Configuring IDEC SmartRelay 5

Parameter assignment refers to the configuration of the block parameters. You can set delay times for time functions, the switching times of timers, counter threshold values, the monitoring interval of an operating hours counter, the on and off thresholds of the trigger, and more.

You can configure the parameters

- In programming mode
- In parameter assignment mode

In programming mode, the author of the circuit program also sets the parameters

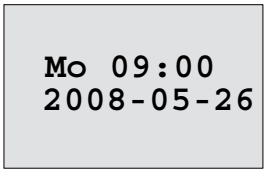
Parameter assignment mode allows the editing of parameters without having to modify the circuit program. This feature is available so that you can edit parameters without having to change to programming mode. The advantage: The circuit program remains protected, but can be adapted by the user to meet specific requirements.

Note

In parameter assignment mode, IDEC SmartRelay continues execution of the circuit program.

5.1 Selecting parameter assignment mode

Press **ESC** to change from RUN to parameter assignment mode:



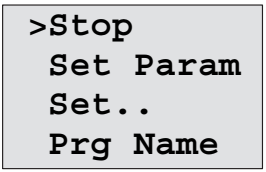
...Press ESC

Note

The following applies to earlier device versions up to FL1A:

- You open parameter assignment mode by pressing **ESC**+**OK**.

IDEC SmartRelay changes to parameter assignment mode and opens the parameter assignment menu:

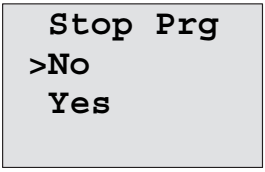


Description of the four menu items of the parameter assignment menu

- **Stop**

You select this command to stop your circuit program and thus change to the main menu of programming mode. To do so:

1. To move the '>' cursor to '**Stop**': Press ▲ or ▼
2. To confirm 'Stop': Press **OK**



3. To move the '>' cursor to '**Yes**': Press ▲ or ▼
4. To confirm 'Yes': Press **OK**

IDEC SmartRelay shows the main menu of the programming mode:

```
>Program..
 Card..
 Setup..
 Start
```

- **Set Param**

For information on the various parameters, refer to the Chapters 5.1.1 to 5.1.3.

- **Set..**

For information on the various settings, refer to Chapter 5.2.

- **Prg Name**

This menu command only allows you to **read** the name of your circuit program. It is not possible to modify this name in parameter assignment mode (see Chapter 3.6.4).

5.1.1 Parameters

Note

In the following discourse on parameters, we presume that the respective default parameter protection mode (“+”) has been maintained. This is a prerequisite for viewing and editing parameters in the parameter assignment mode! See Chapter 4.3.5 and the example on Page 90.

Parameters are, for example:

- The delay times of a timer relay.
- The switching times (cams) of a timer switch.
- Counter thresholds
- The monitoring time for hour counters
- The trigger thresholds.

Each one of the parameters is identified by its block number (Bx) and the shortname of the parameter. Examples:

- T:...is a configurable time.
- MI:...is a configurable time interval.

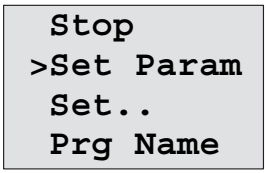
Note

WindLGC also allows you to assign names to blocks (for more information, refer to Chapter 7).

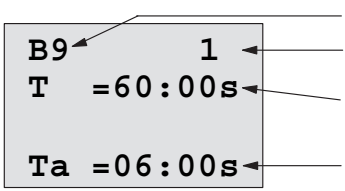
5.1.2 Selecting the parameters

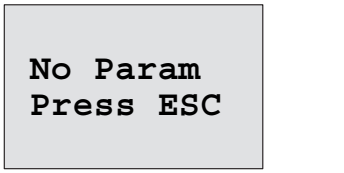
To select a parameter:

1. On the parameter assignment menu, select '**Set Param**': Press ▼ or ▲



2. Confirm with **OK**.
   IDEC SmartRelay shows the first parameter. If no parameter can be set, you can press ESC to return to the parameter assignment menu.





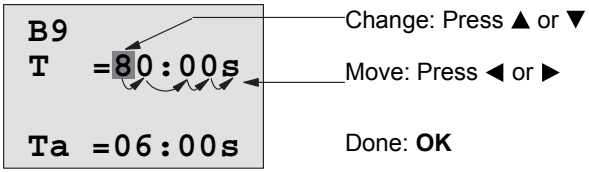
3. Now, select the desired parameter: Press or ▲ or ▼.
4. Select the parameter you want to edit, and press **OK**.

5.1.3 Modifying parameters

You first select the parameter you want to edit (see Chapter 5.1.2).

You change the value of the parameter in the same way as you did in programming mode:

1. Move the cursor to the point at which you want to make the change: Press ◀ or ▶
2. To change this value: Press ▲ or ▼
3. To apply the value: **OK**



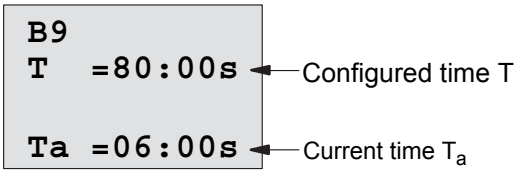
Note

When changing the time parameters when the system is in RUN, you can also change the timebase (s = seconds, m = minutes, h = hours). This does not apply if the time parameter represents the result of another function (for an example, see Chapter 4.4.1). In this case you can neither change the value nor the timebase.

The current time is reset to zero when you change the timebase.

Current value of a time T

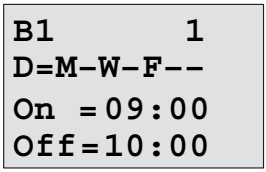
View of a time T in parameter assignment mode:



You can change the configured time T.

Current timer value

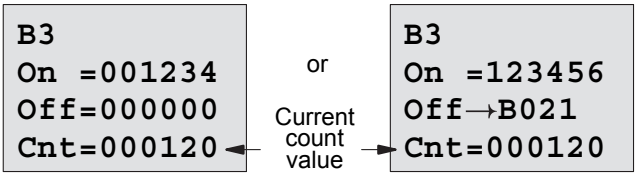
View of a timer cam in parameter assignment mode:



You can change the on/off times and the day.

Current value of a counter

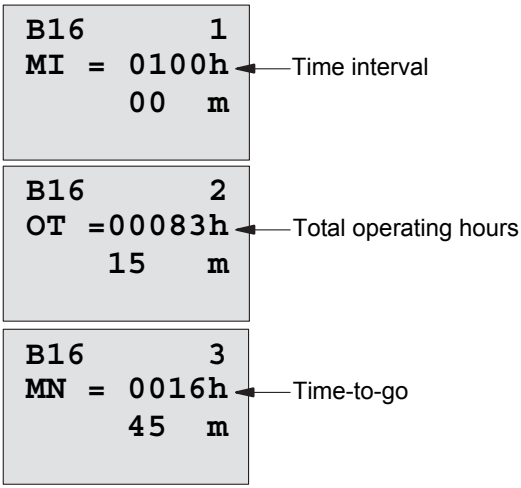
View of a counter parameter in parameter assignment mode:



You can change the on/off threshold. This does not apply if the on or off threshold represents the result of another function (in the example in section 4.4.13, this is B021).

Current value of an hour counter

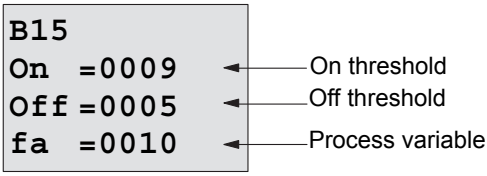
View of an hour counter parameter in parameter assignment mode:



You can edit the configured time interval MI.

Current value of a frequency trigger

View of the parameter of a frequency trigger in parameter assignment mode:



You can change the on/off threshold.

5.2 Setting the default values for IDEC SmartRelay

You can set the following default values for an IDEC SmartRelay base module:

Clock settings

You can set the default values for time-of-day and date, summertime/wintertime conversion and synchronization:

- in parameter assignment mode by means of the set menu (“Clock” menu item)
- in programming mode by means of the setup menu (“Clock” menu item).

Time-of-day and date see Chapter 5.2.1.

Summertime/wintertime conversion see Chapter 3.6.14.

Synchronization see Chapter 3.6.15.

Contrast and backlight settings

You can set the default values for the display contrast and backlight:

- in parameter assignment mode by means of the set menu (“LCD” menu item)
- in programming mode by means of the setup menu (“LCD” menu item).

See Chapter 5.2.2.

Menu Language

You can set the language in which the IDEC SmartRelay menus will be displayed:

- in parameter assignment mode by means of the set menu (“Menu Lang” menu item)
- in programming mode by means of the setup menu (“Menu Lang” menu item)

Number of base module Analog Inputs

The IDEC SmartRelay base modules FL1E-H12SND, and FL1E-H12RCE/FL1E-B12RCE support four analog inputs. Formerly they supported two. You can choose whether to use two or four analog inputs on these modules:

- in parameter assignment mode by means of the set menu (“BM AI NUM” menu item)
- in programming mode by means of the setup menu (“BM AI NUM” menu item)

Start screen settings

You can select the default setting for the start screen that displays on IDEC SmartRelay and the Text Display when IDEC SmartRelay transitions to RUN mode:

- in parameter assignment mode by means of the set menu (“StartScreen” menu item)

See Chapter 5.2.5.

Message Text settings

You can select settings that apply to all message text function blocks from the Programming menu. See Chapter 4.4.23.

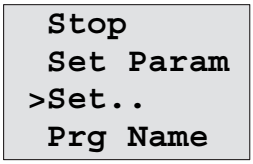
5.2.1 Setting the time of day and date (FL1E-H12RC...)

You can set the time of day and the date

- in parameter assignment mode by means of the set menu (“Clock” menu item)
- in programming mode by means of the setup menu (“Clock” menu item)

To set the TOD and the date in parameter assignment mode:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select ’**Set..**’: Press ▲ or ▼



3. Confirm ’Set..’: Press **OK**
4. Move the ’>’ cursor to ’**Clock**’: Press ▲ or ▼
5. Confirm ’Clock’: Press **OK**
6. Move the ’>’ cursor to ’**Set Clock**’: Press ▲ or ▼
7. Apply ’Set Clock’: Press **OK**

Note

The ‘Set Clock’ command is only executed if your IDEC SmartRelay is equipped with a real-time clock (FL1E-H12RC...). You set the real-time clock of IDEC SmartRelay by means of the ‘Set Clock’ command.

IDEC SmartRelay shows the following display.

```
Set Clock
Mo 15:30
YYYY-MM-DD
2008-05-26
```

The cursor is positioned on the weekday.

8. Select the day of the week: Press ▲ or ▼
9. Move the cursor to the next position: Press ◄ or ►
10. To change the value: Press ▲ or ▼
11. To set the correct TOD, repeat steps 9. and 10.
12. To set the correct date, repeat steps 9. and 10.
13. To confirm your entries: Press **OK**

To set the TOD and the date in programming mode:

If you want to set the TOD and the date in programming mode, select '**Setup**' in the main menu, then menus '**Clock**' and '**Set Clock**'. You can now set the weekday and the time as described earlier (as of step 8.).

5.2.2 Setting the display contrast and backlight choice

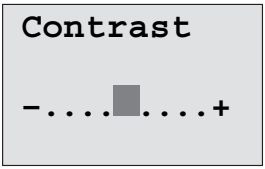
You can set the default value for the display contrast

- in parameter assignment mode by means of the set menu ("LCD" menu item)
- in programming mode by means of the setup menu ("LCD" menu item).

To set the display contrast in parameter assignment mode:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select '**Set**': Press ▼ or ▲
3. Confirm 'Set..': Press **OK**
4. On the Set menu, select 'LCD': Pres ▼ or ▲
5. Confirm 'LCD..': Press **OK**
6. By default, the cursor points to **Contrast**. If not, move the '>' cursor to '**Contrast**': Press ▲ or ▼
7. Confirm 'Contrast': Press **OK**

IDEC SmartRelay shows the following display:



8. To change the display contrast: Press ◀ or ▶
9. To confirm your entry: Press **OK**

To set the display contrast in programming mode:

If you want to set the display contrast in programming mode, select '**Setup**' in the main menu, then menu '**Contrast**'. You can now set the display contrast as described earlier (as of step 8.).

To set the back light choice in parameter assignment mode:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select '**Set**': Press ▼ or ▲
3. Confirm 'Set..': Press **OK**
4. On the Set menu, select 'LCD': Press ▼ or ▲
5. Confirm 'LCD..': Press **OK**
6. Move the '>' cursor to '**BackLight**': Press ▲ or ▼
7. Confirm '**BackLight**': Press **OK**
8. Move the '>' cursor to '**Default**' or '**AlwaysOn**': Press ▲ or ▼

The default is that the back light is not on. To set the back light to always be on, select the '**AlwaysOn**' choice.

To set the back light choice in programming mode:

If you want to set the backlight choice in programming mode, select '**Setup**' in the main menu, then menu 'LCD'. You can now set the back light choice as described earlier (as of step 6.).

Note

The backlight lifetime of the Text Display is 20,000 hours.

5.2.3 Setting the menu language

The language of the IDEC SmartRelay menus can be one of ten predefined languages:

CN (Chinese)	DE (German)	EN (English)	ES (Spanish)	FR (French)
IT (Italian)	NL (Dutch)	RU (Russian)	TR (Turkish)	JP(Japanese)

To set the menu language in parameter assignment mode:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select '**Set**': Press ▼ or ▲
3. Confirm 'Set..': Press **OK**
4. On the Set menu, select '**Menu Lang**': Press ▼ or ▲
5. Confirm 'Menu Lang': Press **OK**
6. Move the '>' cursor to the language of your choice: Press ▲ or ▼
7. Confirm language selection. Press **OK**

To set the menu language in programming mode:

If you want to set the menu language in programming mode, select '**Setup**' in the main menu, then menu '**Menu Lang**'. You can now set the menu language as described earlier (as of step 6.).

To reset IDEC SmartRelay to its default language setting:

If you want to restore IDEC SmartRelay to its default language setting (English), do the following:

1. Switch off IDEC SmartRelay and then switch it on again.
2. When an hour glass icon displays, press ◄, ► and OK together until the English menu entries appear.

5.2.4 Setting the number of AIs in the base module

FL1E-H12RCE/FL1E-B12RCE and FL1E-H12SND support up to four onboard inputs that can be used as either digital or analog inuts (0 ...10V). Inputs I7 (AI1) and I8 (AI2) are available as analog inputs by default, whether you use them or not. Inputs I1 (AI3) and I2 (AI4) are optional analog inputs. IDEC SmartRelay provides a menu where you can choose to use two analog inputs (the default, AI1 and AI2), or four. Regardless of the settings, inputs I1 and I2 can be used as digital inputs. To use them as analog inputs AI3 and AI4, you must set the 'BM AI NUM' to four. Note that the number of configured analog inputs on the base module affects the subsequent numbering of analog inputs on attached expansion modules (See the "Maximum setup (Page 20)" topic).

To set the number of AIs in parameter assignment mode:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select '**Set**': Press ▼ or ▲
3. Confirm 'Set..': Press **OK**
4. On the Set menu, select '**BM AI NUM**': Press ▼ or ▲
5. Confirm 'BM AI NUM': Press **OK**
6. Move to '2AI' or '4AI': Press ▲ or ▼
7. Confirm selection. Press **OK**

To set the number of AIs in programming mode:

If you want to set the number of AIs in programming mode, select '**Setup**' in the main menu, then menu '**BM AI NUM**'. You can now set the number of AIs as described earlier (as of step 6.).

Note

If you change the number of analog inputs, IDEC SmartRelay re-starts automatically.

5.2.5 Setting the start screen

You can select the default setting for the start screen that IDEC SmartRelay and the Text Display will display in RUN mode. You make this selection from the parameter assignment mode by means of the set menu (“StartScreen” menu item).

To select the start screen:

1. Select parameter assignment mode (see Chapter 5.1.)
2. On the parameter assignment menu, select ’**Set..**’: Press ▼ or ▲
3. Confirm ’Set..’: Press **OK**
4. Move to ’**StartScreen**’: Press ▲ or ▼
5. Confirm ’StartScreen’: Press **OK**

IDEC SmartRelay shows the following display:

```
>Clock
 Input DI
StartScreen
 Clock
```

The current setting of the start screen is shown in the bottom row. The default setting is ’Clock’.

You can choose between the display of the current time-of-day and date, or the values of the digital inputs:

6. Select the desired default setting: Press ▲ or ▼
7. To confirm your entry: Press **OK**

IDEC SmartRelay displays your selection.

Power the IDEC SmartRelay base module off then on to make your changes take effect. When IDEC SmartRelay is in RUN mode, both IDEC SmartRelay and the Text Display will display the start screen that you selected.

6 IDEC SmartRelay memory and battery cartridge (card)

IDEC SmartRelay provides the following cartridges for program storage and real-time clock backup:

- IDEC SmartRelay Memory cartridge
- IDEC SmartRelay Battery cartridge
- IDEC SmartRelay Memory/Battery cartridge

Each of the three cartridges is color-coded to make them easily distinguishable from one another. They also vary in size. The IDEC SmartRelay Memory cartridge (purple) provides storage for the circuit program. The IDEC SmartRelay Battery cartridge (green) provides battery backup of the real-time clock for up to two years. The IDEC SmartRelay Memory/Battery cartridge (dark brown) provides both circuit program storage and battery backup of the real-time clock.

Warning

Risk of death, personal injury or property damage can occur if you use the battery cartridge or combined memory/battery cartridge in a hazardous location.

Use the battery cartridge or combined memory/battery cartridge only in non-hazardous locations.

The FL1E IDEC SmartRelay Memory cartridge and the FL1E IDEC SmartRelay Memory/Battery cartridge provide 32 Kbytes memory space: four times the memory space of the FL1D IDEC SmartRelay Memory cartridge.

IDEC SmartRelay allows you to store only one circuit program in its memory. If you want to modify the circuit program or create an additional one without deleting the first, you must archive it somewhere.

You can copy the IDEC SmartRelay circuit program to an IDEC SmartRelay Memory cartridge or IDEC SmartRelay Memory/Battery cartridge. You can then insert this cartridge in another IDEC SmartRelay in order to copy the circuit program. This enables you to manage your programs in the following ways:

- Archive circuit programs
- Reproduce circuit programs

- Send circuit programs by mail
- Write and test your circuit program at the office, and then transfer it to an IDEC SmartRelay in the switching cabinet

IDEC SmartRelay is supplied with a hood. The IDEC SmartRelay Memory cartridge, IDEC SmartRelay Battery cartridge and IDEC SmartRelay Memory/Battery cartridge are supplied separately.

Note

You do **not** need a memory cartridge or combined memory/battery cartridge to backup the circuit program in your IDEC SmartRelay.

The IDEC SmartRelay circuit program is automatically stored in nonvolatile memory when you exit the programming mode.

The memory cartridge or combined memory/battery cartridge can backup all data in the IDEC SmartRelay circuit program memory. The order numbers are found in the appendix.

Compatibility (Old memory cartridges in newer IDEC SmartRelay modules)

... to earlier versions (FL1C and FL1D devices):

Data written to the memory cartridge in the FL1D can be read in all FL1E. But data written to the memory cartridge in the FL1C cannot be read by the FL1E. When the memory cartridge is read by the FL1E, the original data in the FL1E is deleted. Data cannot be written from the FL1E to the memory cartridge.

... to earlier versions (FL1A to FL1B devices):

A memory cartridge that contains data written in earlier versions (FL1A...FL1B devices) cannot be used in IDEC SmartRelay devices of the FL1C and later generations. When the IDEC SmartRelay system detects such an 'old' memory cartridge, the message "Unknown Card / Press ESC" is output to the display.

Vice versa, a FL1C or later memory cartridge cannot be used in IDEC SmartRelay devices of the FL1A...FL1B family.

Compatibility (New memory, battery, or combined memory/ battery cartridges in older IDEC SmartRelay modules)

The FL1E memory cartridge can be used in FL1C or FL1D devices but cannot be used in FL1A..FL1B devices. Data written to the FL1E memory cartridge in the FL1C cannot be read by the FL1E. When the memory cartridge is read by the FL1E, the original data in the FL1E is deleted.

A FL1E Memory cartridge or FL1E Memory/Battery cartridge that already has FL1E circuit program stored on it cannot be used in any device other than FL1E device.

A FL1E Battery cartridge or FL1E Memory/Battery cartridge can only be used in FL1E devices.

Upward compatibility of circuit programs

Circuit programs written for the previous versions FL1A...FL1D can be transferred to FL1E units from WindLGC.

For detail about the compatibility of SmartRelay and memory cartridges, refer to FAQ available on IDEC website. (URL: http://www.idec.com/faq/en/controller/).

6.1 Security function (CopyProtect)

The secuirty function provides copy protection for circuit programs on memory cartridges or combined memory/ battery cartridges.

Unprotected memory cartridges

You can edit circuit programs without restrictions and exchange data between the memory cartridge or combined memory/battery cartridge and the device.

Protected memory cartridges

A circuit program is **protected** when it is transferred from a protected program memory cartridge or combined memory/ battery cartridge to IDEC SmartRelay.

To execute this circuit program in IDEC SmartRelay, the protected cartridge must remain inserted during RUN; that is, the circuit program stored on the cartridge cannot be copied to other IDEC SmartRelay devices.

Over and above that, a protected circuit program is write-protected.

A circuit program **with password** protection is no longer protected after the correct password has been entered; that is, you can then edit the program and remove the memory cartridge or combined memory/battery cartridge.

Note

When you create the circuit program for a memory cartridge or combined memory/battery cartridge, you need to assign a password to be able to edit it at a later time (see Chapter 3.6.5).

Correlation between the password and the protective function

Password	Protection	Editing	Copying	Deleting
-	-	Yes	Yes	Yes
Yes	-	Yes, with password	Yes	Yes, with password
-	Yes	No	No	Yes
Yes	Yes	Yes, with password	Yes, with password	Yes, with password

Assigning a security function

To assign a circuit program and copy protection function to the memory cartridge or combined memory/battery cartridge, open the programming mode and select “Card”.

1. Switch IDEC SmartRelay to programming mode (ESC / >Stop).
2. Select the ’**Card**’ command: Press ▲ or ▼
3. To apply ’Card’: Press **OK**
4. Move the ’>’ cursor to ’**CopyProtect**’: Press ▲ or ▼
5. To apply ’CopyProtect’: Press **OK**

IDEC SmartRelay shows the following display:

```
>No
 Yes
CopyProtect:
 No
```

The current protection setting is shown in the bottom line. This function is disabled by default (”No“: disabled).

Enabling the security function

To set the security function:

1. Move the ’>’ cursor to ’**Yes**’: Press ▲ or ▼
2. Confirm ’Yes’: Press **OK**

IDEC SmartRelay shows the following display:

```
>No
 Yes
CopyProtect:
 Yes
```

Note

This only generates a circuit program and copy protection for the memory cartridge or combined memory/battery cartridge; the circuit program itself must be copied separately from IDEC SmartRelay to the memory cartridge or combined memory/battery cartridge. (This copy can be done at power-on. See chapter 6.4).

You can always change the “No” status (security function disabled) to “Yes” (security function enabled).

A status change from “Yes” (security function enabled) to “No” (security function disabled) is only possible if the memory cartridge or combined memory/battery cartridge does not contain a circuit program.

6.2 Inserting and removing memory and battery cartridges

When you remove a memory cartridge or combined memory/battery cartridge that contains a circuit program with copy protection attributes, note the following: The circuit program stored on the cartridge can only be executed if the cartridge remains inserted during system runtime.

After you have removed the memory cartridge or combined memory/battery cartridge, IDEC SmartRelay outputs the message 'No Program'. A removal of the cartridge during RUN will lead to impermissible operating states.

Always heed the following warning:

Warning

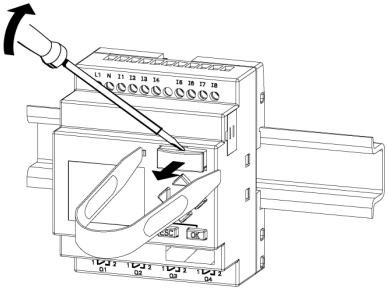
Do not touch the open slot of the memory cartridge with your fingers or with a metallic or conductive object.

The memory cartridge socket might be under voltage if the polarity is accidentally reversed at L1 and N.

The memory cartridge, battery cartridge or combined memory/battery cartridge must only be removed by qualified personnel.

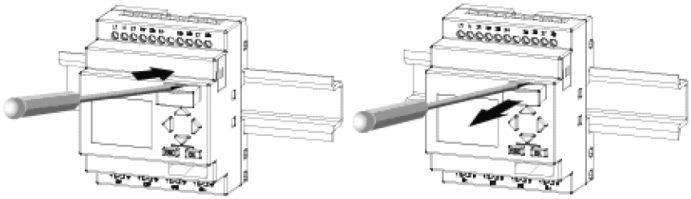
Removing the memory cartridge, battery cartridge or combined memory/battery cartridge

To remove the memory cartridge, carefully insert a screwdriver with a 3-mm blade into the groove on the upper end of the card, and lever the module partially out of the slot. You can now remove the memory cartridge.



1. Carefully insert a screwdriver into the slot at the upper end of the memory cartridge, and ease it out of the slot a little.
2. Hold the memory cartridge at both sides using the memory cartridge removal tool (MT-101). and pull the memory cartridge straight out.

To remove a battery cartridge, or combined memory/battery cartridge, slide a screwdriver with a 3-mm blade into the slot on the upper surface of the card until it engages in the back, then with the screwdriver engaged, pull the card out with your hand.



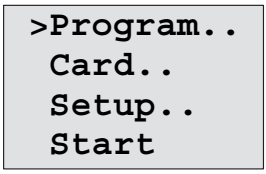
Inserting a memory cartridge, battery cartridge or combined memory/battery cartridge

The entry of the memory cartridge, battery cartridge and the combined memory/battery cartridge slot is chamfered on its bottom right. The edge of the cartridges are chamfered accordingly. This encoding prevents you from inserting cartridges the wrong way. Insert the memory cartridge, battery cartridge or combined memory/battery cartridge into the slot and push it in until it engages.

6.3 Copying data from IDEC SmartRelay to the memory cartridge

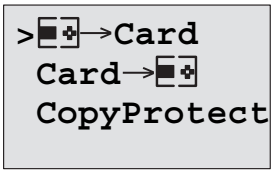
To copy the circuit program to the memory cartridge or combined memory/battery cartridge:

1. Insert the memory cartridge or combined memory/battery cartridge into the slot.
2. Switch IDEC SmartRelay to programming mode (ESC / >Stop).



IDEC SmartRelay main menu

3. The main menu opens. To select the '**Card**' command: Press ▲ or ▼
4. Press **OK**. The transfer menu opens.



= IDEC SmartRelay

5. Move the '>' cursor to '**IDEC SmartRelay** → **Card**' (if required): Press ▲ or ▼
6. Press **OK**.

IDEC SmartRelay now copies the circuit program to the memory cartridge or combined memory/battery cartridge. (If the memory cartridge is from an incompatible FL1A..FL1C version, IDEC SmartRelay displays this message: "Unknown Card / Press ESC" .)

When IDEC SmartRelay has finished copying, it automatically returns you to the main menu:

```
>Program..
 Card..
 Setup..
 Start
```

The circuit program backup is now stored on your memory cartridge or combined memory/battery cartridge and you can remove the cartridge. **Do not forget** to replace the cap.

If power fails while IDEC SmartRelay is copying the circuit program, repeat the process after Power On.

Note

The password of a protected circuit program in IDEC SmartRelay also applies to the copied program version on your memory cartridge or combined memory/battery cartridge.

6.4 Copying data from the memory cartridge to IDEC SmartRelay

You can copy a circuit program from a compatible memory cartridge or combined memory/battery cartridge to IDEC SmartRelay in one of two ways:

- Automatically during the startup of IDEC SmartRelay (POWER ON)
- By means of the “Card” menu of IDEC SmartRelay

Note

If the program on the module/cartridge is protected with a password, the copied program in IDEC SmartRelay is also protected with the same password.

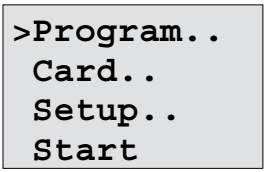
Automatic copying during the startup of IDEC SmartRelay

Proceed as follows:

1. Switch off the power supply to IDEC SmartRelay (POWER OFF)
2. Remove the slot cover.
3. Insert the program module/cartridge into the relevant slot.
4. Switch on the power supply to IDEC SmartRelay

IDEC SmartRelay copies the program from the program module/cartridge to IDEC SmartRelay. (If the memory cartridge is from an incompatible FL1A..FL1B version, IDEC SmartRelay displays this message: “Unknown Card / Press ESC” .)

When IDEC SmartRelay has finished copying, it opens the main menu:



Note

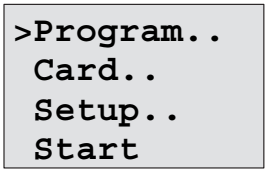
Before you switch IDEC SmartRelay to RUN, you must ensure that the system you are controlling with IDEC SmartRelay does not represent a source of hazard.

1. Move the '>' cursor to '**Start**': Press ▲ or ▼
2. Press **OK**.

Copying by means of the "Card"menu

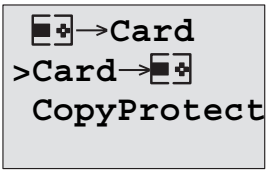
For information on the replacement of a memory cartridge or combined memory/battery cartridge, also note Chapter 6.2. To copy a program from the memory cartridge or combined memory/battery cartridge to IDEC SmartRelay:

1. Insert the memory cartridge or combined memory/battery cartridge
2. Switch IDEC SmartRelay to programming mode (ESC / >Stop).



3. Move the '>' cursor to '**Card**': Press ▲ or ▼
4. Press **OK**. The transfer menu opens.

5. Move the '>' cursor to '**Card** → **IDEC SmartRelay**': Press ▲ or ▼



6. Press **OK**.

IDEC SmartRelay copies the circuit program from the memory cartridge or combined memory/battery cartridge to IDEC SmartRelay. (If the memory cartridge is from an incompatible FL1A..FL1B version, IDEC SmartRelay displays this message: "Unknown Card / Press ESC".)

When IDEC SmartRelay has finished copying, it automatically returns to the main menu.

IDEC SmartRelay software 7

WindLGC is available as a programming package for the PC. This software provides many features, for example:

- A graphic interface for offline creation of your circuit program by means of Ladder Diagram (contact chart / circuit diagram) or Function Block Diagram (function chart)
- Simulation of your circuit program on the PC
- Generating and printing of an overview chart for the circuit program
- Saving a backup of the circuit program on the hard drive or other media
- Comparing circuit programs
- Easy configuration of blocks
- Transferring the circuit program in both directions:
  - from IDEC SmartRelay to the PC
  - from the PC to IDEC SmartRelay
- Reading the values of the hour counter
- Setting the time of day
- Summertime/wintertime conversion
- Online test: Display of status changes and process variables of IDEC SmartRelay in RUN mode:
  - Status of a digital I/O, memory markers, shift register bits and cursor keys
  - The values of all analog I/Os and memory markers
  - The results of all blocks
  - The current values (including the times) of selected blocks
- Starting and stopping circuit program execution via the PC (RUN, STOP)

The IDEC SmartRelay alternatives

As you can see, WindLGC represents an alternative to conventional engineering methods, with several advantages:

- You can develop the circuit program on your PC.
- You simulate the circuit program on your computer and verify its functions before you actually implement it in your system.
- You can add comments to the circuit program and create hardcopies.
- You can save a copy of your circuit program to the file system on your PC, to make it directly available for modifications.
- It takes only a few key actions to download the circuit program to IDEC SmartRelay.

WindLGC

WindLGC runs under Windows 7®, Windows Vista®, Windows 98®, Windows NT 4.0®, Windows Me®, Windows 2000®, Windows XP®. WindLGC is capable of client/server operation and offers you a high degree of freedom and comfort for creating your circuit program.

WindLGC V6.2

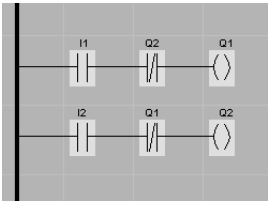
This is the current version of WindLGC. You will find all the functions and the functionality of the devices described in this manual in the version 6.2.

Note

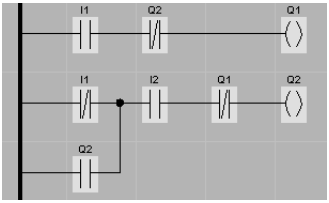
Please note that the SmartRelay ladder programming is slightly different from PLC programming.In the case of a PLC, the output result on each line is reflected on the inputs within the same scan time. However, in the case of the IDEC SmartRelay, all the inputs are processed first and then the outputs. Thus the output results are not reflected on the inputs within the same scan time, but rather they are reflected at the following scan.

ex) Interlock is not activated in the sample program (1) below in which input terminals I1 and I2 are simultaneously turned on. The interlock is activated in the sample program (2) below in which input terminals I1 and I2 are simultaneously turned on.

(1)



(2)



7.1 Connecting IDEC SmartRelay to a PC

Connecting the PC cable

To connect IDEC SmartRelay to a PC, you need the IDEC SmartRelay PC cable (Appendix E lists the order number).

Turn the power off to the IDEC SmartRelay base module. Remove the cap, memory cartridge, or combined memory/ battery cartridge from your IDEC SmartRelay and connect the cable to this socket. Connect the other end of the cable to the serial port of your PC.

Connecting the USB PC cable

You can also connect IDEC SmartRelay to the PC with the IDEC SmartRelay USB PC cable (Appendix E lists the order number).

Remove the cap or memory cartridge, battery cartridge, or combined memory/battery cartridge from your IDEC SmartRelay and connect the cable to this socket. Connect the other end of the cable to a USB port of your PC.

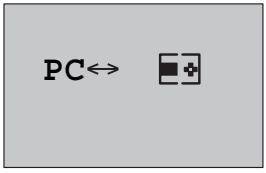
Switching IDEC SmartRelay to PC↔IDEC SmartRelay mode

Switch the IDEC SmartRelay with/without display to STOP from your PC (refer to the WindLGC online help), or select the ESC / >Stop command on a device with display and confirm the entry with 'Yes'.

When IDEC SmartRelay is in STOP and online with the PC, the following PC commands are accepted:

- Switch IDEC SmartRelay to RUN
- Read/write the circuit program
- Read/write the summertime/wintertime

When you start the upload/download in STOP, the following display appears automatically:



= IDEC SmartRelay

Closing the PC↔IDEC SmartRelay mode

When the data transfer is completed, the connection to the PC is shut down automatically.

Note

If the circuit program created with WindLGC is password protected, both the circuit program and the password are downloaded to IDEC SmartRelay. The password prompt is enabled at the end of the data transfer.

The upload of a password protected program created in IDEC SmartRelay is only possible after the correct password is entered in WindLGC.

Applications

8

We have provided a small collection of applications in this manual to give you an impression of the versatility of IDEC SmartRelay. For these examples we have recorded once again the original solution of the circuit diagram, and compared it with the IDEC SmartRelay solutions.

Note

IDEC SmartRelay applications are available to all our customers free of charge. The examples provided are noncommittal, serve as general information about the fields of application for IDEC SmartRelay, and may be different to user-specific solutions.

The user operates the system at his own responsibility. We refer to the relevant national standards and system-related installation regulations.

Although you have four inputs available for logic operations (basic functions, see Chapter 4.2), the following figures will only show a maximum of three inputs for reasons of clarity. You program this fourth input and assign parameters just like the other three inputs.

Errors can not be ruled out, and the right to make changes is reserved.

8.1 Stairway or corridor lighting

8.1.1 Requirements for a stairway lighting system

The basic requirements for a stairway lighting system are as follows:

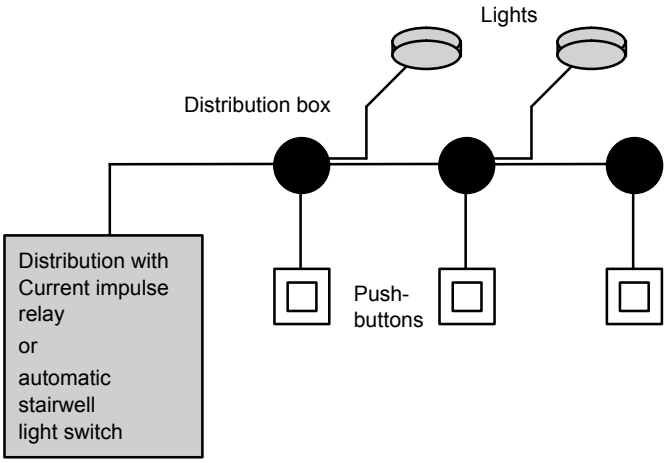
- When someone is using the stairway, the lighting should be switched on.
- If no-one is in the stairway, the lights should be switched off in order to save energy.

8.1.2 Previous solution

The two conventional options for switching the lights:

- With a current impulse relay
- With an automatic stairwell light switch

The wiring of both these lighting systems is identical.



Components used

- Momentary switches
- Automatic stairwell light switch or current impulse relay

Lighting system with current impulse relay

Function of a lighting system with current impulse relay :

- Press any pushbutton: The lighting is switched on
- Press any of the pushbuttons once again: The lighting is switched off.

Disadvantage: People often forget to switch off the lights.

Lighting system with an automatic stairwell light switch

Function of a lighting system with automatic stairwell light switch:

- Press any pushbutton: The lighting is switched on
- The lights are switched off automatically when the preset time has expired.

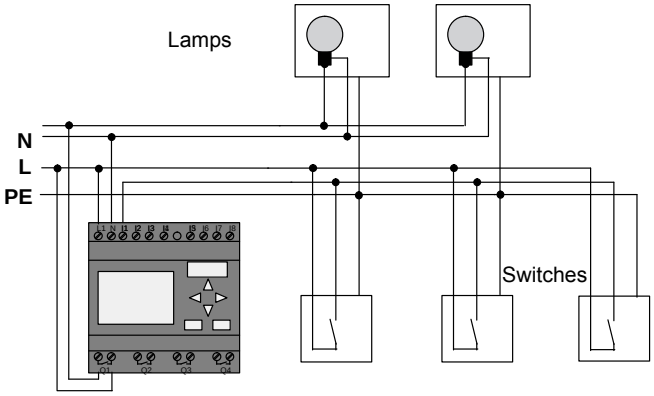
Disadvantage: The lights can not be switched on for a longer period of time (e.g. when cleaning the stairway). The switch for permanent lighting is usually located on the automatic stairwell light switch and may be difficult or impossible to access.

8.1.3 Lighting system with IDEC SmartRelay

An IDEC SmartRelay system allows you to replace the automatic stairwell light switch or the current impulse relay. You can also implement both functions (timed off-delay and Current impulse relay) in a single unit. What is more, you can incorporate extra functions without making any alterations to the wiring. Here are some examples:

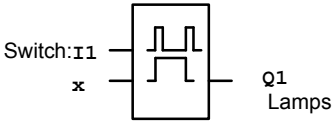
- Current impulse relay with IDEC SmartRelay
- Automatic stairwell light switch with IDEC SmartRelay
- Dual-function switch with IDEC SmartRelay
  - Switch light on
  - Switch on permanent lighting
  - Switch light off

Wiring of a lighting system with FL1E-H12RCC



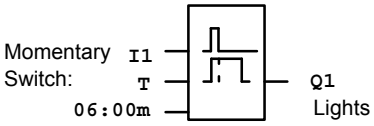
The external wiring of a lighting system with an IDEC SmartRelay is no different than it is for a conventional stairway and corridor lighting system. Only the automatic stairwell light switch/current impulse relay is replaced. Supplementary functions are entered directly in IDEC SmartRelay.

Current impulse relay with IDEC SmartRelay



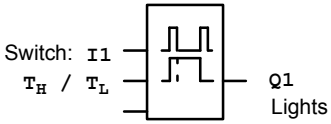
Output Q1 is toggled with a pulse signal at input I1.

Automatic stairwell light switch with IDEC SmartRelay



Output Q1 is set for the duration of 6 minutes with a pulse signal at input I1.

Dual-function switch with IDEC SmartRelay



Output Q1 is set for the duration of a preset time T_H with a pulse signal at input I1.
The permanent lighting function is enabled by keeping the momentary switch pressed for a specified time T_L.

8.1.4 Special features and expansion options

Other options for increasing comfort or saving energy are, for example:

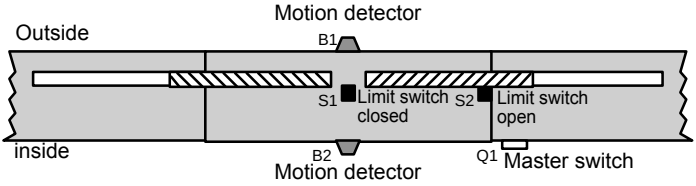
- A flashing function that indicates that the light is about to be switched off automatically.
- You can integrate various central functions:
  - Central off
  - Central on (panic button)
  - Control of all lamps or individual circuits by means of a daylight control switch
  - Controlling by means of an integrated timer (e.g. permanent lighting only until 24.00 h; disabled at specific times)
  - Automatically switching off the permanent lighting on expiration of a preset time (e.g. after 3 hours)

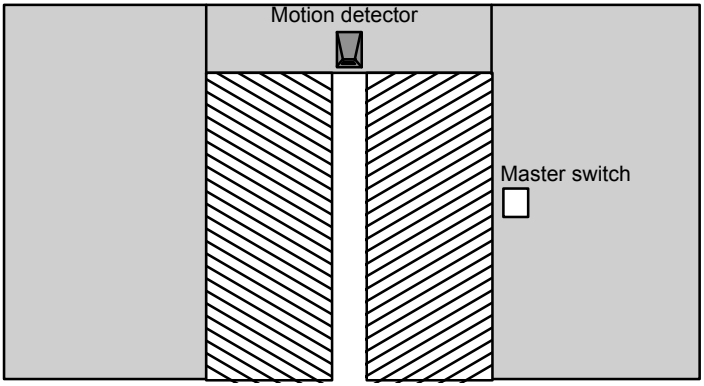
8.2 Automatic door

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

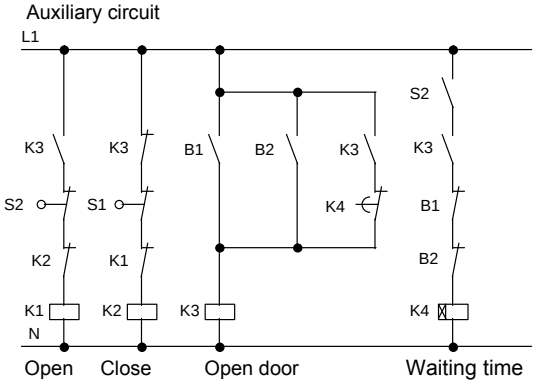
- When a person approaches the door, it must open automatically.
- The door must remain open until the doorway is cleared.
- When the doorway is cleared, the door must close automatically with a short delay.





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



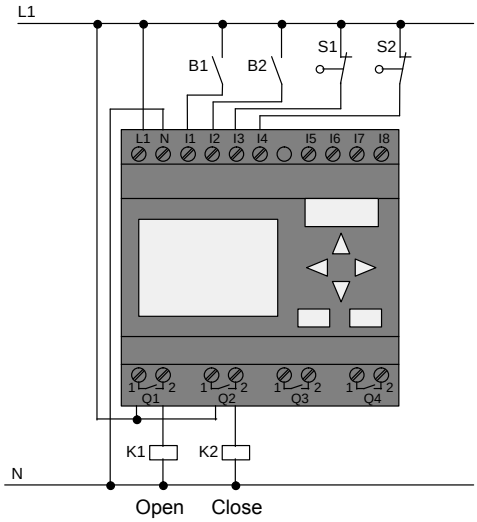
When someone enters the detection range of one of the motion sensors B1 or B2, the door opening motion is initiated by setting K3.

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.

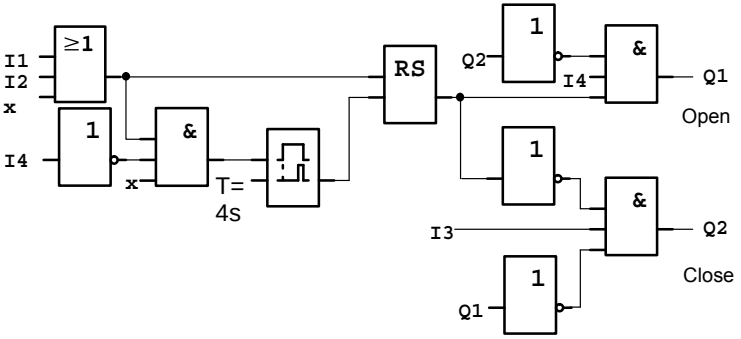
Wiring of a door control system with FL1E-H12RCC



Components used

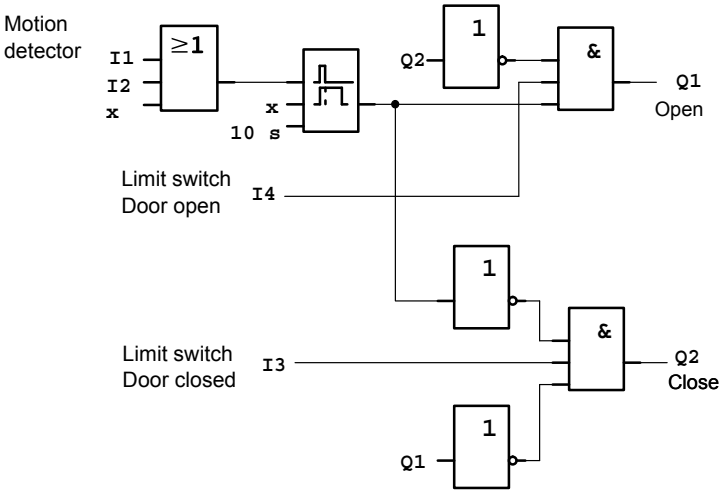
- K1 contactor relay *(open)*
- K2 contactor relay *(close)*
- S1 *(normally closed contact)* limit switch *(close)*
- S2 *(normally closed contact)* limit switch *(open)*
- B1 *(normally open contact)* infrared motion sensor *outside*
- B2 *(normally open contact)* infrared motion sensor *inside*

Door control system with IDEC SmartRelaycircuit 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:



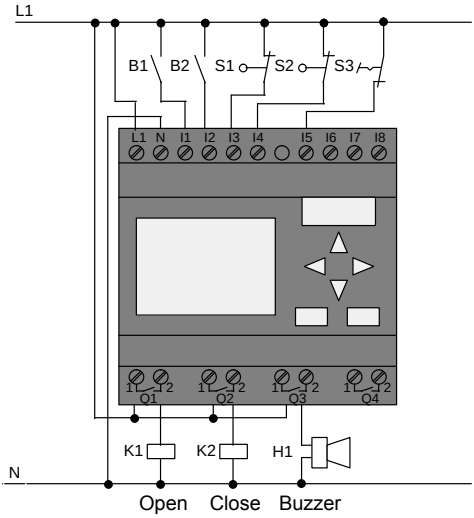
8.2.4 Special features and expansion options

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

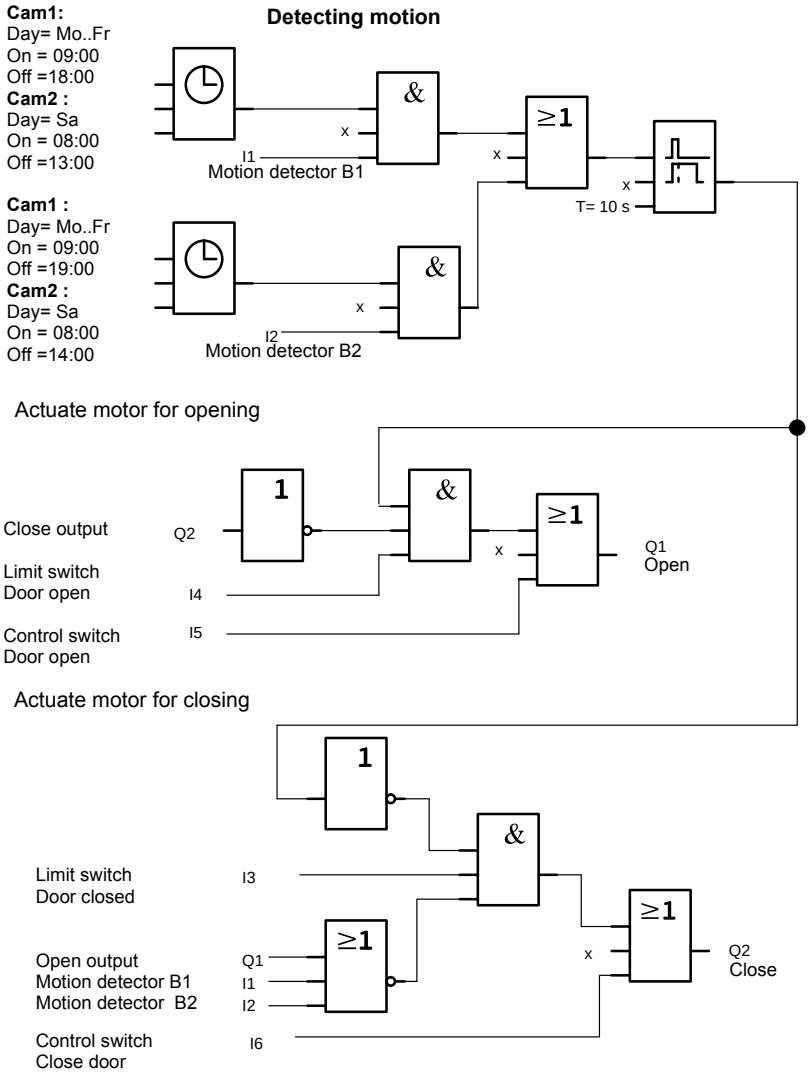
- You can connect an additional control switch with the positions: Open - Automatic - Closed (O-A-C)
- You can connect a buzzer to an output of the IDEC SmartRelay to warn of the closing of the door.
- You can enable opening of the door time and direction-dependent, i.e. opening only during business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

8.2.5 Extended solution with FL1E-H12RCC

Wiring the IDEC SmartRelay extended solution



Block diagram of the extended IDEC SmartRelay solution



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).

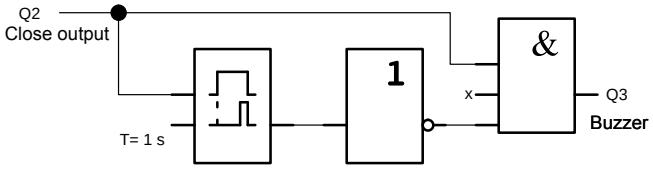
Actuating the motor for closing

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

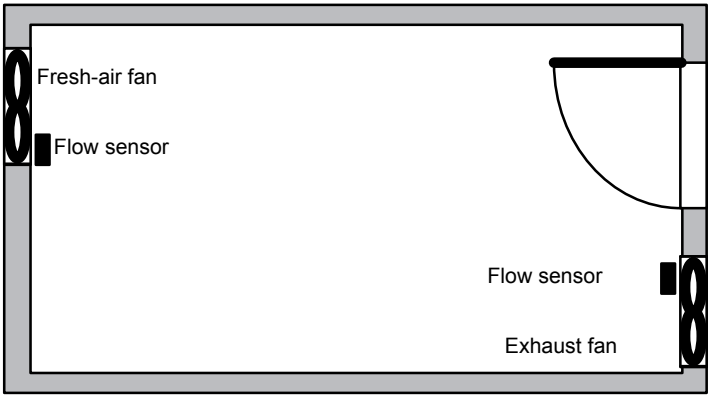
Connect the buzzer to output Q3. The buzzer gives a brief warning (in this case 1 second) when the door is closing. Enter the following circuit at Q3 in the circuit program:



8.3 Air-conditioning system

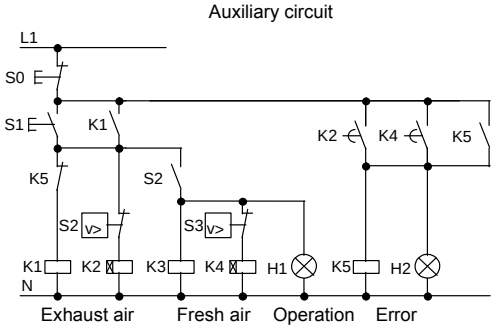
8.3.1 Requirements for an air-conditioning system

The air-conditioning system supplies fresh air to a room or exhausts the contaminated air from a room. Let us examine following example:



- The room is equipped with an exhaust fan and a fresh-air fan.
- Both fans are monitored by means of a flow sensor.
- An excess atmospheric pressure may never develop in the room.
- The fresh-air fan must only be switched on if safe functioning of the exhaust fan is signaled by the flow sensor.
- A warning lamp indicates failure of a fan.

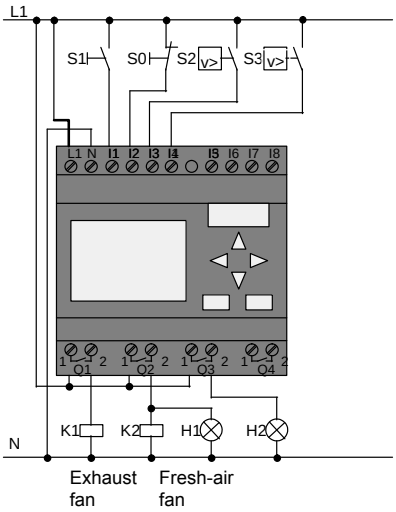
The circuit diagram for conventional solutions is as follows:



The fans are monitored by means of flow sensors. If no air flow is registered within a short waiting time, the system is switched off and an error message is output. This message can be acknowledged by pressing the OFF button.

In addition to the flow sensors, the fan monitoring system also requires an evaluating circuit with several switching devices. This evaluating circuit can be replaced by a single IDEC SmartRelay unit.

Wiring of an air-conditioning system with FL1E-H12RCC

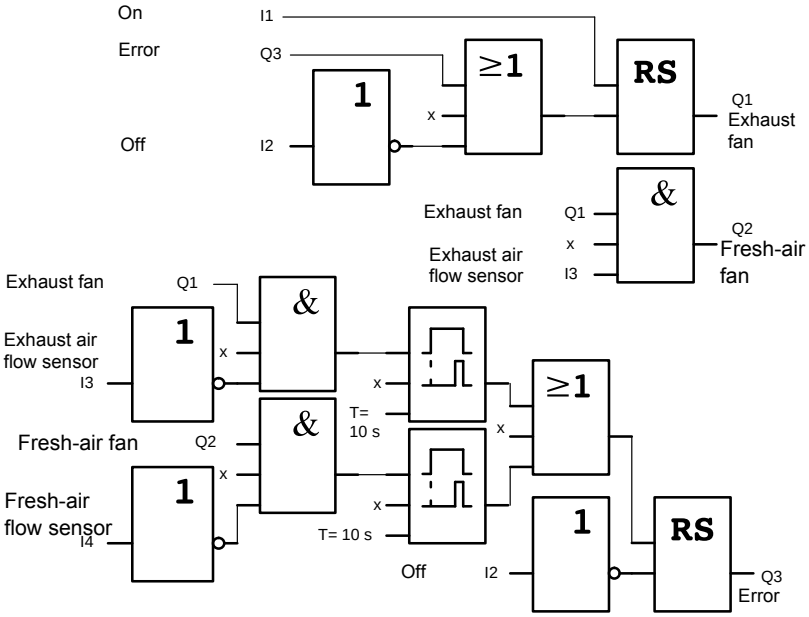


Components used

- K1 contactor relay
- K2 contactor relay
- S0 *(normally closed contact)* STOP pushbutton
- S1 *(normally open contact)* START pushbutton
- S2 *(normally open contact)* flow sensor
- S3 *(normally open contact)* flow sensor
- H1 signal lamp
- H2 signal lamp

Block diagram of the IDEC SmartRelay solution

The block diagram of the air-conditioning system with IDEC SmartRelay :



8.3.2 Advantages of using IDEC SmartRelay

The IDEC SmartRelay solution requires less switchgear. That saves you installation time and space in the control cabinet. You might even be able to use a smaller switching cabinet.

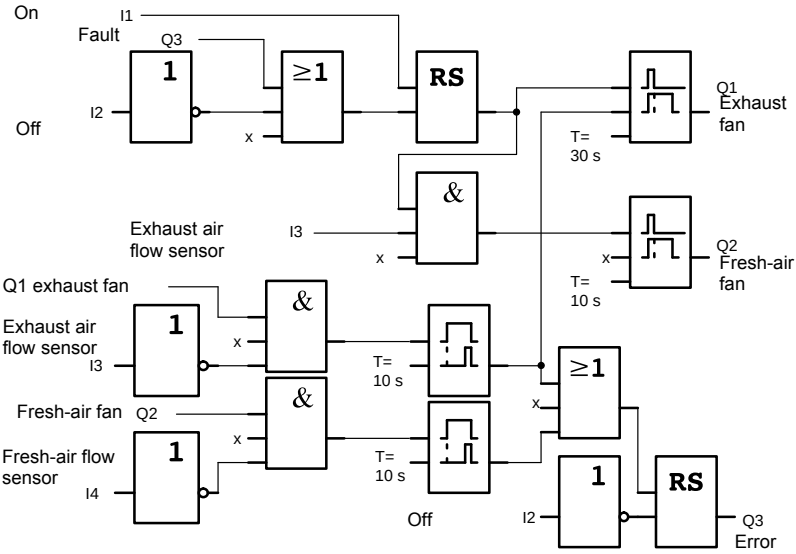
Additional IDEC SmartRelay options

- The free output (Q4) can be used as isolated signal contact for reporting faults or power failure.
- It is possible to switch off of the fans by means of a sequential circuit.

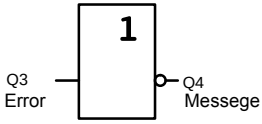
These functions can be implemented without additional switchgear.

Block diagram of the extended IDEC SmartRelay solution

The fans at Q1 and Q2 are switched on and off by means of the following circuit:

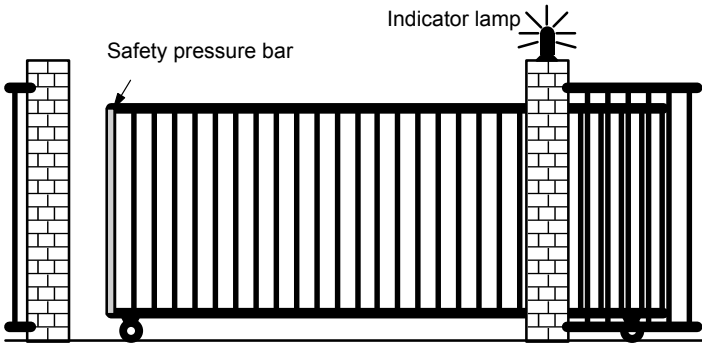


You can also generate a message at output Q4:



The relay contacts of output Q4 are always closed when the system is in operation. Relay Q4 does not drop off unless there is a power failure or a fault in the system. This contact can be used for remote monitoring, for example.

8.4 Factory door



The entrance to a company's premises is often closed with a gate. The gate is only opened to let vehicles in and out.

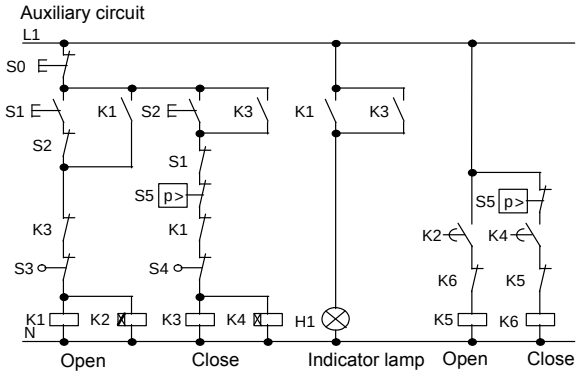
The gate is controlled by the porter.

8.4.1 Requirements for a gate control system

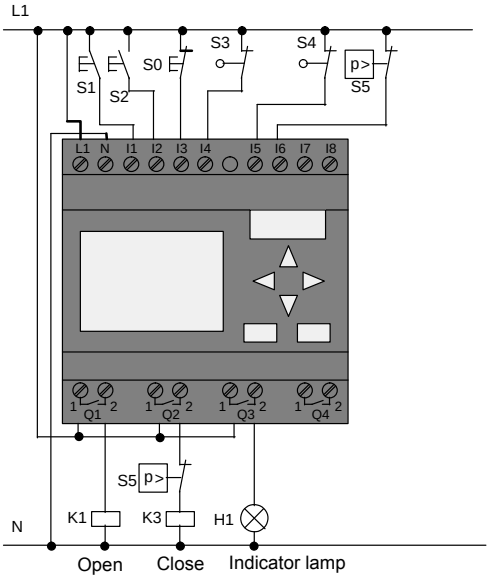
- The gate is opened and closed by means of pushbuttons in the gatehouse. The porter can monitor the operation of the gate at the same time.
- The gate is normally fully opened or fully closed. The gate motion can be interrupted at any time.
- An indicator lamp is switched on five seconds before the gate starts moving and when the gate is in motion.
- A safety pressure bar prevents harm to persons and objects from getting trapped or damaged when the gate is closing.

8.4.2 Previous solution

Various control systems are used to operate automatic gates. The circuit diagram below shows one of these options.



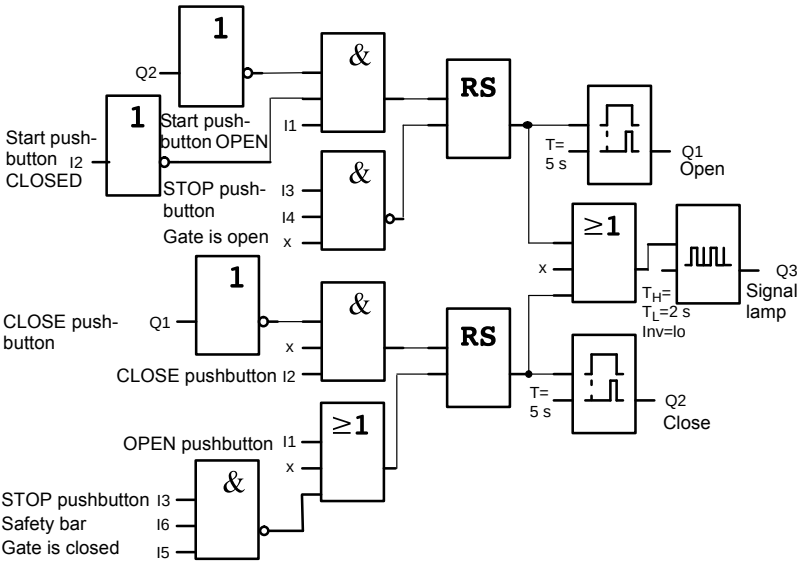
Wiring of a gate control system with FL1E-H12RCC



Components used

- K1 contactor relay
- K2 contactor relay
- S0 *(normally closed contact)* STOP pushbutton
- S1 *(normally open contact)* OPEN pushbutton
- S2 *(normally open contact)* CLOSE pushbutton
- S3 *(normally closed contact)* Position sensor OPEN
- S4 *(normally closed contact)* Position sensor CLOSED
- S5 *(normally closed contact)* Safety bar

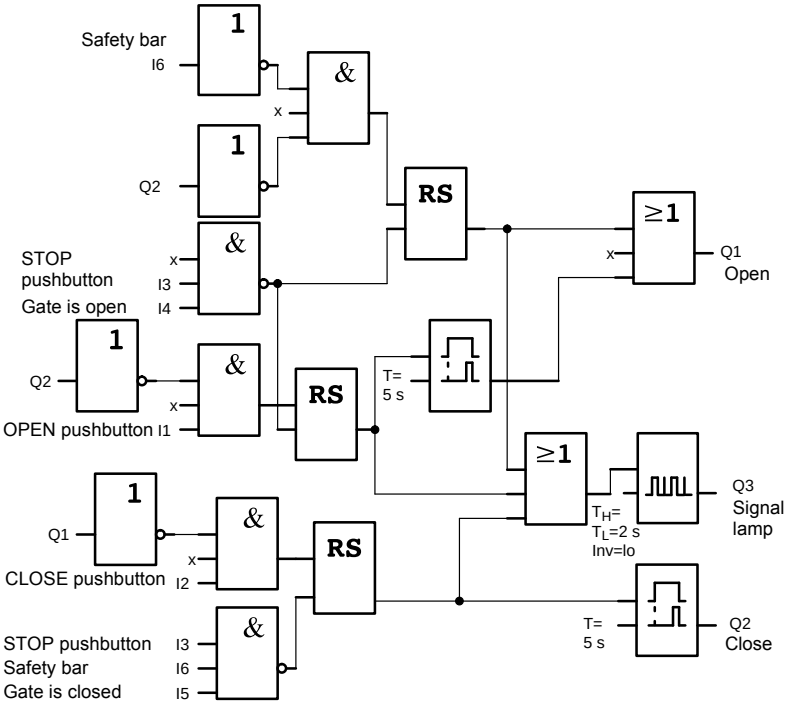
Block diagram of the IDEC SmartRelay solution



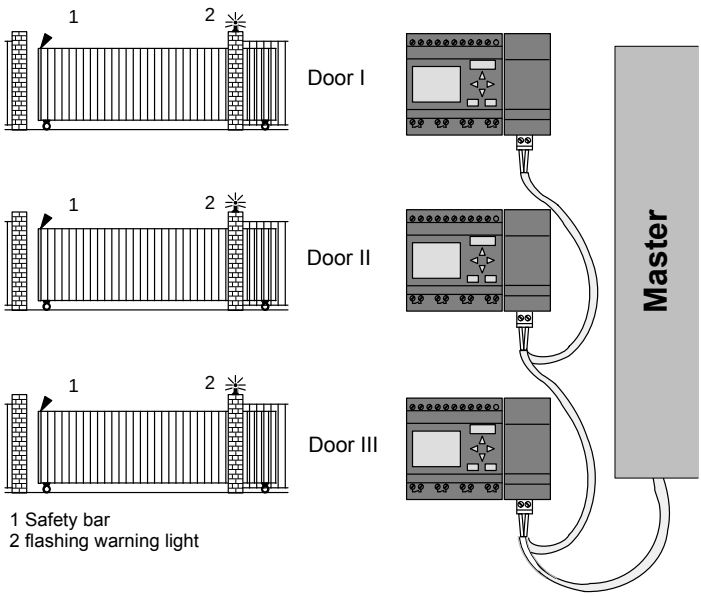
The OPEN or CLOSE pushbuttons initiate the gate motion, provided it is not already moving in the other direction. The gate is stopped by means of the STOP pushbutton or the relevant limit switch. A safety bar furthermore interrupts the closing motion of the gate.

8.4.3 Extended IDEC SmartRelay solution

Our extended control circuit is to open the gate automatically when the safety bar is actuated.



8.5 Centralized control and monitoring of several factory doors



Often, a company's premises can be entered at several locations. Not all of the gates can always be monitored locally by personnel. They must therefore be able to be monitored and operated by the porter who sits in a central gatehouse.

It must also be possible for a member of staff to open and close the gate locally.

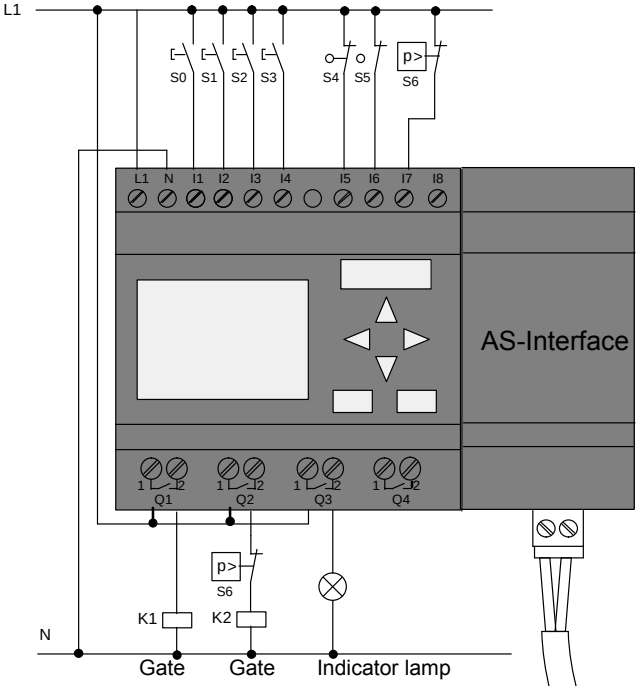
For **each** gate we are going to use one FL1E-H12RCC and one communication module. The modules and the master are interconnected by means of a bus system.

This chapter describes a gate control system. The structures of the other gate control systems are identical.

8.5.1 Requirements for a gate control system

- Every gate is opened and closed by means of a cord-operated switch. The gate is will be fully opened or fully closed.
- All gate can be opened and closed locally by means of pushbuttons.
- The gate can be opened and closed at the gatehouse by means of the bus system. The GATE OPEN or GATE CLOSED status is indicated.
- An indicator lamp is switched on five seconds before the gate starts moving and when the gate is in motion.
- A safety pressure bar prevents harm to persons and objects from getting trapped or damaged when the gate closes.

Wiring of the gate control system with FL1E-H12RCC and CM AS-Interface



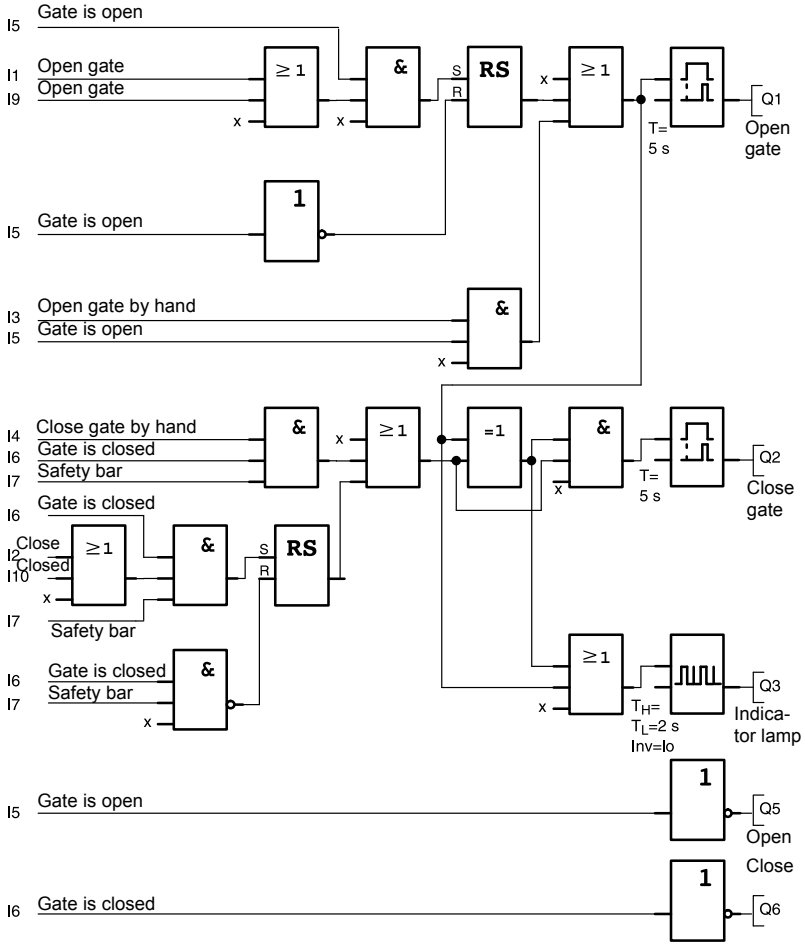
Components used

- K1 — contactor relay open
- K2 — contactor relay close
- S0 *(normally open contact)* — cord operated switch open
- S1 *(normally open contact)* — cord operated switch close
- S2 *(normally open contact)* — OPEN pushbutton
- S3 *(normally open contact)* — CLOSE pushbutton
- S4 *(normally closed contact)* — position sensor GATE IS OPEN
- S5 *(normally closed contact)* — position sensor GATE IS CLOSED
- S6 *(normally closed contact)* — Safety bar

Master control system

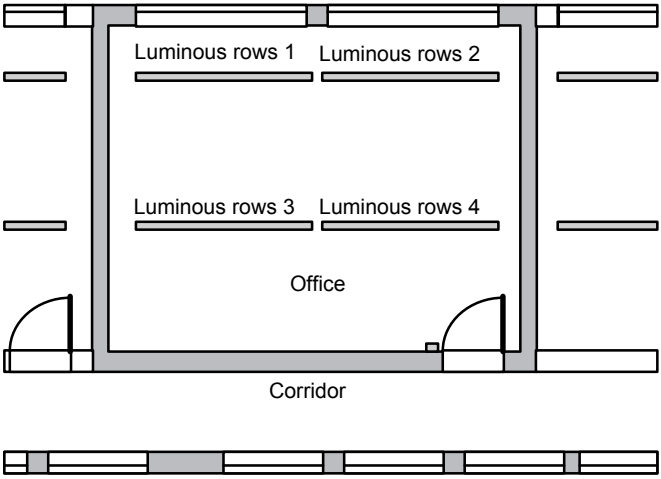
- Q5 — position sensor GATE IS OPEN
- Q6 — position sensor GATE IS CLOSED
- I9 — external pushbutton OPEN GATE
- I10 — external pushbutton CLOSE GATE

Block diagram of the IDEC SmartRelay solution



The OPEN GATE and CLOSE GATE pushbuttons initiate the gate motion, provided it is not already moving in the other direction. The gate motion ends at the respective limit switch. Closing of the gate is also interrupted by the safety bar.

8.6 Luminous rows

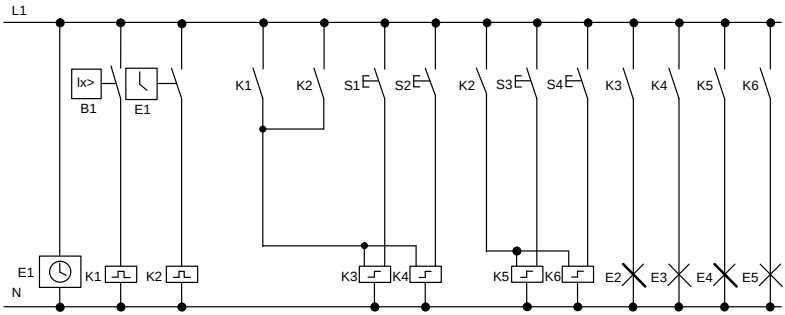


When planning lighting systems for commercial locations, the type and number of lamps used is determined by the luminance required. For reasons of cost efficiency, the installation often consists of fluorescent tubes arranged in luminous rows, and are divided into separate switching circuits, according to the way the room is used.

8.6.1 Requirements for a lighting system

- The various luminous rows are switched on and off locally.
- If there is sufficient daylight, the rows on the window side of the room are automatically switched off by means of a daylight control switch.
- The lights are switched off automatically at 20.00 h.
- Local manual operation of the lighting must be possible at all times.

8.6.2 Previous solution



The lamps are switched on and off with current impulse relays, by means of pushbutton control at the door. Regardless of this, they are reset with a timer or daylight control switch signal at the *central off* input. The pulse width of the off commands must be reduced by means of interval time-delay relays to allow operation of the lights after they are switched off.

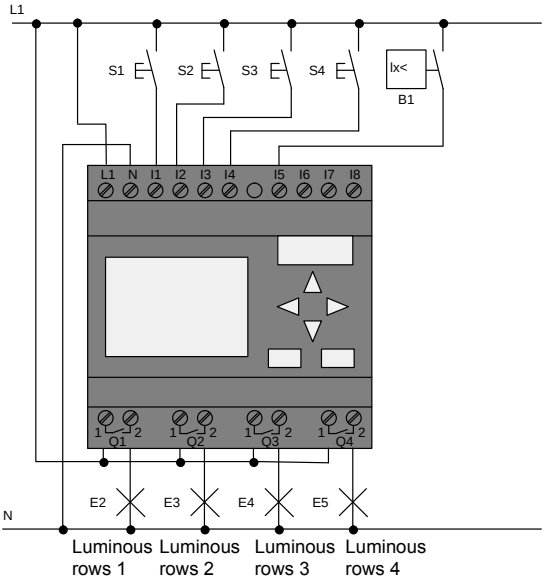
Components required:

- Pushbuttons S1 to S4
- Daylight control switch B1
- Timer E1
- Interval time-delay relays K1 and K2
- Pulse switches K3 to K6 with central OFF function

Disadvantages of the previous solution

- A substantial amount of switchgear needs to be installed to implement the necessary functions.
- Due to the large number of mechanical components, high wear and tear and maintenance expenditure is to be expected.
- The modification of functions involves considerable effort.

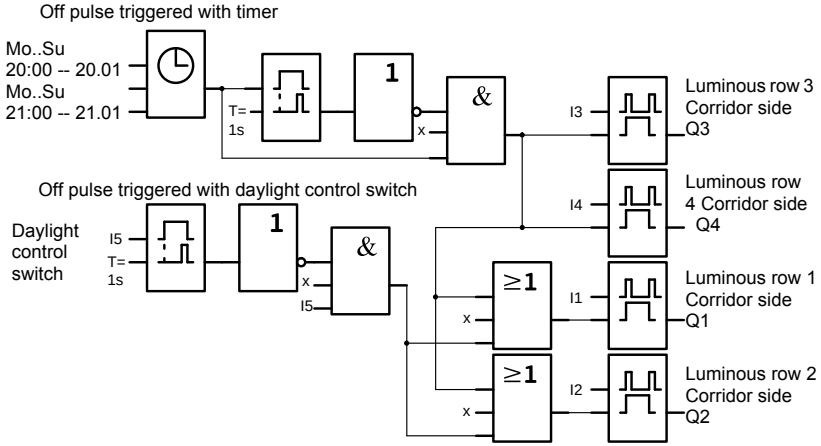
8.6.3 Luminous row control system with FL1E-H12RCC



Components used

- S1 to S4 *(normally open contact)*
  momentary pushbutton
- B1 *(normally open contact)*
  daylight control switch

Block diagram of the IDEC SmartRelay solution



Advantages of the IDEC SmartRelay solution

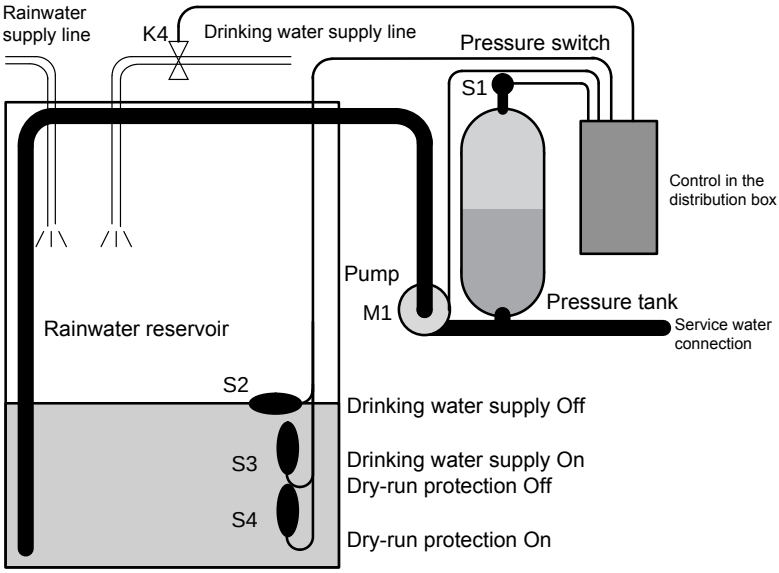
- You can connect the lamps directly to the IDEC SmartRelay, provided the power consumption does not exceed the switching capacity of the various outputs. Higher loads should be switched with a contactor relay.
- Connect the daylight control switch directly to an input of the IDEC SmartRelay.
- You do not need an external timer, because this function is integrated in the IDEC SmartRelay.
- Due to the reduced amount of switchgear, you can install a smaller and space-saving distribution cabinet.
- Fewer devices are required
- The lighting system can be easily modified.
- Additional switching times can be set as required (sequential circuit for the off pulses at the end of the day).
- The function of the daylight control switch can be easily applied to all lamps or to a modified group of lamps.

8.7 Service water pump

The use of rainwater as an addition to the drinking water supply is gaining importance. This saves cost and helps to protect the environment. For example, rainwater can be used for:

- Washing clothes
- Irrigation system for gardens
- Watering indoor plants
- Car wash
- Toilet flushing installations

The sketch below illustrates how such a rainwater utilization system is operated:

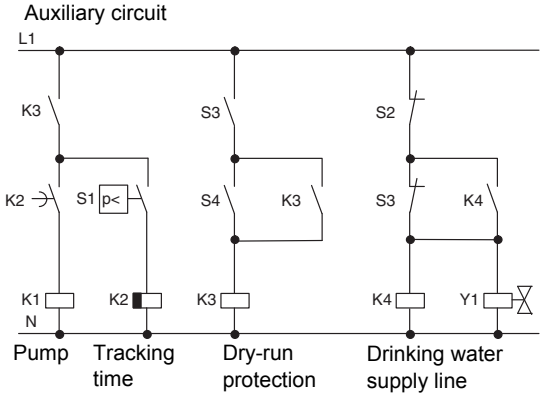


The rainwater is collected in a reservoir. From the reservoir, a pumping station supplies a respective line system. From there it can be tapped in the same way as normal drinking water. If the reservoir should run dry it can be topped up with drinking water.

8.7.1 Requirements for a control system of a service water pump

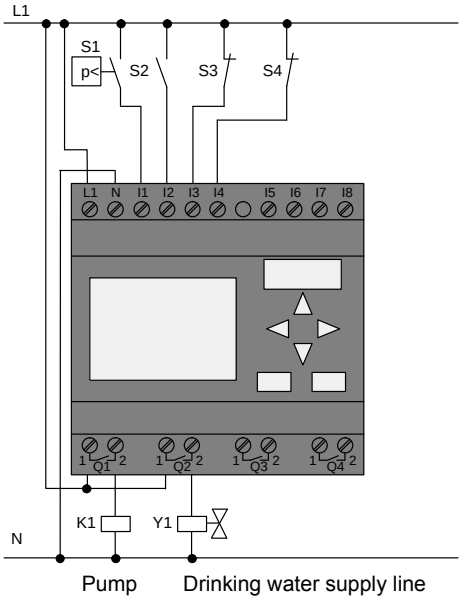
- Service water must be available at all times. In case of emergency, the control system must automatically switch over to drinking water supply.
- When switching over to the drinking water supply, the ingress of rainwater into the drinking water system must be prevented.
- The service water pump may not be switched on if the reservoir has run low of rainwater (dry-run protection).

8.7.2 Previous solution



The pump and a solenoid valve are controlled by means of a pressure switch and 3 float switches, which are installed in the rainwater reservoir. The pump must be switched on when the pressure level in the boiler drops below minimum. After the operating pressure is reached, the pump is switched off again after a tracking time of a few seconds has expired. The tracking time prevents oscillation of the water pump if water is drawn off over a longer period of time.

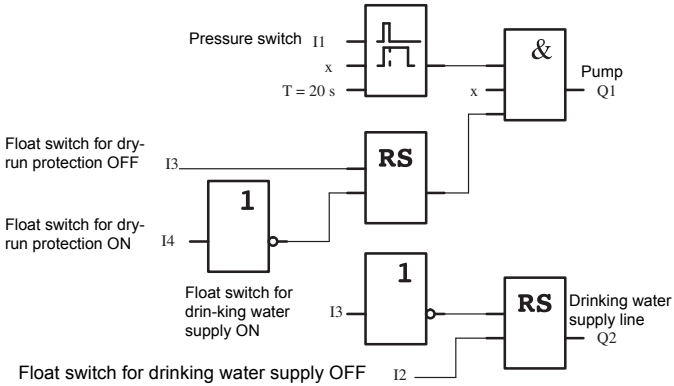
8.7.3 Service water pump system with FL1E-H12RCC



Apart from the IDEC SmartRelay, all you need is a pressure switch and the float switches to control the pump. If you are using a 3-phase AC motor, you must use a contactor relay to switch the pump. For single-phase AC pump systems you must provide a contactor relay if the power consumption of the AC motor exceeds the capacity of the output relay Q1. The power consumption of a solenoid valve is usually low enough to allow direct controlling.

- K1 contactor relay
- Y1 solenoid valve
- S1 *(normally open contact)* pressure switch
- S2 *(normally open contact)* float switch
- S3 *(normally closed contact)* float switch
- S4 *(normally closed contact)* float switch

Block diagram of the IDEC SmartRelay solution



8.7.4 Special features and expansions

The block diagram shows how you can interconnect the pump controls and the solenoid valve. The layout corresponds with the circuit diagram. You also have the option to integrate further functions for specific applications, which can only be implemented in a conventional circuitry by adding further switchgear, e.g.:

- Enabling the pump at specific times
- Indication of imminent or existing water shortage
- Reporting of system faults

Technical data

A

A.1 General technical data

Criterion	Tested in accordance with	Values
IDEC SmartRelay Base Dimensions (WxHxD) Weight Installation		72 x 90 x 55 mm Approx. 190 g on a 35 mm profile rail 4 module widths or wall mounting
IDEC SmartRelay expansion modules Dimensions (WxHxD) Weight Installation		36 x 90 x 53 mm Approx. 90 g on a 35 mm profile rail 2 module widths or wall mounting
Text Display		128.2 x 86 x 38.7 mm Approx. 220g Bracket mounting
Climatic conditions		
Ambient temperature Horizontal installation Vertical installation	Low temperature to IEC 60068-2-1 High temperature to IEC 60068-2-2	 0 ... 55 °C 0 ... 55 °C
Storage/shipping		-40 °C ... +70 °C
Relative humidity	IEC 60068-2-30	From 10 to 95 % no condensation
Air pressure		795 ... 1080 hPa
Pollutants	IEC 60068-2-42 IEC 60068-2-43	SO_2 10 cm^3 /m^3, 10 days H_2S 1 cm^3 /m^3, 10 days
Ambient mechanical conditions		
Degree of protection		IP 20 for IDEC SmartRelay base module front panel IP 65 / UL type 4x / 12 for Text Display front panel
Vibrations:	IEC 60068-2-6	5 ... 8.4 Hz (constant amplitude 3.5 mm) 8.4 ... 150 Hz (constant acceleration 1 g)
Shock	IEC 60068-2-27	18 shocks (half-sine wave 15g/11 ms)
Free fall (packaged)	IEC 60068-2-32	0.3 m

Criterion	Tested in accordance with	Values
Electromagnetic compatibility (EMC)		
Noise emission	EN 55011/A EN 55022/B EN 50081-1 (domestic area)	Limit class B group 1
Electrostatic discharge	IEC 61000-4-2 Severity 3	8 kV air discharge 6 kV contact discharge
Electromagnetic fields	IEC 61000-4-3	Field strength 1 V/m and 10 V/m
HF currents on cables and cable shielding	IEC 61000-4-6	10 V
Burst pulses	IEC 61000-4-4 Severity 3	2 kV (supply and signal lines)
High-energy surge pulse (applies only to FL1E-H12RCC/ FL1E-B12RCC)	IEC 61000-4-5 Severity 3	1 kV (power lines) symmetrical 2 kV (power lines) asymmetrical
Safety to IEC		
Clearance and creepage distance rating	IEC 60664, IEC 61131-2, EN 50178 cULus to UL 508, CSA C22.2 No. 142 With FL1E-H12RCC/ FL1E-B12RCC, also IEC60730-1	Fulfilled
Insulation strength	IEC 61131-2	Fulfilled
Cycle time		
Cycle time per function		< 0.1 ms
Startup		
Startup time at power-up		typ. 9 s

Note: Use a surge absorber, noise cut transformer, or noise filter to protect products rated at 12/24V DC or 24V DC power type modules against surge.

A.2 Technical data: FL1E-H12RCC/FL1E-B12RCC

	FL1E-H12RCC **FL1E-B12RCC**
Power supply	
Input voltage	100...240 V AC/DC
Permissible range	85 ... 265 V AC 100 ... 253 V DC
Permissible mains frequency	47 ... 63 Hz
Power consumption • 100 V AC • 240 V AC • 100 V DC • 240 V DC	 25 ... 40 mA 20 ... 30 mA 10 ... 25 mA 6 ... 15 mA
Inrush current	0.46 A at 100 V DC 0.46 A at 100 V AC 0.92 A at 240 V DC 0.92 A at 240 VAC
Voltage failure buffering • 100 V AC/DC • 240 V AC/DC	 typ. 10 ms typ. 20 ms
Power loss at • 100 V AC • 240 V AC • 100 V DC • 240 V DC	 2.8 ... 4.6 VA 4.8 ... 7.2 VA 1.1... 2.9 W 1.4 ... 3.6 W
Backup of the real-time clock at 25 °C	typ. 80 hours without battery cartridge typ. 2 years with battery cartridge
Accuracy of the real-time clock	typ. ±2 s / day
Digital inputs	
Number	8
Electrical isolation	No
High speed inputs	not applicable for this module
Input frequency • Normal input • High speed input	 • max. 4 Hz • not applicable for this module
Input voltage L1 • Signal 0 • Signal 1 • Signal 0 • Signal 1	 < 40 V AC > 79 V AC < 30 V DC > 79 V DC

	FL1E-H12RCC **FL1E-B12RCC**
Input current at • Signal 0 • Signal 1 • Signal 0 • Signal 1	 < 0.03 mA AC > 0.08 mA AC < 0.03 mA DC > 0.12 mA DC
Delay time at • 0 to 1 : 120 V AC : 240 V AC : 120 V DC : 240 V DC • 1 to 0 : 120 V AC : 240 V AC : 120 V DC : 240 V DC	 typ. 50 ms typ. 30 ms typ. 25 ms typ. 15 ms typ. 65 ms typ. 105 ms typ. 95 ms typ. 125 ms
Line length (unshielded)	100 m
Digital outputs	
Number	4
Output type	Relay outputs
Electrical isolation	Yes
Dielectric Strength (between power/input terminals and output terminals)	2,500 V AC, 1minute 500 V DC, 1 minute
In groups of	1
Control of a digital input	Yes
Continuous current I_{th}	max. 10 A per relay
Surge current	max. 30 A
Incandescent lamp load (25000 switching cycles) at • 230/240 V AC • 100/110 V AC	 1000 W 500 W
Fluorescent tubes with ballast (25000 switching cycles)	10 x 58 W (at 230/240 V AC)
Fluorescent tubes, conventionally compensated (25000 switching cycles)	1 x 58 W (at 230/240 V AC)
Fluorescent tubes, uncompensated (25000 switching cycles)	10 x 58 W (at 230/240 V AC)
Short circuit–proof cos 1	Power protection B16, 600A
Short circuit-proof cos 0.5 to 0.7	Power protection B16, 900A
Derating	none; across the entire temperature range
Parallel output circuits for power increase	Not permitted
Protection of output relay (if desired)	max. 16 A, characteristic B16

	FL1E-H12RCC **FL1E-B12RCC**
Minimum Switching Load	10 mA, 12 V DC
Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)
Mechanical Life	10,000,000 operations minimum (no load, 10 Hz)
Electrical Life	100,000 operations minimum (rated resistive load, 1800 operations / hour)
Switching rate	
Mechanical	10 Hz
Ohmic load/lamp load	2 Hz
Inductive load	0.5 Hz

Notice: For fluorescent lamps with capacitors, the technical data of fluorescent lamp ballasts must also be considered. If the maximum allowed surge current is exceeded, fluorescent lamps must be switched with appropriate contactor relays.

A.3 Technical data: FL1B-M08C2R2

	FL1B-M08C2R2
Power supply	
Input voltage	100...240 V AC/DC
Permissible range	85 ... 265 V AC 100 ... 253 V DC
Permissible mains frequency	47 ... 63 Hz
Power consumption • 100 V AC • 240 V AC • 100 V DC • 240 V DC	 34 ... 45 mA 30 ... 32 mA 5 ... 15 mA 5 ... 10 mA
Voltage failure buffering • 100 V AC/DC • 240 V AC/DC	 typ. 10 ms typ. 20 ms
Power loss at • 100 V AC • 240 V AC • 100 V DC • 240 V DC	 3.9 ... 4.1 VA 7.4 ... 7.6 VA 0.5 ... 1.8 W 1.2 ... 2.4 W
Backup of the real-time clock at 25 °C	
Accuracy of the real-time clock	
Digital inputs	
Number	4
Electrical isolation	No
High speed inputs	not applicable for this module
Input frequency • Normal input • High speed input	 • max. 4 Hz • not applicable for this module
Input voltage L1 • Signal 0 • Signal 1 • Signal 0 • Signal 1	 < 40 V AC > 79 V AC < 30 V DC > 79 V DC
Input current at • Signal 0 • Signal 1 • Signal 0 • Signal 1	 < 0.03 mA AC > 0.08 mA AC < 0.03 mA DC > 0.12 mA DC

	FL1B-M08C2R2
Delay time at • 0 to 1 : 120 V AC : 240 V AC : 120 V DC : 240 V DC • 1 to 0 : 120 V AC : 240 V AC : 120 V DC : 240 V DC	 typ. 50 ms typ. 30 ms typ. 25 ms typ. 15 ms typ. 65 ms typ. 105 ms typ. 95 ms typ. 125 ms
Line length (unshielded)	100 m
Digital outputs	
Number	4
Output type	Relay outputs
Electrical isolation	Yes
Dielectric Strength (between power/input terminals and output terminals)	2,500 V AC, 1minute 500 V DC, 1 minute
In groups of	1
Control of a digital input	Yes
Continuous current I_{th}	max. 5 A per relay
Surge current	max. 30 A
Incandescent lamp load (25000 switching cycles) at 230/240 V AC 100/110 V AC	 1000 W 500 W
Fluorescent tubes with ballast (25000 switching cycles)	10 x 58 W (at 230/240 V AC)
Fluorescent tubes, conventionally compensated (25000 switching cycles)	1 x 58 W (at 230/240 V AC)
Fluorescent tubes, uncompensated (25000 switching cycles)	10 x 58 W (at 230/240 V AC)
Short circuit-proof cos 1	Power protection B16, 600A
Short circuit-proof cos 0.5 to 0.7	Power protection B16, 900A
Derating	none; across the entire temperature range
Parallel output circuits for power increase	Not permitted
Protection of output relay (if desired)	max. 16 A, characteristic B16
Minimum Switching Load	10 mA, 12 V DC
Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)
Mechanical Life	10,000,000 operations minimum (no load, 10 Hz)

	FL1B-M08C2R2
Electrical Life	100,000 operations minimum (rated resistive load, 1800 operations / hour)
Switching rate	
Mechanical	10 Hz
Ohmic load/lamp load	2 Hz
Inductive load	0.5 Hz

Notice: For fluorescent lamps with capacitors, the technical data of fluorescent lamp ballasts must also be considered. If the maximum allowed surge current is exceeded, fluorescent lamps must be switched with appropriate contactor relays.

A.4 Technical data: FL1E-H12SND

	FL1E-H12SND
Power supply	
Input voltage	24 V DC
Permissible range	20.4 ... 28.8 V DC
Reverse polarity protection	Yes
Permissible mains frequency	not applicable for this module
Power consumption from 24 V DC	40 ... 75 mA 0.3 A per output
Inrush current	7.8 A at 24 V DC
Voltage failure buffering	
Power loss at 24 V	1.0 ... 1.8 W
Backup of the real-time clock at 25°C	no clock available
Accuracy of the real-time clock	no clock available
Digital inputs	
Number	8
Electrical isolation	No
High speed inputs	4 (I3, I4, I5, I6)
Input frequency • Normal input • High speed input	 • max. 4 Hz • max. 5 kHz
Input voltage • Signal 0 • Signal 1	L+ < 5 V DC > 12 V DC
Input current at • Signal 0 • Signal 1	 < 0.85 mA (I3...I6) < 0.05 mA (I1, I2, I7, I8) > 2 mA (I3... I6) > 0.15 mA (I1, I2, I7, I8)
Delay time at • 0 to 1 • 1 to 0	 typ. 1.5 ms <1.0 ms (I3 ... I6) typ. 1.5 ms <1.0 ms (I3 ... I6)
Line length (unshielded)	100 m
Analog inputs	
Number	4 (I1=AI3, I2=AI4, I7=AI1, I8=AI2)
Range	0 ... 10 V DC input impedance 72 kΩ
Cycle time for analog value generation	300 ms
max. input voltage	28.8 V

	FL1E-H12SND
Line length (shielded and twisted)	10 m
Error limit	+/- 1.5% at full scale
Digital outputs	
Number	4
Output type	Transistor, current-sourcing (1)
Electrical isolation	No
In groups of	
Control of a digital input	Yes
Output voltage	⏥ Supply voltage
Output current	max. 0.3 A
Short circuit-proof and overload-proof	Yes
Short circuit current limitation	Approx. 1 A
Derating	none; across the entire temperature range
Short circuit-proof cos 1	not applicable for this module
Short circuit-proof cos 0.5 to 0.7	not applicable for this module
Parallel output circuit for power increase	Not permitted
Protection of output relay (if desired)	
Switching rate (2)	
Mechanical	not applicable for this module
Electrical	10 Hz
Ohmic load/lamp load	10 Hz
Inductive load	0.5 Hz

(1): When FL1E-H12SND or FL1B-M08B1S2 are switched on, signal 1 is sent to the digital outputs for about 50 microseconds. Take this into account, especially when using devices that react to short pulses.

(2) The maximum switching rate is only dependent on the switching program's cycle time.

A.5 Technical data: FL1B-M08B1S2

	FL1B-M08B1S2
Power supply	
Input voltage	24 V DC
Permissible range	20.4 ... 28.8 V DC
Reverse polarity protection	Yes
Permissible mains frequency	not applicable for this module
Power consumption from 24 V DC	30 ... 45 mA 0.3 A per output
Voltage failure buffering	
Power loss at 24 V	0.8 ... 1.1 W
Backup of the real-time clock at 25 °C	no clock available
Accuracy of the real-time clock	no clock available
Digital inputs	
Number	4
Electrical isolation	No
Input voltage • Signal 0 • Signal 1	L+ < 5 V DC > 12 V DC (1)
Input current at • Signal 0 • Signal 1	 < 0.85 mA (2) > 2 mA (3)
Delay time at • 0 to 1 • 1 to 0	 typ. 1.5 ms typ. 1.5 ms
Line length (unshielded)	100 m
Digital outputs	
Number	4
Output type	Transistor, current-sourcing (4)
Electrical isolation	No
In groups of	
Control of a digital input	Yes
Output voltage	≙ Supply voltage
Output current	max. 0.3 A
Short circuit-proof and overload-proof	Yes
Short circuit current limitation	Approx. 1 A
Derating	none; across the entire temperature range

	FL1B-M08B1S2
Short circuit–proof cos 1	not applicable for this module
Short circuit-proof cos 0.5 to 0.7	not applicable for this module
Parallel output circuit for power increase	Not permitted
Protection of output relay (if desired)	
Switching rate	
Mechanical	
Electrical	10 Hz
Ohmic load/lamp load	10 Hz
Inductive load	0.5 Hz

(1): 8 V DC (Version 1 to 4 specifications)
(2): 1.0 mA (Version 1 to 4 specifications)
(3): 1.5 mA (Version 1 to 4 specifications)
(4): When FL1E-H12SND or FL1B-M08B1S2 are switched on, signal 1 is sent to the digital outputs for about 50 microseconds. Take this into account, especially when using devices that react to short pulses.

A.6 Technical data: FL1E-H12RCA/FL1E-B12RCA

	FL1E-H12RCA **FL1E-B12RCA**
Power supply	
Input voltage	24 V AC/DC
Permissible range	20.4 ... 26.4 V AC 20.4 ... 28.8 V DC
Reverse polarity protection	not applicable for this module
Permissible mains frequency	47 ... 63 Hz
Power consumption • 24 V AC • 24 V DC	 76 ... 182 mA 40 ... 100 mA
Inrush current	2.28 A at 24 V DC 2.48 A at 24 V AC
Voltage failure buffering	typ. 5 ms
Power loss • 24 V AC • 24 V DC	 1.8... 4.4 VA 1.0 ... 2.4 W
Backup of the real-time clock at 25 °C	typ. 80 hours without battery cartridge typ. 2 years with battery cartridge
Accuracy of the real-time clock	typ. ±2 s / day

	FL1E-H12RCA **FL1E-B12RCA**
Digital inputs	
Number	8, optional P action or N action
Electrical isolation	No
High speed inputs	not applicable for this module
Input frequency • Normal input • High speed input	 • max. 4 Hz • not applicable for this module
Input voltage • Signal 0 • Signal 1	L < 5 V AC/DC > 12 V AC/DC
Input current at • Signal 0 • Signal 1	 < 1.0 mA > 2.5 mA
Delay time at • 0 to 1 • 1 to 0	 typ. 1.5 ms typ. 15 ms
Line length (unshielded)	100 m
Analog inputs	
Number	
Range	
max. Input voltage	
Digital outputs	
Number	4
Output type	Relay outputs
Electrical isolation	Yes
Dielectric Strength (between power/input terminals and output terminals)	2,500 V AC, 1minute 500 V DC, 1 minute
In groups of	1
Control of a digital input	Yes
Continuous current I_{th}	max. 10 A per relay
Surge current	max. 30 A
Incandescent lamp load (25000 switching cycles) at	1000 W
Fluorescent tubes with ballast (25000 switching cycles)	10 x 58 W
Fluorescent tubes, conventionally compensated (25000 switching cycles)	1 x 58 W

	FL1E-H12RCA **FL1E-B12RCA**
Fluorescent tubes, uncompensated (25000 switching cycles)	10 x 58 W
Derating	none; across the entire temperature range
Short circuit-proof cos 1	Power protection B16, 600A
Short circuit-proof cos 0.5 to 0.7	Power protection B16, 900A
Parallel output circuits for power increase	Not permitted
Protection of output relay (if desired)	max. 16 A, characteristic B16
Minimum Switching Load	10 mA, 12 V DC
Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)
Mechanical Life	10,000,000 operations minimum (no load, 10 Hz)
Electrical Life	100,000 operations minimum (rated resistive load, 1800 operations / hour)
Switching rate	
Mechanical	10 Hz
Ohmic load/lamp load	2 Hz
Inductive load	0.5 Hz

Notice: For fluorescent lamps with capacitors, the technical data of fluorescent lamp ballasts must also be considered. If the maximum allowed surge current is exceeded, fluorescent lamps must be switched with appropriate contactor relays.

A.7 Technical data: FL1B-M08D2R2

	FL1B-M08D2R2
Power supply	
Input voltage	24 V AC/DC
Permissible range	20.4 ... 26.4 V AC 20.4 ... 28.8 V DC
Reverse polarity protection	not applicable for this module
Permissible mains frequency	47 ... 63 Hz
Power consumption • 24 V AC • 24 V DC	 120 ... 146 mA 20 ... 75 mA
Voltage failure buffering	typ. 5 ms
Power loss • 24 V AC • 24 V DC	 2.4 ... 4.3 VA 0.4 ... 1.8 W
Backup of the real-time clock at 25 °C	
Accuracy of the real-time clock	
Digital inputs	
Number	4, optional P action or N action
Electrical isolation	No
High speed inputs	not applicable for this module
Input frequency • Normal input • High speed input	 • max. 4 Hz • not applicable for this module
Input voltage • Signal 0 • Signal 1	L < 5 V AC/DC > 12 V AC/DC
Input current at • Signal 0 • Signal 1	 < 1.0 mA > 2.5 mA
Delay time at • 0 to 1 • 1 to 0	 typ. 1.5 ms typ. 15 ms
Line length (unshielded)	100 m
Digital outputs	
Number	4
Output type	Relay outputs
Electrical isolation	Yes
Dielectric Strength (between power/input terminals and output terminals)	2,500 V AC, 1 minute 500 V DC, 1 minute
In groups of	1

	FL1B-M08D2R2
Control of a digital input	Yes
Continuous current I_{th}	max. 5 A per relay
Surge current	max. 30 A
Incandescent lamp load (25000 switching cycles) at	1000 W
Fluorescent tubes with ballast (25000 switching cycles)	10 x 58 W
Fluorescent tubes, conventionally compensated (25000 switching cycles)	1 x 58 W
Fluorescent tubes, uncompensated (25000 switching cycles)	10 x 58 W
Derating	none; across the entire temperature range
Short circuit-proof cos 1	Power protection B16, 600A
Short circuit-proof cos 0.5 to 0.7	Power protection B16, 900A
Parallel output circuits for power increase	Not permitted
Protection of output relay (if desired)	max. 16 A, characteristic B16
Minimum Switching Load	10 mA, 12 V DC
Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)
Mechanical Life	10,000,000 operations minimum (no load, 10 Hz)
Electrical Life	100,000 operations minimum (rated resistive load, 1800 operations / hour)
Switching rate	
Mechanical	10 Hz
Ohmic load/lamp load	2 Hz
Inductive load	0.5 Hz

Notice: For fluorescent lamps with capacitors, the technical data of fluorescent lamp ballasts must also be considered. If the maximum allowed surge current is exceeded, fluorescent lamps must be switched with appropriate contactor relays.

A.8 Technical data: FL1E-H12RCE/ FL1E-B12RCE and FL1B-M08B2R2

	FL1E-H12RCE FL1E-B12RCE	FL1B-M08B2R2
Power supply		
Input voltage	12/24 V DC	12/24 V DC
Permissible range	10.8 ... 28.8 V DC	10.8 ... 28.8 V DC
Reverse polarity protection	Yes	Yes
Inrush current	1.6 A at 12 V DC 7.48 A at 24 V DC	
Power consumption • 12 V DC • 24 V DC	 60 ... 175 mA 40 ... 100mA	 30 ... 140 mA 20 ... 75 mA
Voltage failure buffering • 12 V DC • 24 V DC	 typ. 2 ms typ. 5 ms	 typ. 2 ms typ. 5 ms
Power loss • 12 V DC • 24 V DC	 0.7 ... 2.1 W 1.0 ... 2.4 W	 0.3 ... 1.7 W 0.4 ... 1.8 W
Backup of the real-time clock at 25 °C	typ. 80 hours without battery cartridge typ. 2 years with battery cartridge	
Accuracy of the real-time clock	typ. ±2 s / day	
Electrical isolation	No	No
Digital inputs		
Number	8	4
Electrical isolation	No	No
High speed inputs	4 (I3, I4, I5, I6)	
Input frequency • Normal input • High speed input	 • max. 4 Hz • max. 5 kHz	 • max. 4 Hz • not applicable for this module
Input voltage L+ • Signal 0 • Signal 1	 < 5 V DC > 8.5 V DC	 < 5 V DC > 8.5 V DC (1)
Input current at • Signal 0 • Signal 1	 < 0.85 mA (I3...I6) < 0.05 mA (I1, I2, I7, I8) > 1.5 mA (I3... I6) > 0.1 mA (I1, I2, I7, I8)	 < 0.85 mA(2) > 1.5 mA

	FL1E-H12RCE **FL1E-B12RCE**	**FL1B-M08B2R2**
Delay time at • 0 to 1 • 1 to 0	typ. 1.5 ms <1.0 ms (I3 ... I6) typ. 1.5 ms <1.0 ms (I3 ... I6)	typ. 1.5 ms typ. 1.5 ms
Line length (unshielded)	100 m	100 m
Analog inputs		
Number	4 (I1=AI3, I2=AI4, I7=AI1, I8=AI2)	
Range	0 ... 10 V DC input impedance 72 kΩ	
Cycle time for analog value generation	300 ms	
max. Input voltage	28.8 V DC	
Line length (shielded and twisted)	10 m	
Error limit	+/- 1.5 % at full scale	
Digital outputs		
Number	4	4
Output type	Relay outputs	Relay outputs
Electrical isolation	Yes	Yes
Dielectric Strength (between power/ input terminals and output terminals)	2,500 V AC, 1 minute 500 V DC, 1 minute	2,500 V AC, 1 minute 500 V DC, 1 minute
In groups of	1	1
Control of a digital input	Yes	Yes
Continuous current $I_{th\ (per\ terminal)}$	max. 10 A per relay	max. 5 A per relay
Surge current	max. 30 A	max. 30 A
Incandescent lamp load (25000 switching cycles) at	1000 W	1000 W
Fluorescent tubes with ballast (25000 switching cycles)	10 x 58 W	10 x 58 W
Fluorescent tubes, conventionally compensated (25000 switching cycles)	1 x 58 W	1 x 58 W
Fluorescent tubes, uncompensated (25000 switching cycles)	10 x 58 W	10 x 58 W
Derating	none; across the entire temperature range	none; across the entire temperature range
Short circuit-proof cos 1	Power protection B16, 600A	Power protection B16, 600A

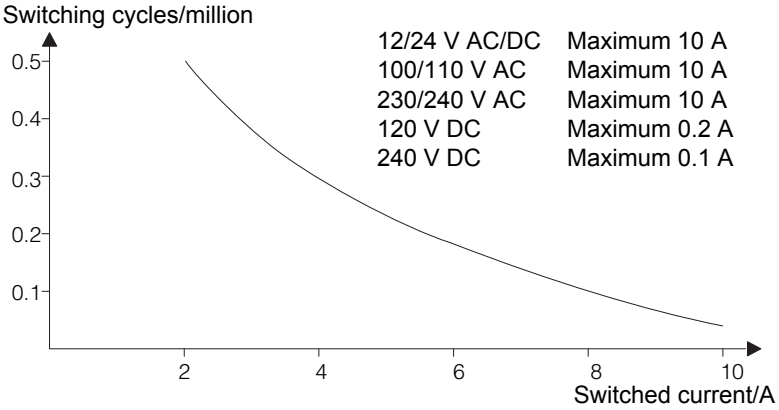
	FL1E-H12RCE **FL1E-B12RCE**	**FL1B-M08B2R2**
Short circuit-proof cos 0.5 to 0.7	Power protection B16, 900A	Power protection B16, 900A
Parallel output circuits for power increase	Not permitted	Not permitted
Protection of output relay (if desired)	max. 16 A, characteristic B16	max. 16 A, characteristic B16
Minimum Switching Load	10 mA, 12 V DC	10 mA, 12 V DC
Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)	100 mΩ maximum (at 1A, 24V DC)
Mechanical Life	10,000,000 operations minimum (no load, 10 Hz)	10,000,000 operations minimum (no load, 10 Hz)
Electrical Life	100,000 operations minimum (rated resistive load, 1800 operations / hour)	100,000 operations minimum (rated resistive load, 1800 operations / hour)
Switching rate		
Mechanical	10 Hz	10 Hz
Ohmic load/lamp load	2 Hz	2 Hz
Inductive load	0.5 Hz	0.5 Hz

Notice: For fluorescent lamps with capacitors, the technical data of fluorescent lamp ballasts must also be considered. If the maximum allowed surge current is exceeded, fluorescent lamps must be switched with appropriate contactor relays.

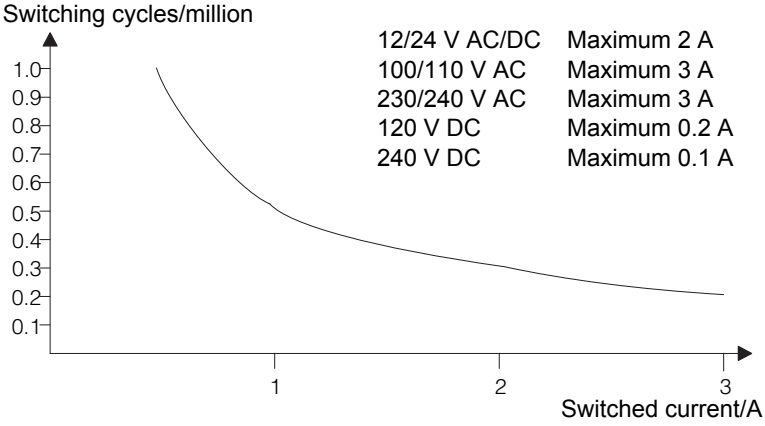
(1): 8 V DC (Version 1 to 5 specifications)
(2): 1.0 mA (Version 1 to 5 specifications)

A.9 Switching capacity and service life of the relay outputs

Switching capacity and service life of the contacts with ohmic load (heating):



Switching capacity and service life of the contacts with high inductive load to IEC 947-5-1 DC 13/AC 15 (contactors, solenoid coils, motors)



A.10 Technical data: FL1B-J2B2

	FL1B-J2B2
Power supply	
Input voltage	12/24 V DC
Permissible range	10.8 ... 28.8 V DC
Power consumption	25 ... 50 mA
Voltage failure buffering	typ. 5 ms
Power loss at • 12 V • 24 V	 0.3 ... 0.6 W 0.6 ... 1.2 W
Electrical isolation	No
Reverse polarity protection	Yes
Ground terminal	for connecting ground and shielding of the analog measuring line
Analog inputs	
Number	2
Type	Unipolar
Input range	0 ... 10 V DC (input impedance 76 kΩ) or 0 ... 20 mA (input impedance <250 Ω)
Resolution	10 bit, normalized to 0 ... 1000
Cycle time for analog value generation	50 ms
Electrical isolation	No
Line length (shielded and twisted)	10 m
Encoder supply voltage	none
Error limit	+/- 1.5 %
Interference frequency suppression	55 Hz

A.11 Technical data: FL1D-K2B2, FL1D-K2BM2

	FL1D-K2B2	FL1D-K2BM2
Power supply		
Input voltage	24 V DC	24 V DC
Permissible range	20.4 ... 28.8 V DC	20.4 ... 28.8 V DC
Power consumption	25 ...50 mA	35 ...90 mA
Voltage failure buffering	typ. 5 ms	typ. 5 ms
Power loss at 24 V	0.6 ... 1.2 W	0.9 ... 2.2 W
Electrical isolation	No	No
Reverse polarity protection	Yes	Yes
Ground terminal	for connecting ground and shielding of the analog output line.	for connecting ground and shielding of the analog output line.
Analog outputs		
Number	2	2
Voltage range	0 ... 10 V DC	0 ... 10 V DC
Voltage load	>= 5 kΩ	>= 5 kΩ
Current output	-	0/4 ... 20 mA
Current load	-	<= 250 Ω
Resolution	10 bit, normalized to 0 ... 1000	10 bit, normalized to 0 ... 1000
Cycle time for analog output	depending on installation (typ. 50 ms)	depending on installation (typ. 50 ms)
Electrical isolation	No	No
Line length (shielded and twisted)	10 m	10 m
Error limit	Voltage output: +/- 2.5 % at full scale	Voltage output: +/- 2.5 % at full scale Current output: +/- 3 % at full scale
Short circuit protection	Yes	Yes
Response at short-circuit	(1)	(1)
Overload protection	Yes	Yes
Response at overload	(1)	(1)

(1) Voltage output: If short-circuit protection or overcurrent protection is activated for a voltage output, the error limit of the other voltage is not ensured.

A.12 Technical data: Text Display

	Text Display
Mechanical data	
Dimensions (WxHxD) Weight Installation	128.2 x 86 x 38.7 mm Approx. 220 g Bracket mounting
Keyboard Display	Membrane keypad with 10 keys FSTN-Graphic Display with 128 x 64 (columns x rows), LED backlight
Power supply	
Input voltage	24 V AC/DC 12 V DC
Permissible range	20.4 ... 26.4 V AC 10.2 ... 28.8 V DC
Permissible mains frequency	47 ... 63 Hz
Power consumption • 12 V DC • 24 V DC • 24 V AC	 typ. 65 mA typ. 40 mA typ. 90 mA
Data transmission rate	19200 baud
Inrush current	3.04 A at 12 V DC 6.36 A at 24 V DC 0.66 A at 24 V AC
LCD Display and Backlight	
Backlight lifetime(1)	20,000 hours
Display lifetime(2)	50,000 hours

(1) Backlight lifetime is defined as: The final brightness is 50% of the original brightness.

(2) Display lifetime is calculated under ordinary operating and storage conditions: room temperature (20 +/-8°C), normal humidity below 65% relative humidity, and not in exposure to direct sunlight.

Determining the cycle time

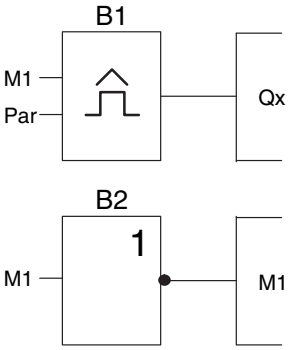
B

The program cycle is the complete execution of the circuit program, that is, primarily the reading in of the inputs, the processing of the circuit program and the subsequent reading out of the outputs. The cycle time is the time required to execute a circuit program once in full.

The time required for a program cycle can be determined using a short test program. This test program is created in IDEC SmartRelay and returns a value during its execution in parameter assignment mode from which the current cycle time is derived.

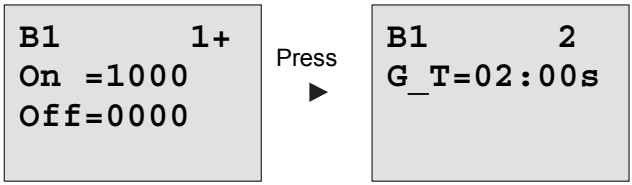
Test program

1. Create the test program by linking an output to a frequency trigger and connecting the trigger input with an inverted marker.

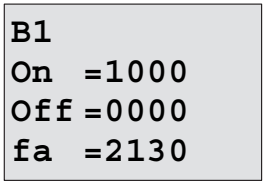


Output Qx or other marker Mx

2. Configure the frequency trigger as shown below. A pulse is generated in each program cycle due to the inverted marker. The trigger interval is set to 2 seconds.



3. Now start the circuit program and switch IDEC SmartRelay to parameter assignment mode. In this mode, view the trigger parameters.



f_a= total of measured pulses per timebase G_T

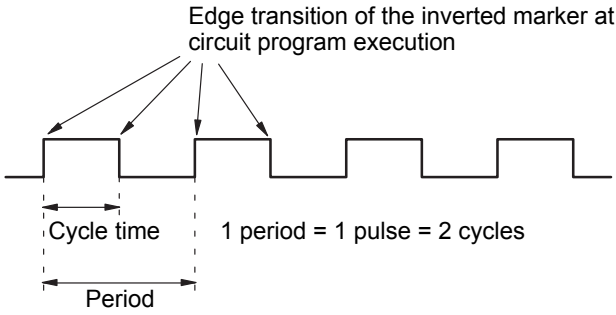
4. The reciprocal value of f_a is equivalent to the IDEC SmartRelay execution time of the current circuit program in its memory.

   $1/f_a$ = cycle time in s

Explanation

The inverted marker block changes its output signal at each program execution. Thus, one logic level (high or low) width is exactly equivalent to the length of one cycle. Hence, a period lasts 2 cycles.

The frequency trigger indicates the ratio of periods per 2 seconds, which results in the ratio of cycles per second.

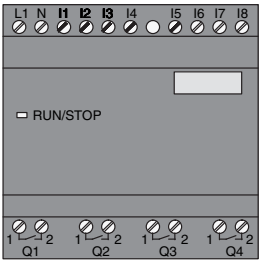


IDEC SmartRelay without display

C

Because some specific applications do not require operator control and monitoring units such as buttons or a display, we provide the FL1E-B12RCE, FL1E-B12RCA and FL1E-B12RCC versions without display.

View of a FL1E-B12RCC, for example:



Less is definitely more!

The versions without display offer you the following benefits:

- Even more cost-effective without the operating element
- Requires less switch cabinet space than conventional hardware
- Substantial benefits with regard to flexibility and prime costs compared to stand-alone electronic switchgear
- Of advantage even for applications in which merely two or three conventional switching devices can be replaced
- Very easy to use
- Access protected
- Compatible to IDEC SmartRelay versions with display
- Offers the option to read data by means of WindLGC

Creating a circuit program without operator panel

There are two ways to create a circuit program for an IDEC SmartRelay without display:

- You create the circuit program with WindLGC on your PC and then download it to IDEC SmartRelay (see Chapter 7).
- You download the circuit program from an IDEC SmartRelay memory cartridge or combined memory/battery cartridge to your IDEC SmartRelay without display (see Chapter 6).

Operating characteristics

IDEC SmartRelay is ready for operation when power is switched on. Switching off an IDEC SmartRelay without display is equivalent to disconnecting the power supply, e.g. as if you were removing the plug.

The circuit program of FL1E-B12... versions cannot be started or stopped by means of buttons. This is why the FL1E-B12... versions have other startup characteristics:

Startup characteristics

If there is no circuit program in IDEC SmartRelay or on the inserted memory cartridge or combined memory/battery cartridge, IDEC SmartRelay remains in STOP.

If there is a valid circuit program in IDEC SmartRelay memory, the IDEC SmartRelay automatically switches from STOP to RUN when power is switched on.

The circuit program on an inserted memory cartridge or combined memory/battery cartridge is automatically copied to IDEC SmartRelay, immediately after power is switched on. The existing circuit program in IDEC SmartRelay memory is overwritten. The system automatically changes from STOP to RUN.

Provided the PC cable is connected to IDEC SmartRelay, you can download the circuit program to IDEC SmartRelay and start it by means of WindLGC PC software (see Chapter 7.1).

Operating status indication

Operating states, e.g. Power On, RUN and STOP are indicated by an LED on the front hood.

- Red LED: Power On/STOP
- Green LED: Power On/RUN

The red LED is lit after Power On and in all IDEC SmartRelay states other than RUN. The green LED is lit when IDEC SmartRelay is in RUN mode.

Reading current data

WindLGC (see Chapter 7) provides an online test for reading the current data of all functions while the system is in RUN.

If your IDEC SmartRelay without display holds a protected memory cartridge or combined memory/battery cartridge, you cannot read the current data unless you enter the correct password for the circuit program. The circuit program is otherwise deleted from IDEC SmartRelay memory when you remove the memory cartridge or combined memory/battery cartridge to connect the PC cable. (See Chapter 6.1).

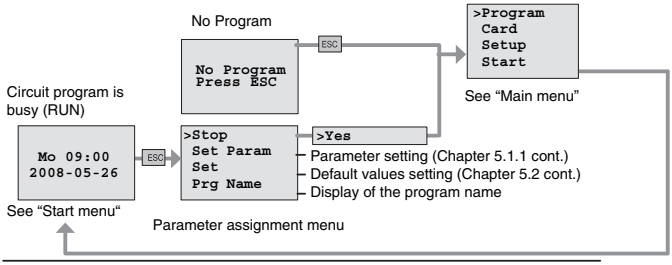
Deleting the circuit program

Use WindLGC to delete the circuit program and password if a password exists.

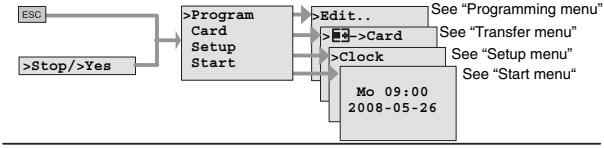
IDEC SmartRelay menu structure D

D.1 IDEC SmartRelay base module

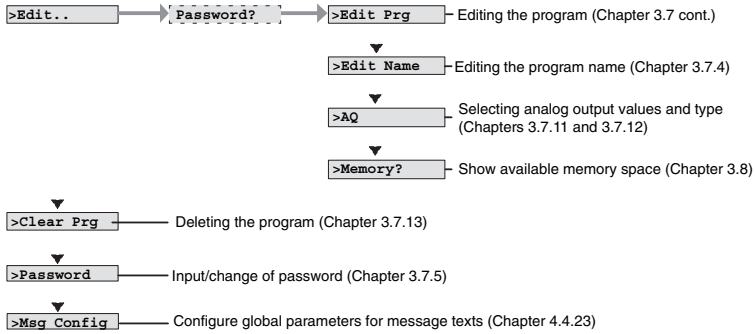
Menu overview



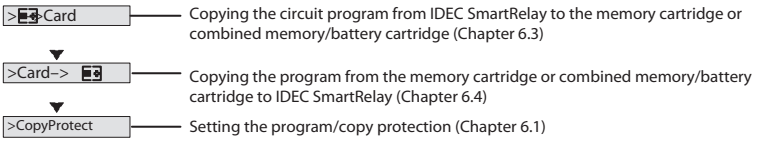
Main menu (ESC / >Stop)



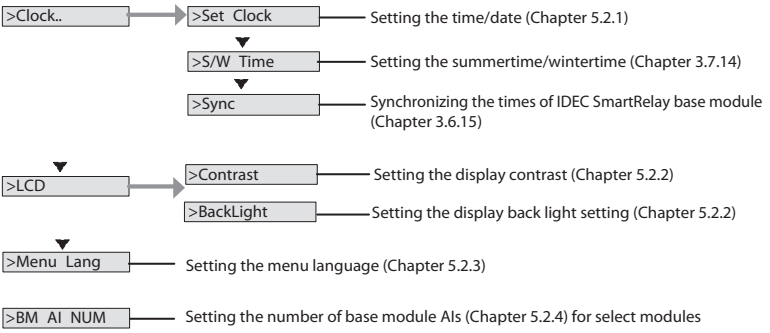
Programming menu (ESC / >Stop → >Program)



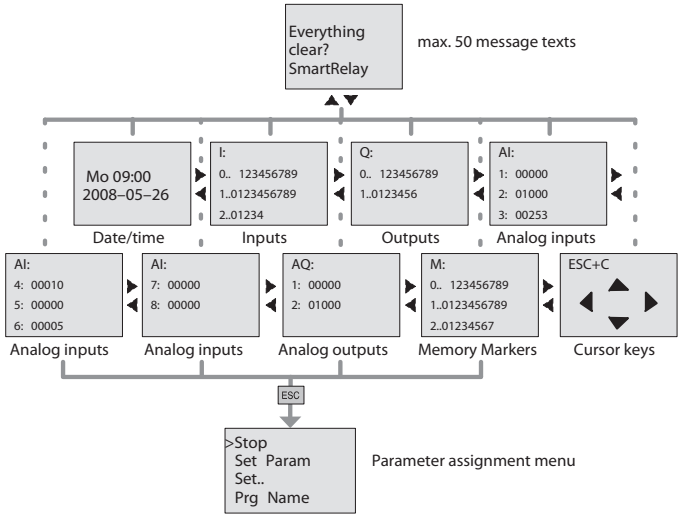
Transfer menu (ESC / >Stop ⟶ >Card)



Setup menu (ESC / >Stop ⟶ >Setup)

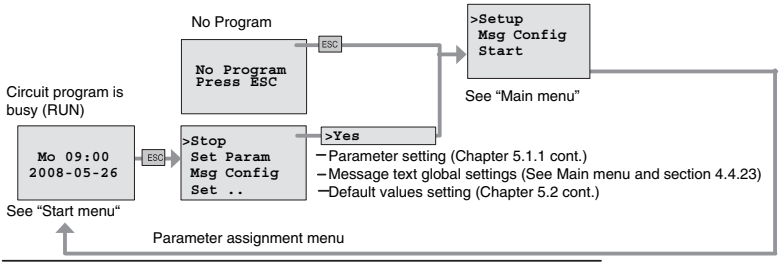


Start Menu (RUN)

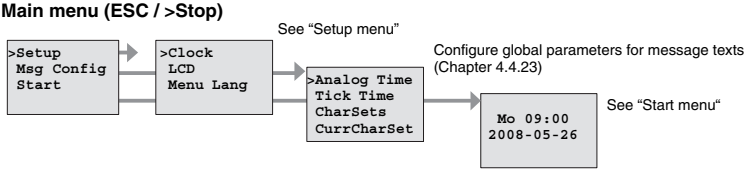


D.2 Text Display

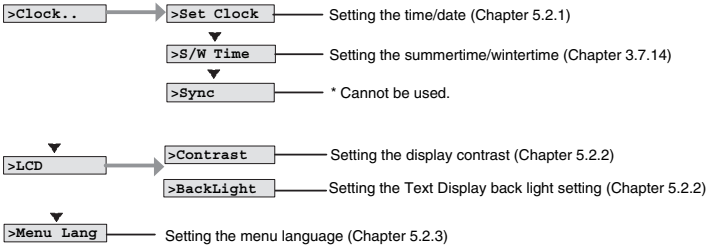
Menu overview



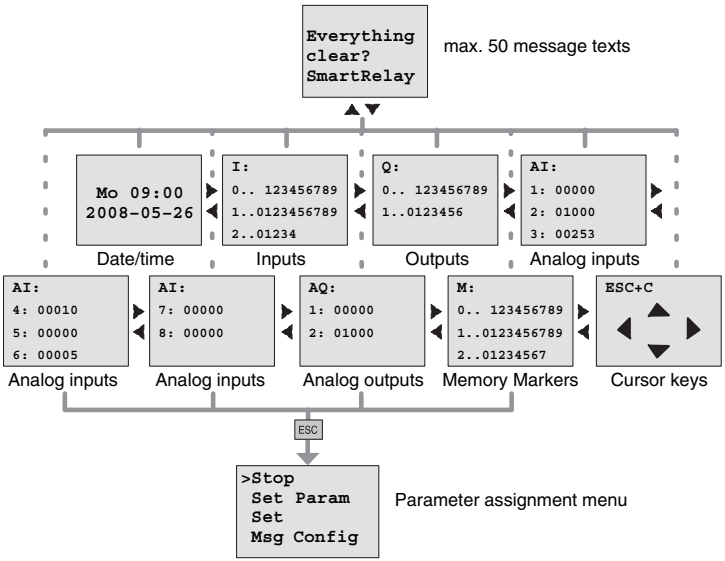
Main menu (ESC / >Stop)



Setup menu (ESC / >Stop ⟶ >Setup)



Start Menu (base module in RUN)



Type Numbers

E

Table A IDEC SmartRelay Modules

Name	Type Number	Rated Power Voltage	Input Type (Digital)	Input Type (Analog)	Output Type (Relay)	Output Type (Analog)	Display and Keypad	Real Time Clock
Base Module (IDEC SmartRelay Base or Pure)	FL1E-H12RCC	100-240V AC/DC	8	-	4	-	Yes	Yes
	FL1E-B12RCC						-	
	FL1E-H12RCA	24V AC/DC	8	-	4	-	Yes	Yes
	FL1E-B12RCA						-	
	FL1E-H12RCE	12/24V DC	8 (I1-I8)	4 (I1, I2, I7, I8)	4	-	Yes	Yes
	FL1E-B12RCE						-	
	FL1E-H12SND	24V DC	8 (I1-I8)	4 (I1, I2, I7, I8)	4 (Tr)	-	Yes	-
Expansion Module	FL1B-M08B2R2	12/24V DC	4	-	4	-	-	-
	FL1B-M08B1S2	24V DC	4	-	4 (Tr)	-	-	-
	FL1B-M08C2R2	100-240V AC/DC	4	-	4	-	-	-
	FL1B-M08D2R2	24V AC/DC	4	-	4	-	-	-
	FL1B-J2B2	12/24V DC	-	2	-	-	-	-
	FL1D-K2B2	24V DC	-	-	-	2(0-10V)	-	-
	FL1D-K2BM2	24V DC	-	-	-	2(0-10V, 0/4-20mA)	-	-
Text Display	FL1E-RD1	24V AC/DC 12V DC	-	-	-	-	Yes	-
AS-Interface Module	FL1B-CAS2	AS-Interface Voltage	-	-	-	-	-	-

Cable and Accessories Table B

Name	Function	Type Number
WindLGC	Exclusive Programming Software for IDEC SmartRelay (incl. Hardware/Software Manual)	FL9Y-LP1CDW
PC Cable	Down-load/Up-load Cable	FL1A-PC1
USB PC cable	Down-load/Up-load Cable	FL1E-PC2
Memory cartridge		FL1E-PM4
Battery cartridge		FL1E-PB1
Combined memory/ battery cartridge		FL1E-PG1
User's Manual	FL1E User's Manual (English)	FL9Y-B1090
Mounting Clip	5 pieces	FL1B-PSP1PN05
Removal Tool	Memory Cartridge Removal Tool	MT-101

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