TECO

SG2 PLR Application Examples

SG2-10HR-A

**SG2 Programmable Logic Relay**

1. Lighting Control for Staircase

1.1 Requirement for Staircase Lighting

- When someone goes up-stair or down-stair, 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
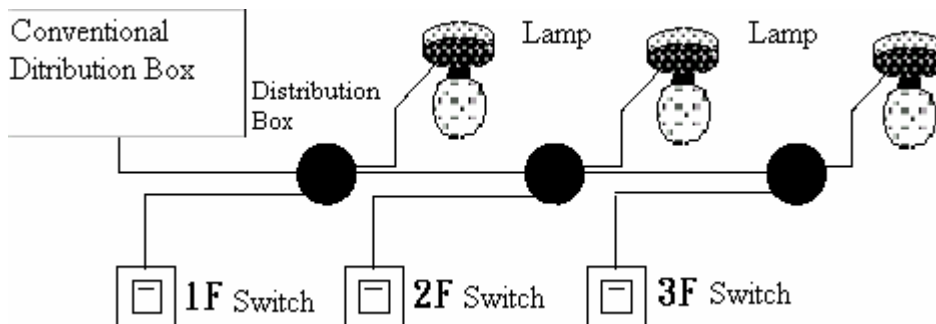
Components Applied
- Switches
- Auto lighting system or pulse relay for staircase

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 weak point for the person to forget turning off the light at most cases.

Auto lighting control system for the staircase

- The light is on whenever the switch is turned on.

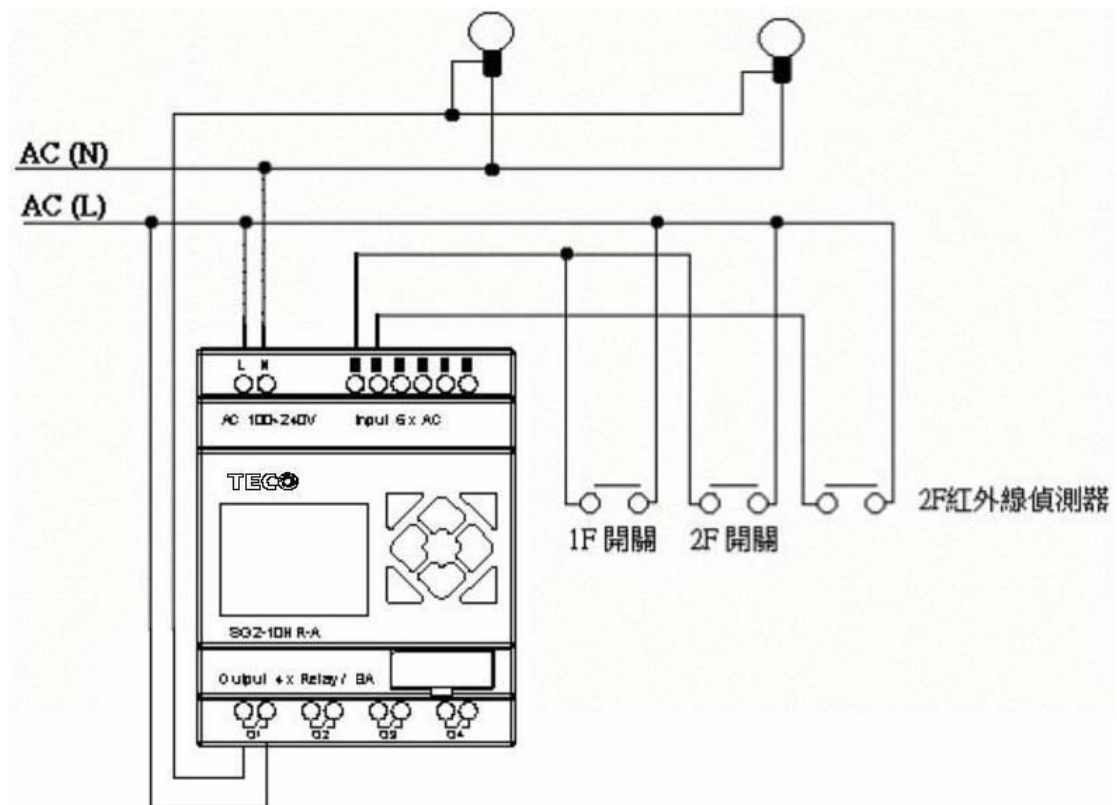- Lighting system shall be turned off in a few minutes automatically or manually

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

1.3 Apply SG2 in Lighting System

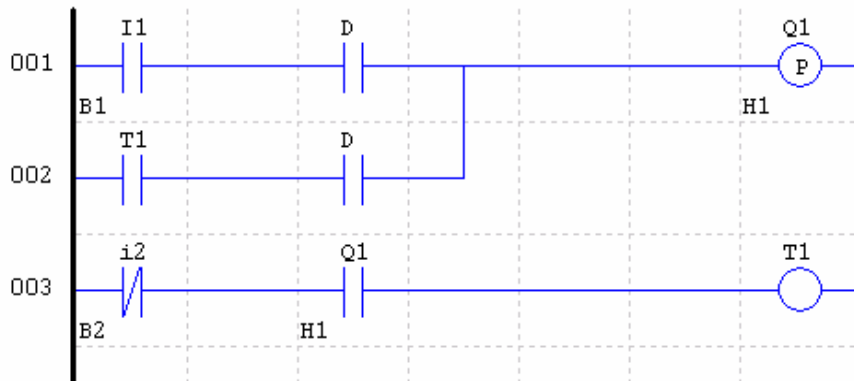## Devices Applied

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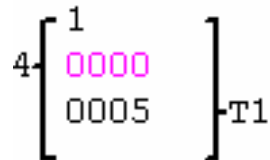
Wiring Diagram for Lighting System

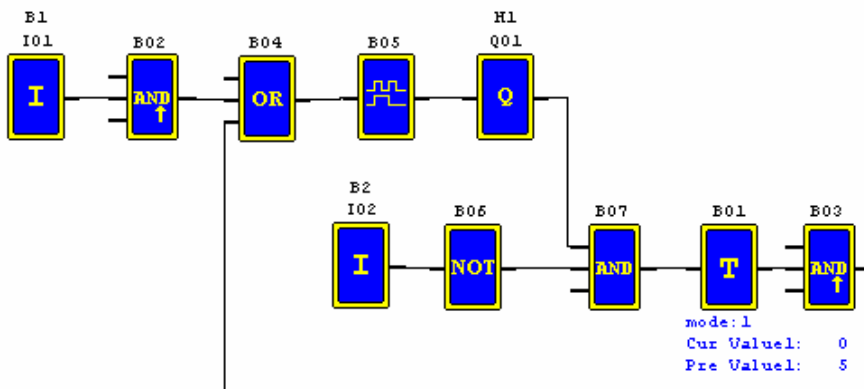Illustrated program using SG2 in lighting system

Ladder：

```
        I1              D                          Q1
001  ──┤├──────────────┤├───────────┬──────────────(P)──
     B1              D              │              H1
        T1              D           │
002  ──┤├──────────────┤├───────────┘
        i2              Q1                         T1
003  ──┤/├─────────────┤├─────────────────────────( )──
     B2              H1
```

FUNCTION：

```
      ⎡  1   ⎤
   4 ─⎢ 0000 ⎥─ T1
      ⎣ 0005 ⎦
```

FBD：

```
B1                                    H1
I01    B02      B04      B05          Q01
┌──┐   ┌──┐    ┌──┐     ┌──┐         ┌──┐
│ I │──│AND│───│OR │─────│⎍⎍│─────────│ Q │──┐
└──┘   │ ↑ │   └──┘     └──┘         └──┘    │
       └──┘                                  │
              B2                             │
              I02     B06       B07    B01      B03
              ┌──┐   ┌───┐     ┌──┐   ┌──┐     ┌──┐
              │ I │──│NOT│─────│AND│──│ T │─────│AND│
              └──┘   └───┘     └──┘   └──┘     │ ↑ │
                                       mode:1  └──┘
                                       Cur Value1:  0
                                       Pre Value1:  5
```
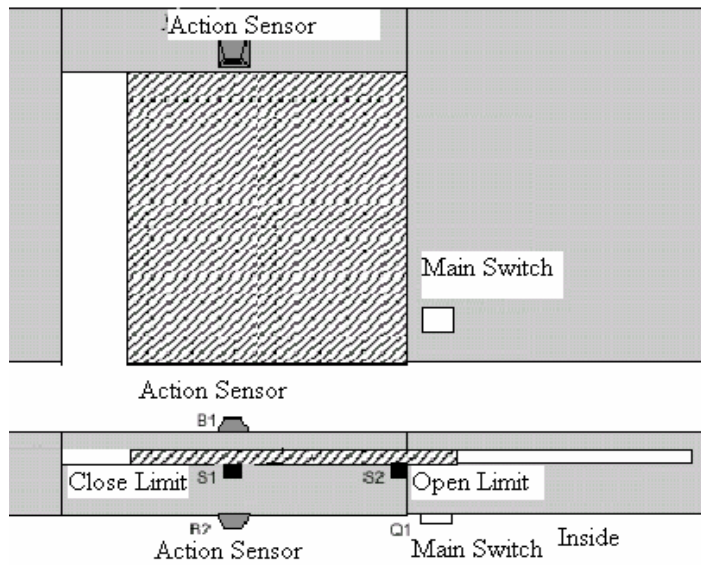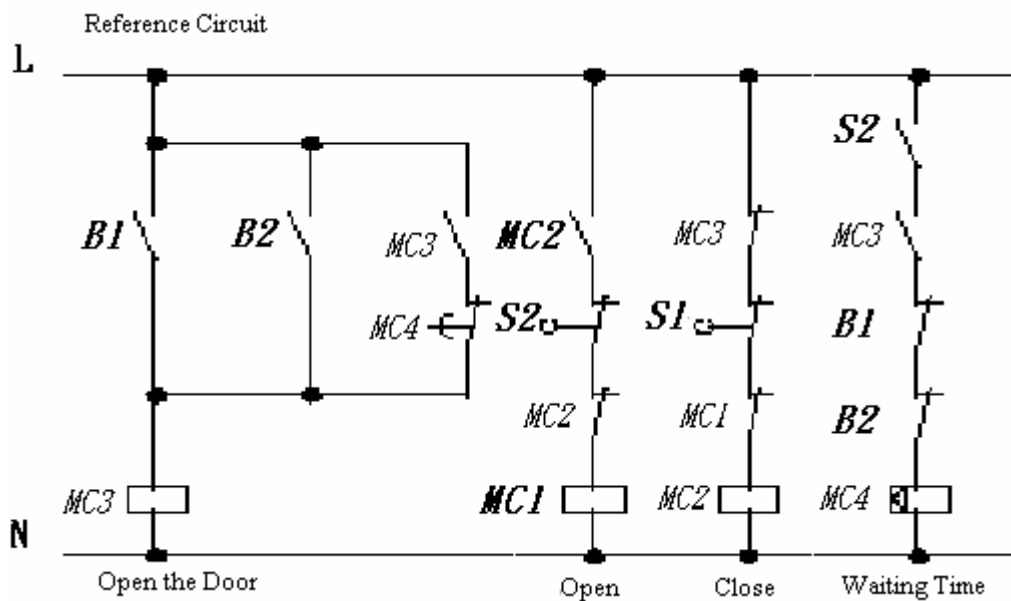
2 Auto Door Control

The auto doors are very popularly installed at the entrance of supermarkets, mansions, banks and hospitals.

2.1Requirement for Auto Door Control

- •It automatically opens whenever a person is approaching.

- • The door remains open for a certain period and closes if no visitor is present.

2.2 Traditional solution

Whenever B1 or B 2 senses the approach of a visitor, the door is actuated to open. After an elapse of time, B1 or B2 senses no presence of a visitor; MC 4 will close the door.
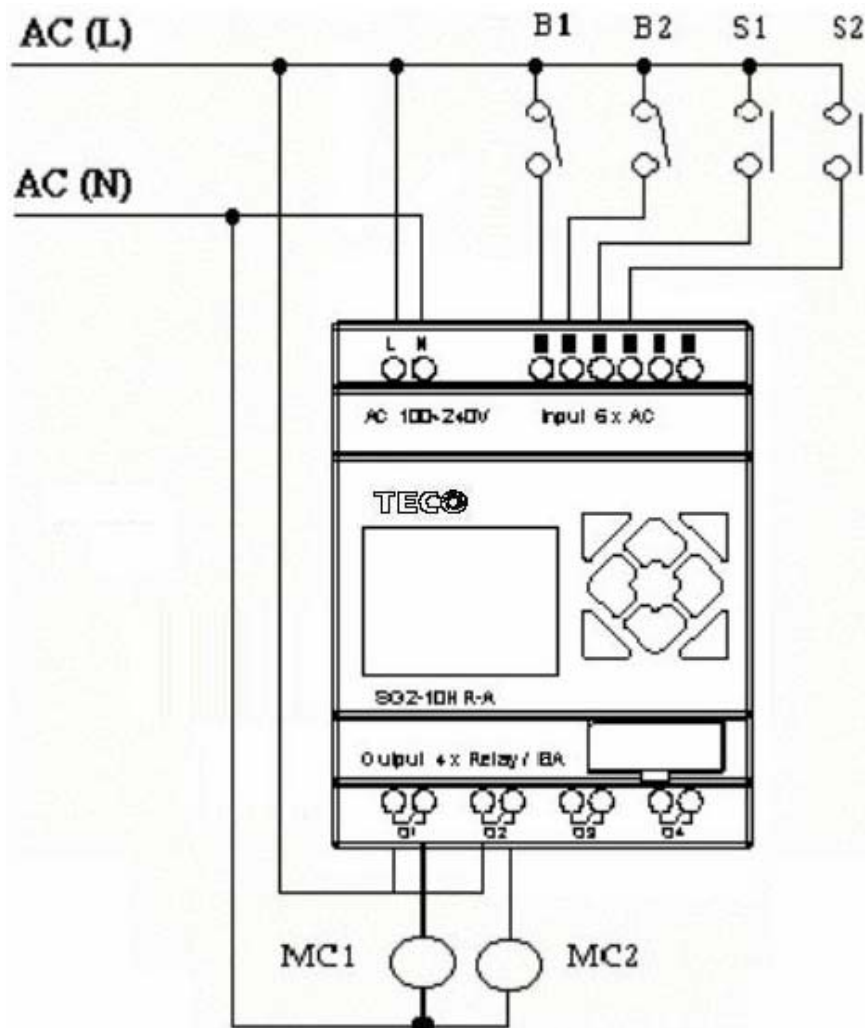
2.3 Apply SG2 in Door Control System

Applying SG2 in door control system can simplify the circuit. All that one need to do is connect the action sensor, limit switch and contactor with SG2.
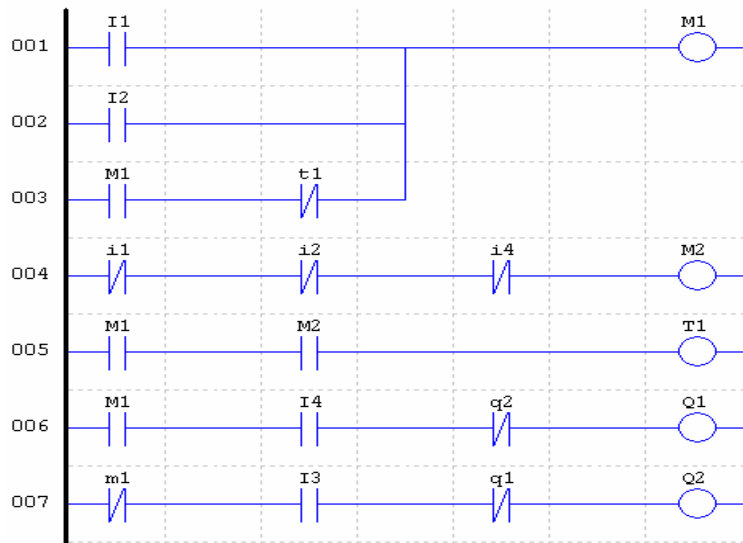
Devices Applied

- 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
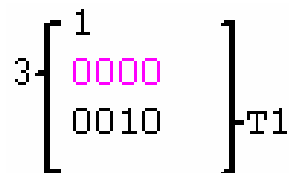- B2(NO contact) indoor infrared sensor

Wiring Diagram and Program with SG2 applied in door control system.
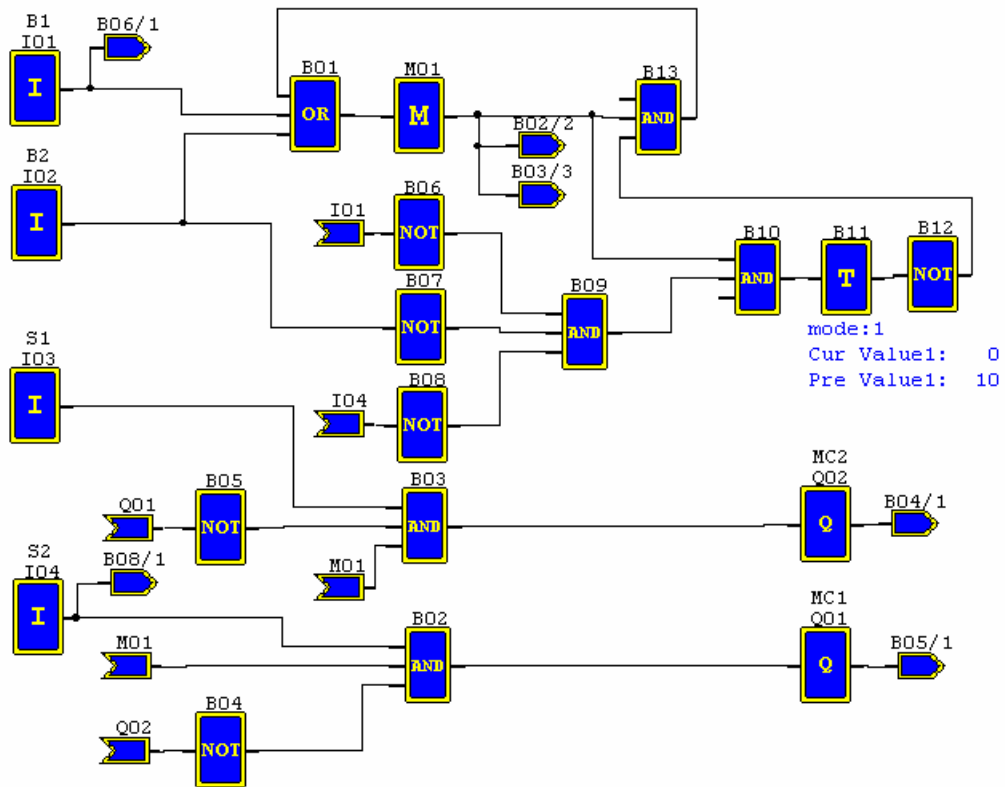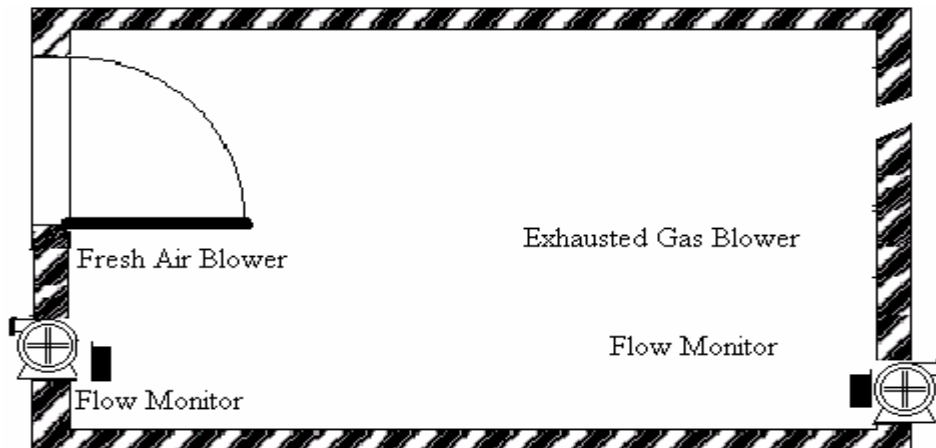
Ladder :

FUNCTION :

$$3 \begin{bmatrix} 1 \\ 0000 \\ 0010 \end{bmatrix} T1$$

FBD Operation Flow :

- 6 -

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 control 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 works 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:

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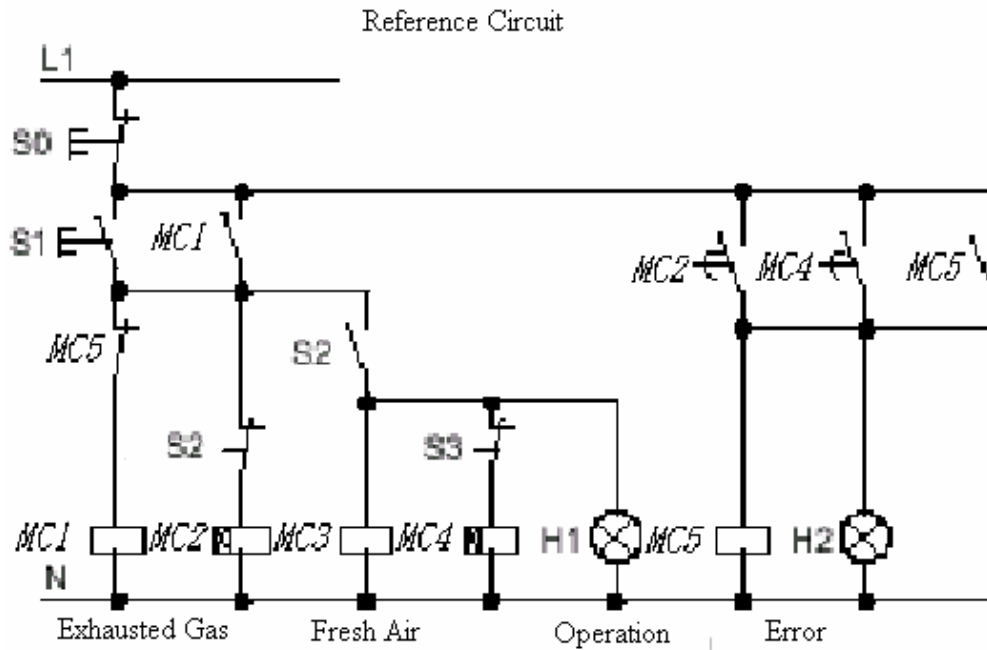
The ventilation system is wholly controlled by the airflow monitor. If there is no flow air in the room after a designated duration of time, the system will activate the warning system so the user shall shut off the system.
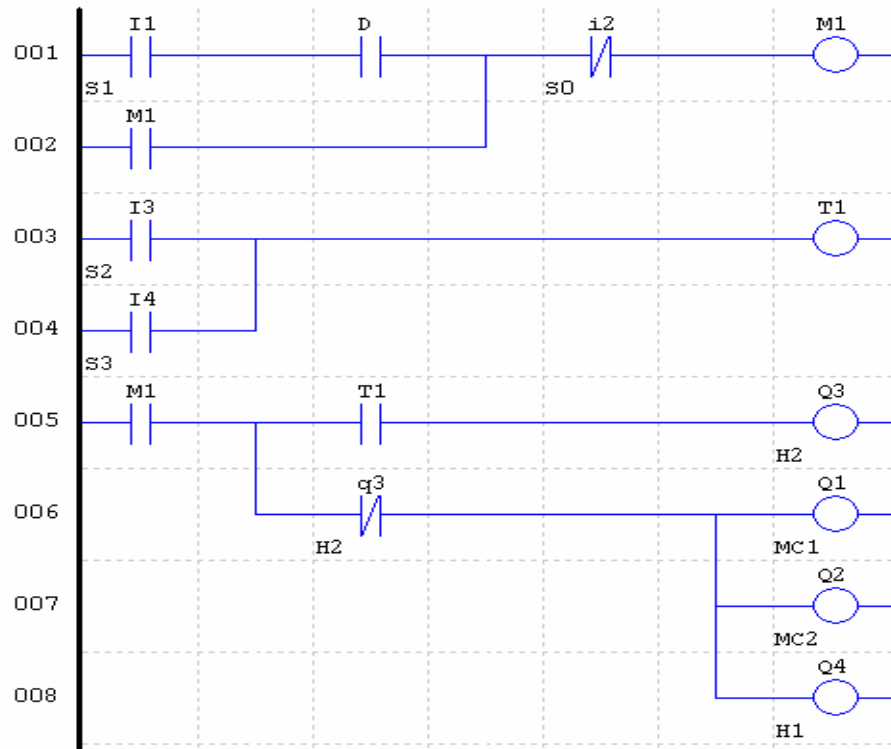
Devices Applied

- 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
- H1 operation indicator
- H2 alarm light

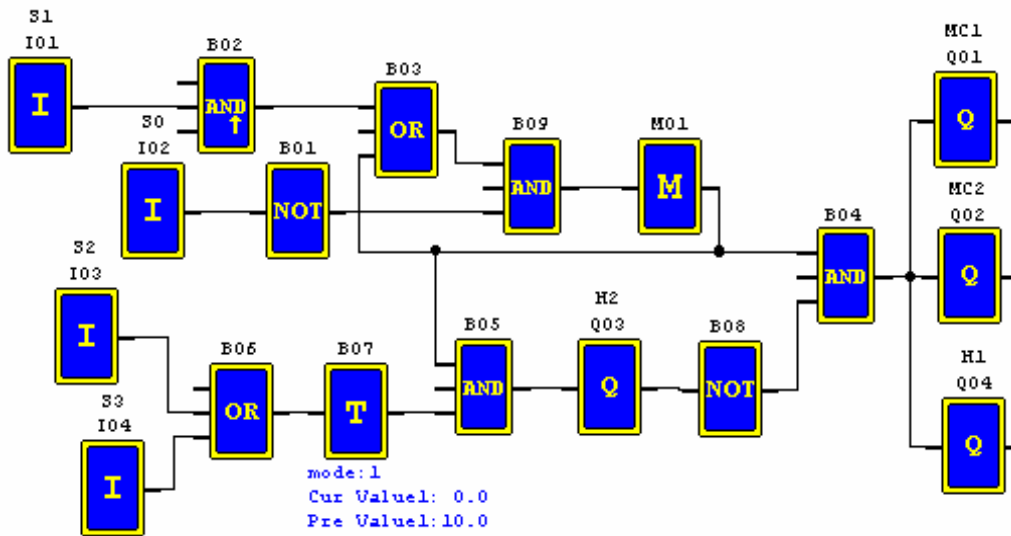**Wiring Diagram and Program with SG2 applied in Ventilation System.**
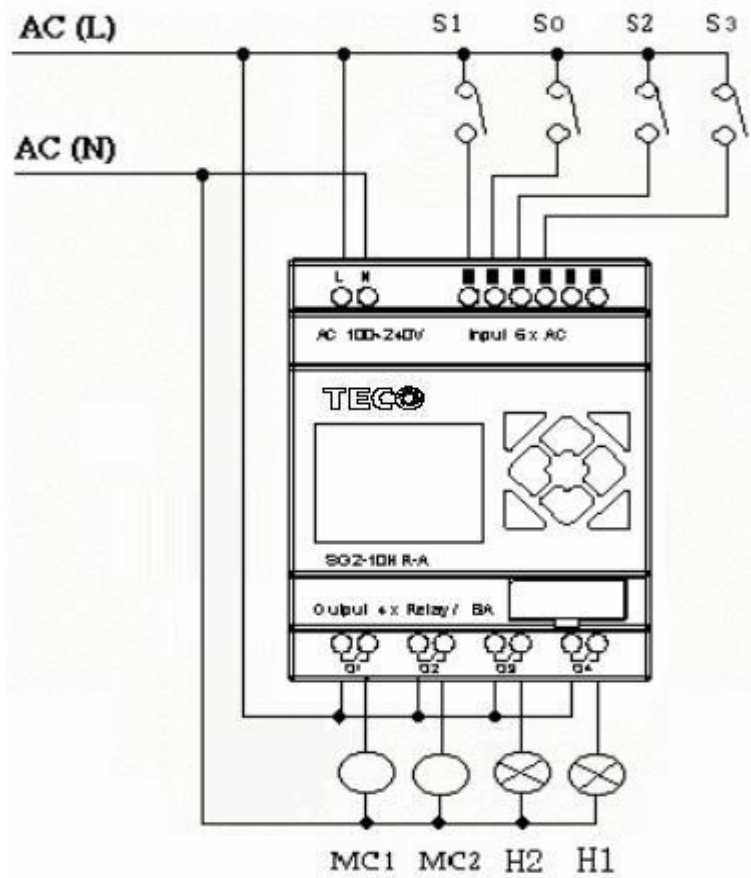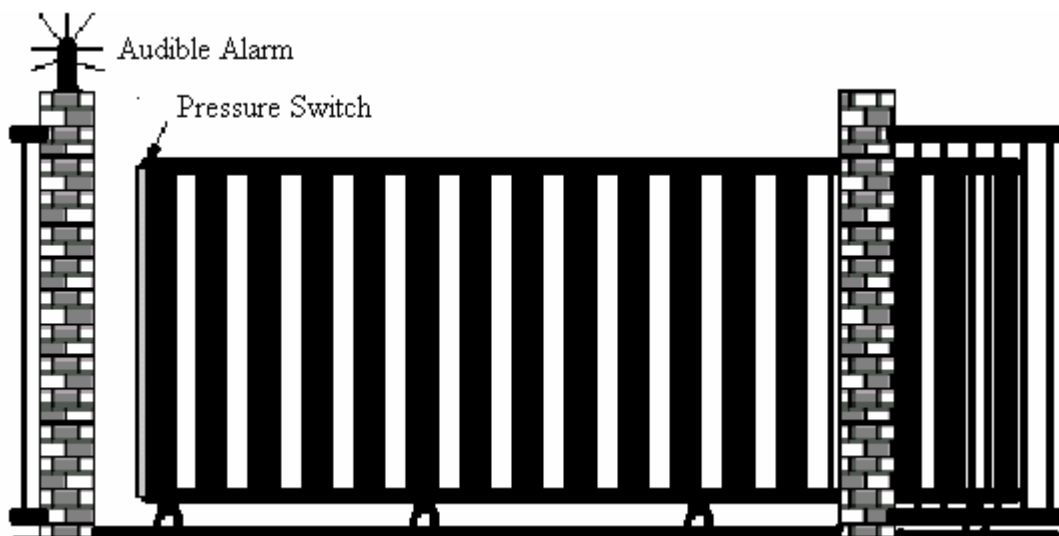

Ladder：

FUNCTION：


FBD Operation Flow：

4. Plant Gate Control
4.1 Requirements for Plant Gate Control

The main purpose of the plant gate is to control the access of truck, 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 the gate in fully open or close condition.

- The alarm light will be activated for 5 seconds in advance before the gate operation.

- The damper is provided on the gate. Gate closing operation, whenever the damper is contacted by the gate, stops.
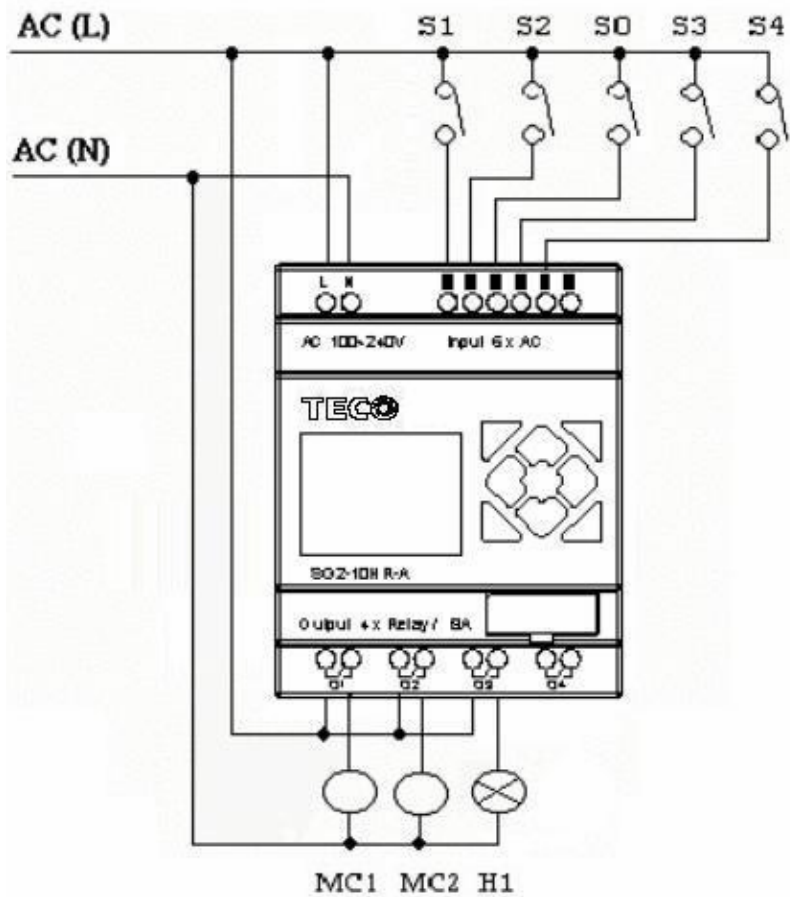
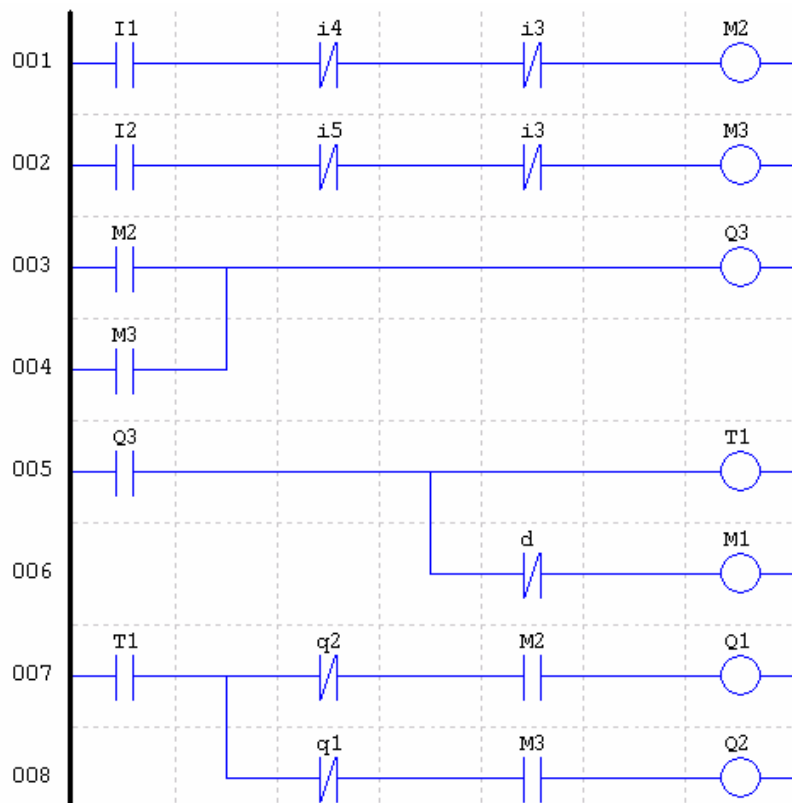## 4.2 **Traditional Control Circuit for Gate System**
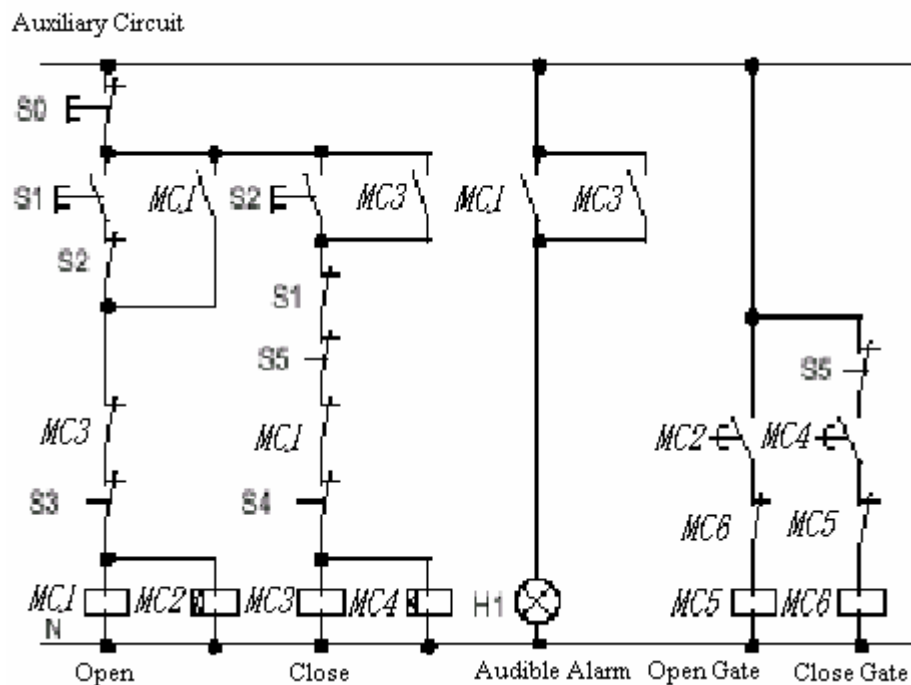
Devices Applied
- MC1   Main Electromagnetic Contactor
- MC2   Main Electromagnetic Contactor
- S0(NC contact)   stop switch
- S1(NO contact)   open switch
- S2(NO contact)   close switch
- S3(NC contact)   open safe damper
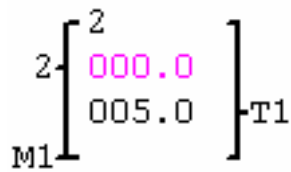- S4(NC contact)   close safe damper

Wiring Diagram and Program with SG2 applied in Plant Gate
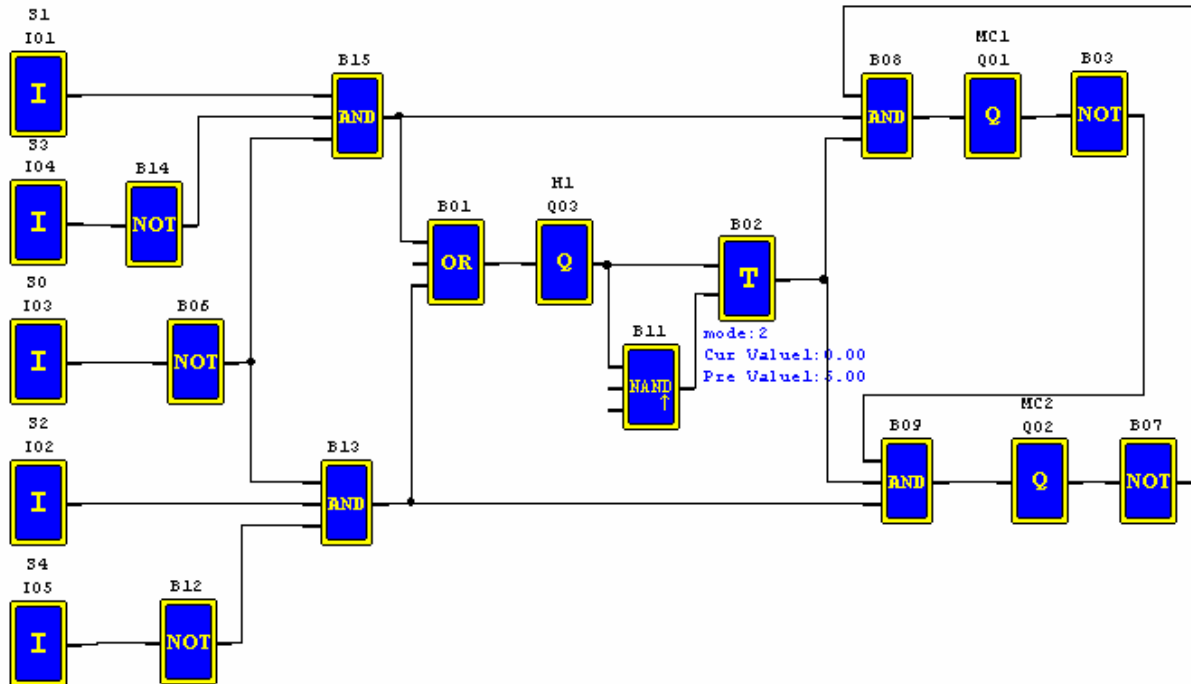
MC1 MC2 H1

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.
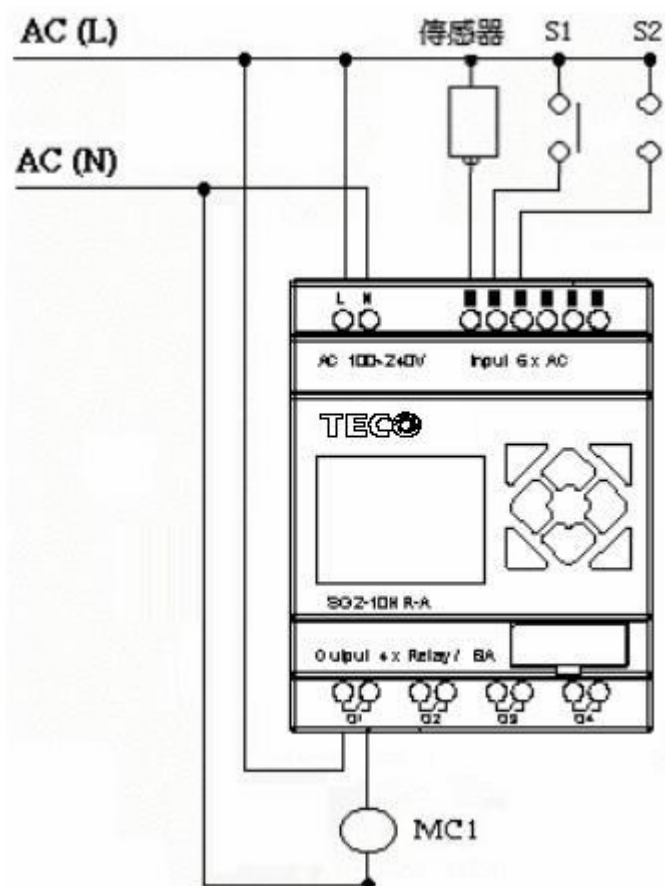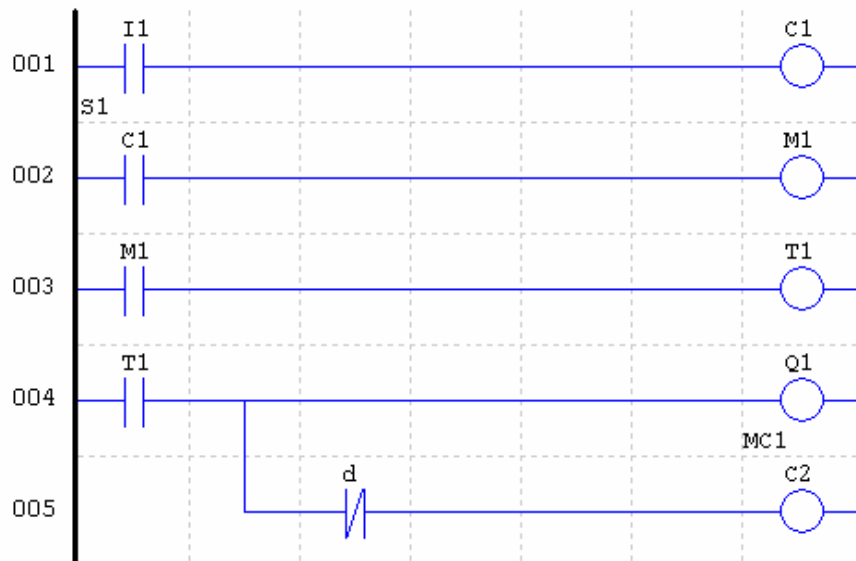
Devices Applied

I1：counting sensor;
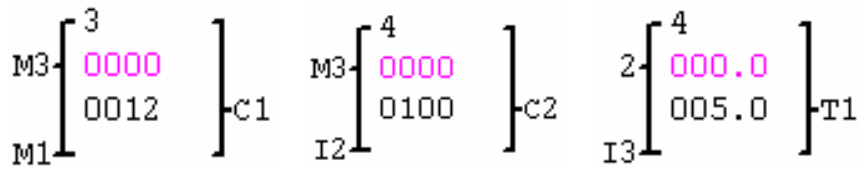
S1：reset the counting value to zero;

MC1：packing

Wiring Diagram and Program with SG2 applied at for Packing Machine

Ladder：

| | I1 | | | C1 |
| 001 | ⊣⊢ | | | ◯ |

S1

| | C1 | | | M1 |
| 002 | ⊣⊢ | | | ◯ |

| | M1 | | | T1 |
| 003 | ⊣⊢ | | | ◯ |

| | T1 | | | Q1 |
| 004 | ⊣⊢ | | | ◯ |

MC1

| | | d | | C2 |
| 005 | | ⊣/⊢ | | ◯ |

FUNCTION：

$$M3 \begin{bmatrix} 3 \\ 0000 \\ 0012 \end{bmatrix} M1 \dashv C1 \qquad M3 \begin{bmatrix} 4 \\ 0000 \\ 0100 \end{bmatrix} I2 \dashv C2 \qquad 2 \begin{bmatrix} 4 \\ 000.0 \\ 005.0 \end{bmatrix} I3 \dashv T1$$

FBD：

S1
I01

B01
C
mode:3
Cur Value:0
Pre Value:12

M01
M

B02
T
mode:4
Cur Valuel:0.0
Pre Valuel:5.0

MC1
Q01
Q

I03
I

S2
I02
I

B03
NAND
↑

B04
C
mode:4
Cur Value:0
Pre Value:1000