8.2 Automatic door

You often find automatic door control systems at the entrance to supermarkets, public buildings, banks, hospitals etc.

8.2.1 Requirements of an automatic door

- When a person approaches the door, it must open automatically.
- The door must remain open until the doorway is cleared.
- When the doorway is cleared, the door must close automatically with a short delay.

The door is usually driven by a motor that is equipped with a slip coupling. This prevents people from being squeezed in and injured. The control system is connected to the mains via a master switch.
8.2.2 Conventional solution

When someone enters the detection range of one of the motion sensors B1 or B2, the door opening motion is initiated by setting K3.

After the detection range of the two motion sensors has been cleared at least for a minimum time, K4 enables the closing motion.

8.2.3 Door control system with IDEC SmartRelay

IDEC SmartRelay can simplify this circuit considerably. You only need to connect the motion sensors, limit switches and the contactor relays to the IDEC SmartRelay.
Wiring of a door control system with FL1D-H12RCC

Components used
- K1 contactor relay (open)
- K2 contactor relay (close)
- S1 (normally closed contact) limit switch (close)
- S2 (normally closed contact) limit switch (open)
- B1 (normally open contact) infrared motion sensor outside
- B2 (normally open contact) infrared motion sensor inside
Door control system with IDEC SmartRelay circuit diagram

This is what the circuit diagram of the conventional solution looks like.
You can simplify this circuit if you make use of the IDEC SmartRelay functions. You can use the off-delay function to replace the latching relay and the on-delay. The block diagram below illustrates this simplification:
8.2.4 Special features and expansion options

Options for increasing comfort and user friendliness are, for example:

- You can connect an additional control switch with the positions: Open - Automatic - Closed (O-A-C)
- You can connect a buzzer to an output of the IDEC SmartRelay to warn of the closing of the door.
- You can enable opening of the door time and direction-dependent, i.e. opening only during business hours, and opening only from the inside after closing time.

8.2.5 Extended solution with FL1D-H12RCC

Wiring the IDEC SmartRelay extended solution
Block diagram of the extended IDEC SmartRelay solution

Cam1:
- Day: Mo., Fr
- On: 09:00
- Off: 18:00

Cam2:
- Day: Sa
- On: 08:00
- Off: 14:00

Detecting motion

Cam1:
- Day: Mo., Fr
- On: 09:00
- Off: 19:00

Cam2:
- Day: Sa
- On: 08:00
- Off: 14:00

Actuate motor for opening

Close output

Limit switch
- Door open

Control switch
- Door open

Actuate motor for closing

Limit switch
- Door closed

Open output
- Motion detector B1
- Motion detector B2

Control switch
- Close door
Applications

Detecting motion

During business hours, the motion detector B1 initiates the opening of the door when somebody wants to enter the shop. Motion detector B2 initiates the opening of the door when somebody wants to leave the shop.

After closing time, the motion detector B2 continues to be used to open the door for 1 hour to allow the customers to leave the shop.

Actuating the motor for opening

Output Q1 is set and opens the door when:
- The control switch at I5 is actuated (the door is permanently open), or
- The motion detectors indicate that somebody is approaching the door, and
- The door has not yet fully opened (limit switch at I4).

Actuating the motor for closing

Output Q2 is set to close the door when:
- The control switch at I6 is actuated (the door is permanently closed) or
- The motion detectors indicate that there is nobody near the door, and
- The door has not yet fully closed (limit switch at I3).

Buzzer

Connect the buzzer to output Q3. The buzzer gives a brief warning (in this case 1 second) when the door is closing. Enter the following circuit at Q3 in the circuit program: