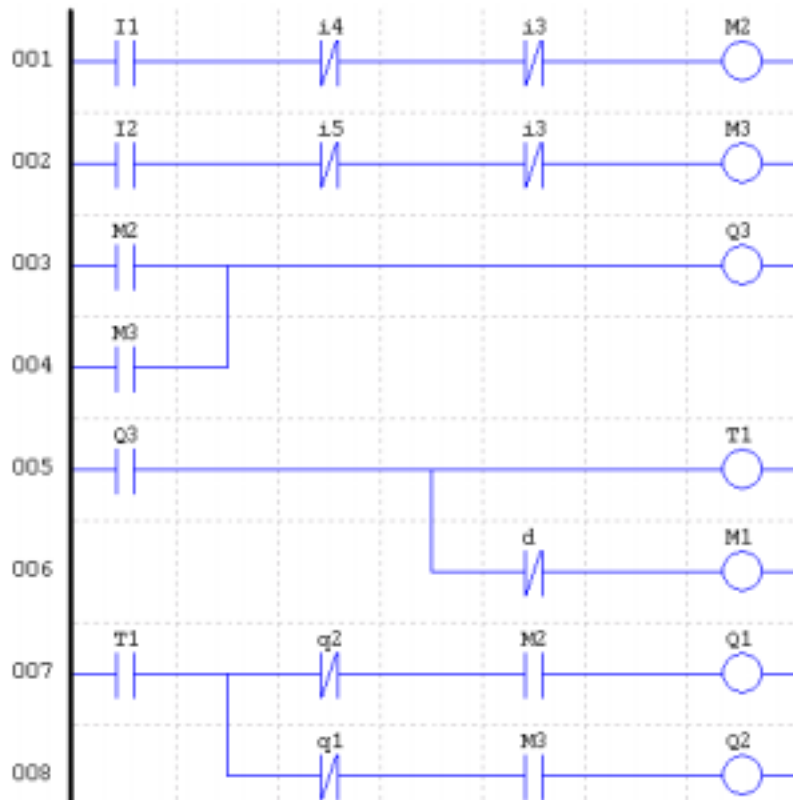
Devices Applied

- 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

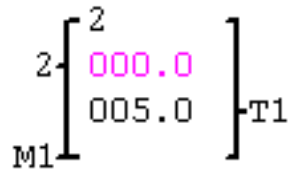
Wiring Diagram and Program with iSmart applied in Plant Gate



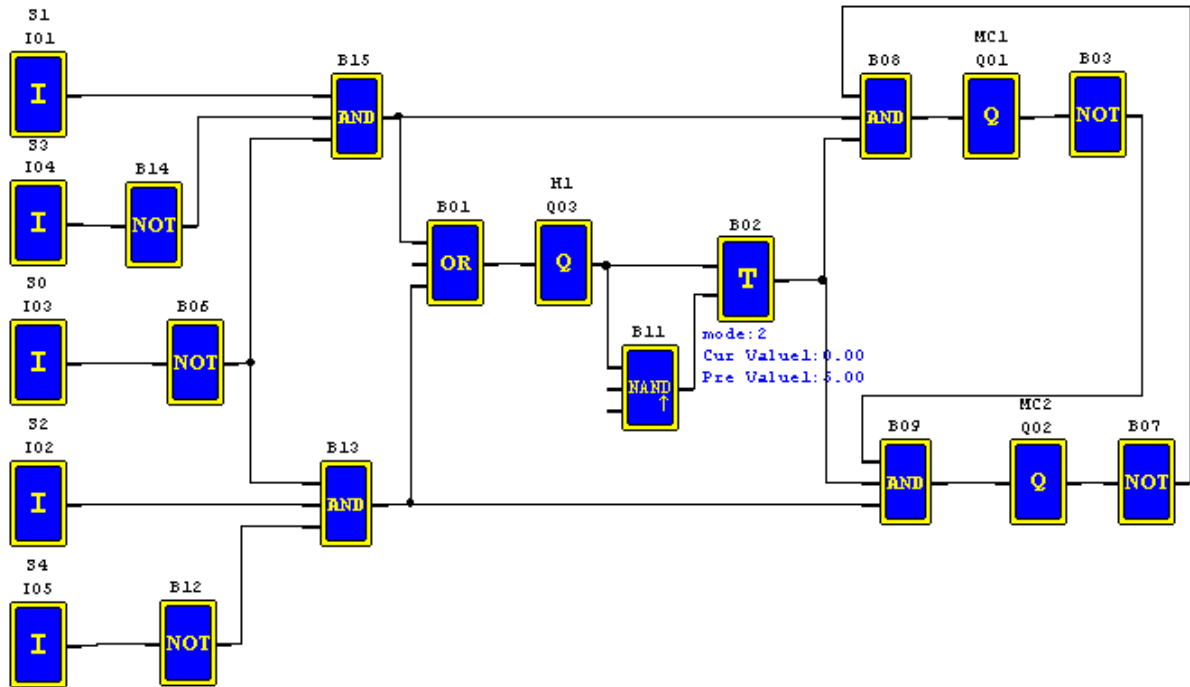
Ladder :



FUNCTION



FBD:



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.

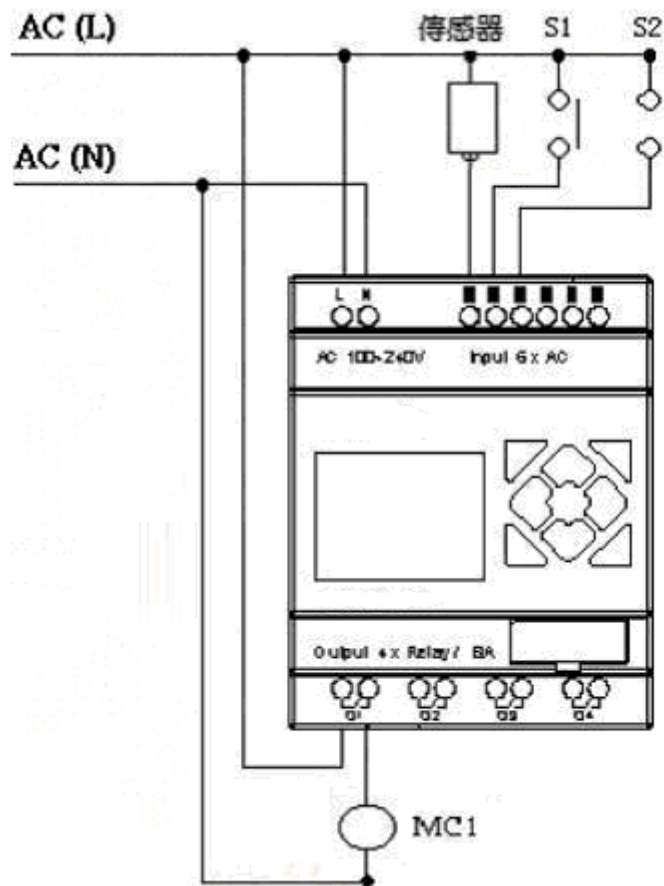
Devices Applied

I1 : counting sensor;

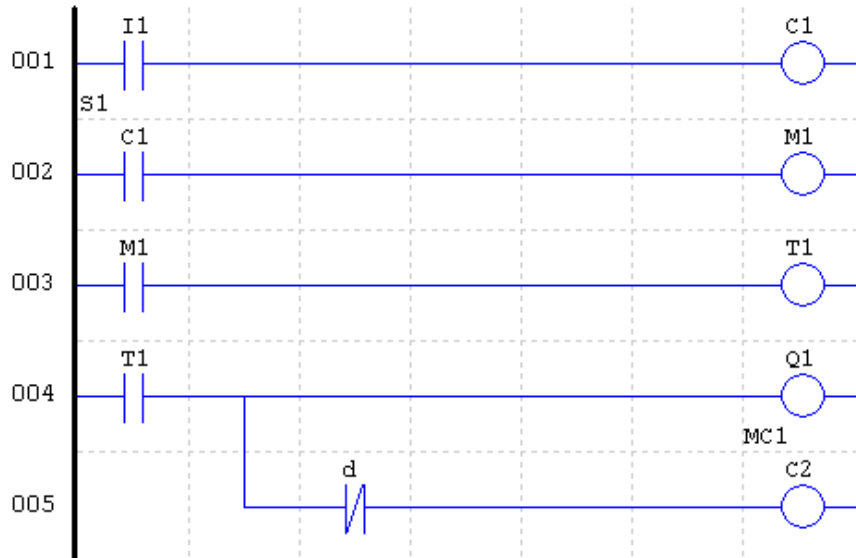
S1 : reset the counting value to zero;

MC1 : packing

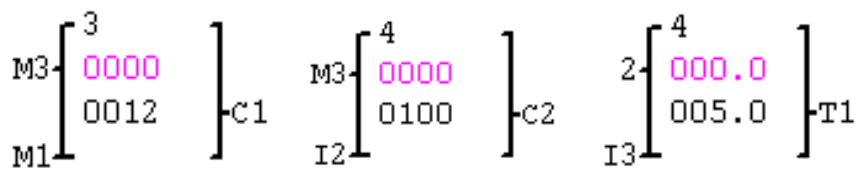
Wiring Diagram and Program with iSmart applied for Packing Machine



Ladder :



FUNCTION :



FBD :

