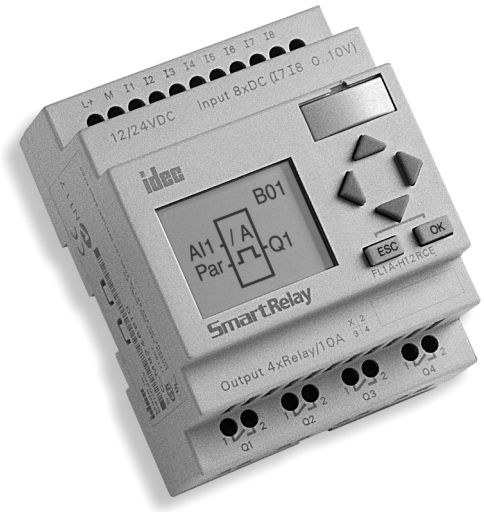
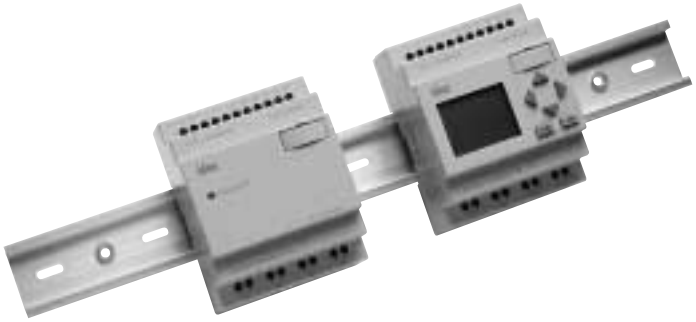
Section H



IDEC SmartRelay



Smarter than the rest.

Key features of the IDEC SmartRelay include:

- Compact body size (72x90x55 mm)
- Easy to program
- Operational control buttons
- Multifunction interface
- Digital/Analog inputs (6 digital plus 2 digital or analog)
- LCD display panel
- Maximum of 56 function blocks and 8 internal relays can work at the same time
- UL/CSA listed, C-tick listed, and IEC61131/VDE0631 compliant
- FM approved for Class I, Division 2 hazardous locations

Text Display

It can display messages up to 40 characters long from a selection of 97 character types.

Operational Buttons

Use the selection buttons for easy confirmation or modification of the circuit being displayed.

Memory Cartridge

Using the FL1A-PM1 (yellow) memory cartridge it is not only possible to save your program, but also duplicate it without any special procedures.

The FL1A-PM2 (red) memory cartridge will back up the program, and protect the internal program from unintended modification or unauthorized copying.

Economical Type

Models available without the display panel and operational buttons.

H

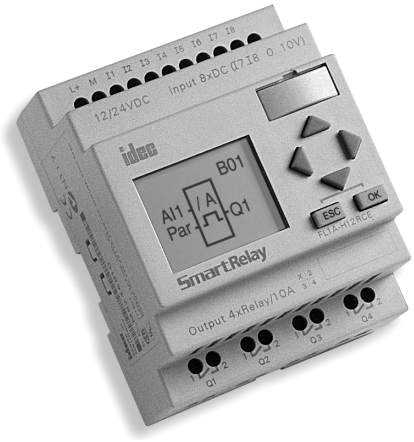
Part Number

Part Number	Rated Voltage	Input Signal	Output Signal	With Display	With Clock	Input/Output
FL1A-H12RCE	12/24V DC	DC I7and I8 are used for digital/analog	Relay Output	Yes	Yes	8/4
FL1A-B12RCE				—		
FL1A-H12SND	24V DC		Transistor Source Output	Yes	—	
FL1A-H10RCA	24V AC	AC	Relay Output	Yes	Yes	6/4
FL1A-B10RCA				—		
FL1A-H10RCB	100-240V AC	AC		Yes		
FL1A-B10RCB				—		

Options

Description	Part Number	Note
Memory Cartridge (Yellow)	FL1A-PM1	Rewritable
Memory Cartridge (Red)	FL1A-PM2	Not Rewritable
Programming Software: WindLGC	FL9Y-LP1CDW	CD w/Online Manual
PC Cable	FL1A-PC1	
35MM DIN Rail Aluminum, 1m/3.28ft	BNDN1000	
Mounting Clips	BNL6	

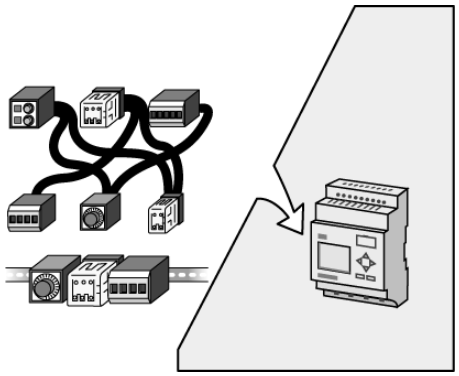
Applications



The IDEC SmartRelay can replace multiple timers, relays and counters in many control and monitoring applications. The compact body (72x90x55 mm) houses a real-time clock and calendar, plus 29 different function blocks. Program and edit using either the "smart" selection buttons or our even "smarter" exclusive software, WindLGC. The IDEC SmartRelay is the ideal solution for managing automatic lighting, access control, watering systems, pump control, or ventilation systems in factory or home automation.

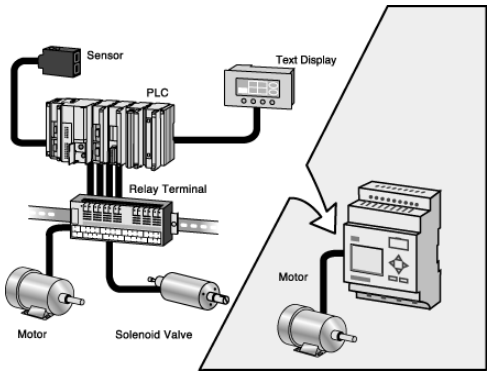
"SMARTer" than Relays, Counters, and Timers!

Change your current system easily, from multiple relays, counters and timers to a single IDEC SmartRelay.



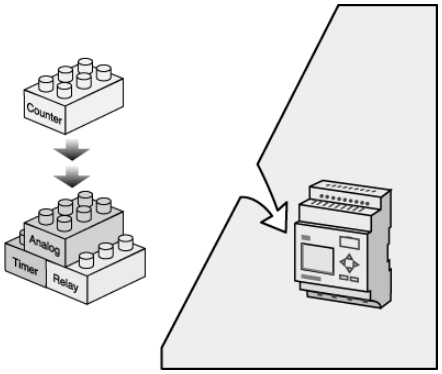
"SMARTer" than systems with Programmable Logic Systems

The IDEC SmartRelay can "smartly" mimic many functions of programmable logic controller components. The IDEC SmartRelay also features max. 10A output contacts and up to 40 letters of display.



"SMARTer" Problem Solving

Reduce your programming time by utilizing and selecting from one of the 29 function blocks. Edit or modify programs without any special skills or advanced training.



H

Specifications

General Specifications

Item			Specifications	Compliant Standards
Dimensions (W x H x D)			72 x 90 x 55 mm	—
Weight			Approx. 190g	—
Operating termperature		Horizontal	0 to +55°C	Cold: IEC60068-2-1
		Vertical	0 to +55°C	Hot: IEC60068-2-2
Storage temperature			-40 to +70°C	—
Relative humidity			5 to 95%	IEC60068-2-30
Pressure			795 to 1080 hPa	—
Corrosion immunity			Free from corrosive gases	—
Degree of protection			IP20	
Vibration resistance			10 to 57Hz (amplitude: 0.15mm) 57 to 150Hz (acceleration: 2G)	IEC60068-2-6
Shock resistance			150 m/s^2	IEC60068-2-27
Dropping			50 mm (Drop height)	IEC60068-2-31
Free fall (packaged)			1 m	IEC60068-2-32
Emmission			Class B Group 1	EN55011
EMC	Emitted interference		—	EN50081-2, EN50082-2
	Electrostatic discharge		8kV Air Discharge 6kV Contact Discharge	IEC61000-4-2
	Electromagnetic fields		10V/m	IEC61000-4-3
	Burst pulses		2KV (Supply and Signal Lines)	IEC61000-4-4
	Energy carriers single pulse (surge) (apply only to FL1A-H10RCD, FL1A-B10RCD)		0.5kV(Power Lines): Symmetrical 1kV (Power Lines): Asymmetrical	IEC61000-4-5
Communication cable			2 x 1.5 mm2, 1 x 0.5 to 2.5 mm2	—

H

Operating Specifications

Part Number		With Display	FL1A-H12RCE	FL1A-H12SND	FL1A-H10RCA	FL1A-H10RCB
		Without Display	FL1A-B12RCE	–	FL1A-B10RCA	FL1A-B10RCB
Power Supply	Rated voltage		12/24V DC	24V DC	24V AC	100-240V AC
	Allowable Voltage Range		10.8-15.6V DC 20.4-28.8V DC	20.4-28.8V DC	20.4V-26.4V AC	85-264V AC
	Rated Frequency		—	—	—	50/60Hz (47-63Hz)
	Input Current		10-120 mA (12V DC) 10-85 mA (24V DC)	10-20 mA (24V DC)	15-120 mA (24V DC)	10-30 mA (100V AC) 10-20 mA (240V AC)
	Allowable Momentary Power Interruption		5 ms	—	5 ms	10 ms (100V AC) 20 ms (240V AC)
	Power Consumption		0.1-1.5W (12V DC) 0.2-2.0W (24V DC)	0.2-0.5W (24V DC)	0.3-2.9W (24V AC)	1.1-3.5W (100V AC) 2.3-4.8W (240V AC)
	Reverse Polarity Protection		Yes	Yes	—	—
Clock	Backup Duration		80h at 25°C	—	80h at 25°C	80h at 25°C
	Clock Accuracy		±5s / day maximum	—	±5s / day maximum	±5s / day maximum

Specifications con't

	Part Number		FL1A-H12RCE FL1A-B12RCE	FL1A-H12SND	FL1A-H10RCA FL1A-B10RCA	FL1A-H10RCB FL1A-B10RCB
Operating Specifications (con't)	Input	Input Signal	DC	DC	AC	AC
		Input Points	8 (I1-I8)	8 (I1-I8)	6 (I1-I6)	6 (I1-I6)
		Analog Input Points	2 (I7, I8)*	2 (I7, I8)*	—	—
		Fast Inputs	2 (I5, I6) Max 1KHz**	2 (I5, I6) Max 1KHz**	—	—
		Analog Input Voltage Range	0 to10V DC (maximum rated voltage: 28.8V DC)	0 to 10V DC (maximum rated voltage : 28.8V DC)	—	—
		Rated Input Voltage	12/24V DC	24V DC	24V AC	100-240V AC
		Allowable Voltage Range	10.8-15.6V DC 20.4-28.8V DC	20.4-28.8V DC	20.4-26.4V AC	85-264V AC
		Isolation	Not Isolated	Not Isolated	Isolated	Not Isolated
		Operating Range — Turn OFF Voltage	< 5V DC	< 5V DC	< 5V AC	< 40V AC
		Operating Range — Turn ON Voltage	> 8V DC	> 8V DC	> 12V AC	> 79V AC
		Operating Range — Turn OFF Current	< 1.0 mA (I1-I6) < 0.05 mA (I7-I8)	< 1.0 mA (I1-I6) < 0.05 mA (I7-I8)	< 1.0 mA	< 0.03 mA
		Operating Range — Turn ON Current	> 1.5 mA (I1-I6) > 0.1 mA (I7-I8)	> 1.5 mA (I1-I6) > 0.1 mA (I7-I8)	> 2.5 mA	> 0.08 mA
		Turn ON Time	1.5ms (Typ.)	1.5 ms (Typ.)	15 ms (Typ.)	50 ms (Typ.)
		Turn OFF Time	1.5ms (Typ.)	1.5 ms (Typ.)	15 ms (Typ.)	50 ms (Typ.)
		Wire Length	100m	100m	100m	100m
	Output	Output Signal	Relay Output	Transistor Source Output	Relay Output	Relay Output
		Output Type	4NO contacts	4 points	4NO contacts	4NO contacts
		Isolation	Isolated	Not Isolated	Isolated	Isolated
		Dielectric Strength (between power/input terminal and output terminals)	2,500V AC/1 minute 500V DC/1 minute	—	2,500V AC/1 minute 500V DC/1 minute	2,500V AC/1 minute 500V DC/1 minute
		Output Voltage	—	Ext. power supply 20.4-28.8V DC	—	—
		Maximum Load Current	Resistive Load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC Inductive Load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V	0.3A	Resistive Load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC Inductive Load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC	Resistive Load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC Inductive Load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC
		Short Circuit Protection	External fuse 16A maximum	Internal current limiting circuit: 1A	External fuse 16A maximum	External fuse 16A maximum
		Minimum Switching Load	10 mA, 12V DC	—	10 mA, 12V DC	10 mA, 12V DC
		Initial Contact Resistance	100 mΩ maximum (at 1A, 24V DC)	—	100 mΩ maximum (at 1A, 24V DC)	100 mΩ maximum (at 1A, 24V DC)
		Mechanical Life	10,000,000 operations minimum (no load, 10Hz)	—	10,000,000 operations minimum(no load, 10Hz)	10,000,000 operations minimum(no load, 10Hz)
		Electrical Life	100,000 operations minimum (rated load 10A, 1,800 operations/hour)	—	100,000 operations minimum (rated load 10A, 1,800 operations/hour)	100,000 operations minimum (rated load 10A, 1,800 operations/hour)
		Mechanical Load	10 Hz	—	10 Hz	10 Hz
		Electrical Load	—	10 Hz	—	—
		Resistive Load/Lamp Load	2 Hz	10 Hz	2 Hz	2 Hz
		Inductive Load	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz

** Input terminals 17 and 18 are used for digital and analog inputs.*

*** When selecting frequency trigger function.*

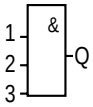
H

Function Blocks

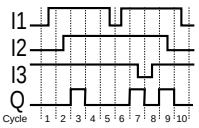
General Function Blocks

AND

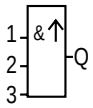
Series connection of normally open contacts (AND)



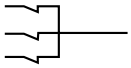
AND with RLO



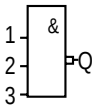
Edge detection (AND↑) with edge evaluation (pos. edge) (AND↑)



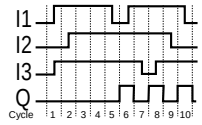
NAND (AND not)



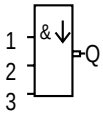
Parallel connection of normally closed contacts (NAND)



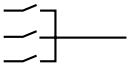
NAND with RLO



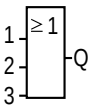
Edge detection (NAND↓) with edge evaluation (neg. edge) (NAND↓)



OR

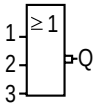


Parallel connection of normally open contacts (OR)

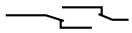


NOR (OR not)

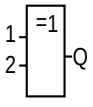
Series connection of normally closed contacts (NOR)



XOR (exclusive OR)

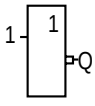


Double changeover contact (XOR)



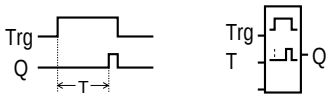
NOT (negation, inverter)

Connection of closed contact (NOT)

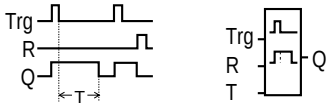


Special Function Blocks

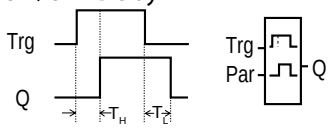
ON Delay



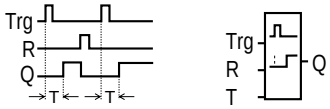
OFF Delay



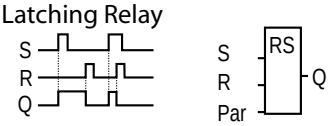
ON/OFF Delay



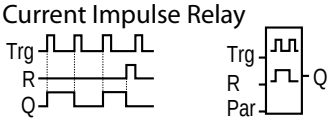
Retentive on Delay



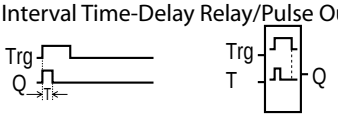
Latching Relay



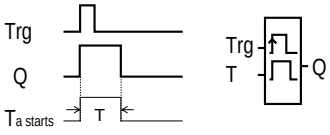
Current Impulse Relay



Interval Time-Delay Relay/Pulse Output

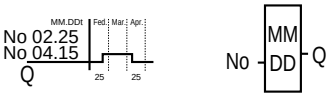


Edge-Triggered Interval Time-Delay Relay

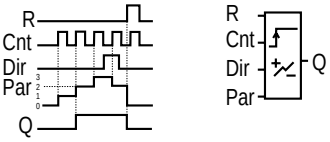


Seven-Day Time Switch

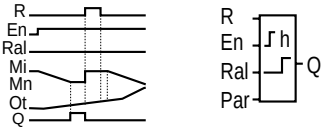
Twelve-Month Time Switch



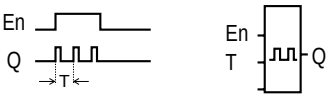
Up/Down Counter



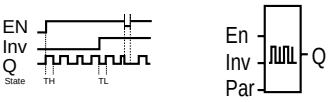
Operating House Counter



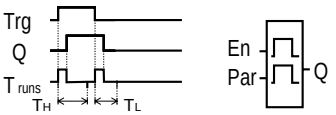
Symmetrical Clock Pulse Generator



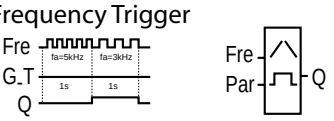
Asynchronous Pulse Generator



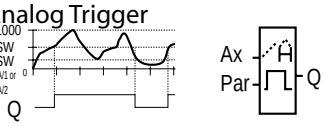
Random Generator



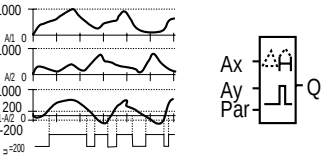
Frequency Trigger



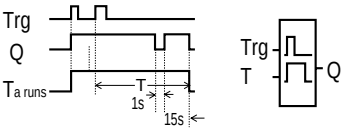
Analog Trigger



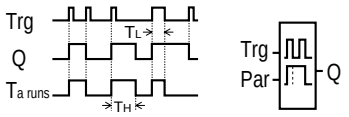
Analog Comparator



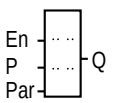
Stairwell Light Switch



Dual-Function Switch



Message Texts

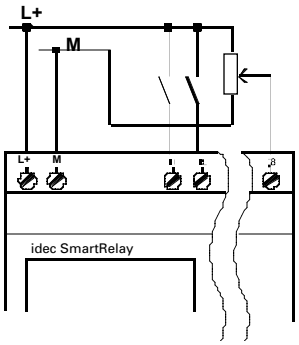


H

Circuit Diagrams

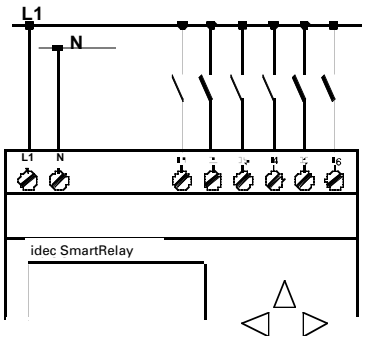
Inputs

FL1A-H12RCE / -B12RCE



The inputs of FL1A-H12RCE/-B12RCE are non-isolated and therefore require the same reference potential (ground) as the power supply. You can also pick up analog signals between the powers supply and ground.

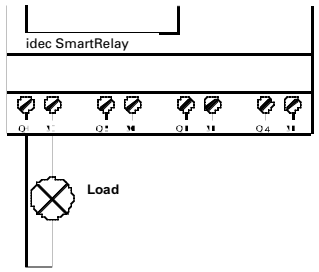
FL1A-H10RCB / -B10RCB



Warning: Existing safety regulations (VDE 0110, ... and IEC 1131, ..., as well as UL and CSA) prohibit the connection of different phases to the inputs of FL1A-H10RCB / -B10RCB.

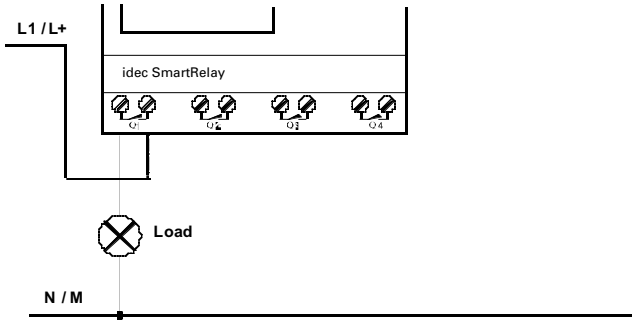
Outputs

FL1A-H12SND



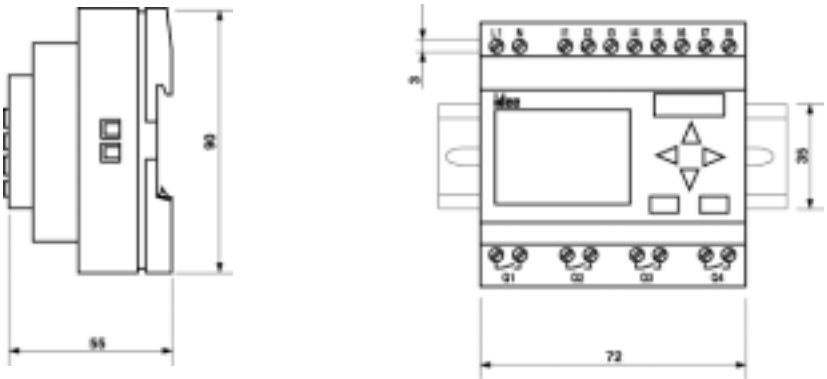
Load: 24 V DC, 0.3 A max.

FL1A-...R



Protection with automatic circuit breakers (max. 16A).

Dimensions



(all dimensions in mm)

WindLGC Programming Software

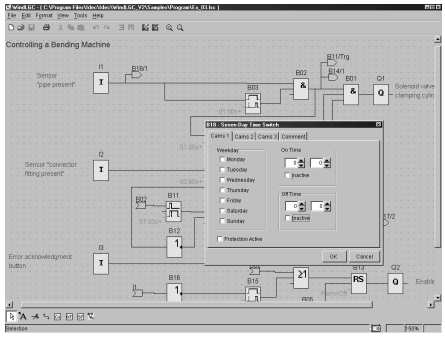
Key features include:

- Design tool for the IDEC SmartRelay
- Windows 95, 98 and NT compatible
- Edits, save and print out your program
- Function blocks
- Drag and drop simplicity
- Offline program simulation
- Boolean logic
- Tag name editor

Just click the function blocks you need and link function blocks for easy wiring. Devise complicated circuits using the convenient functions of WindLGC.

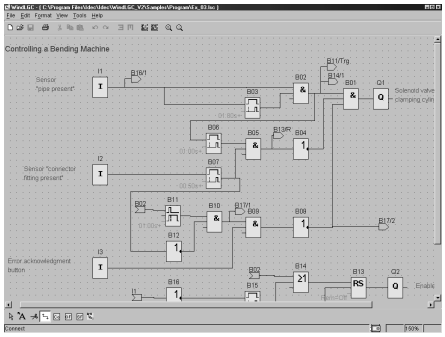
- CPU recommendation: Pentium 133MHz or higher
- Memory: 32MB or more
- RAM recommendation: 64MB
- Hard disk space: 90MB or more for installing WindLGC software.
- Recommendation: Display more than 800 x 600 dots and 256 colors

Function Block



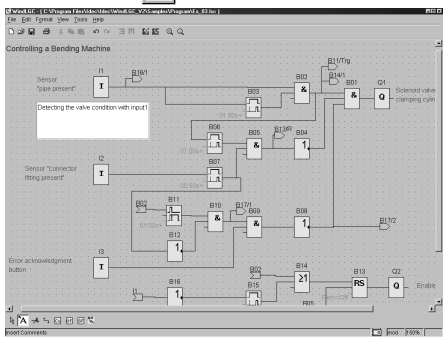
Setup and modification of function block parameters is easy using the function block dialog boxes.

Link Tool



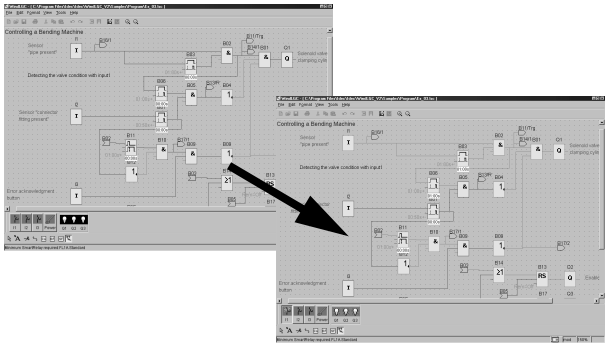
Link function blocks to complete your program. Set up as many as 56 function blocks in one circuit program.

Label Tool



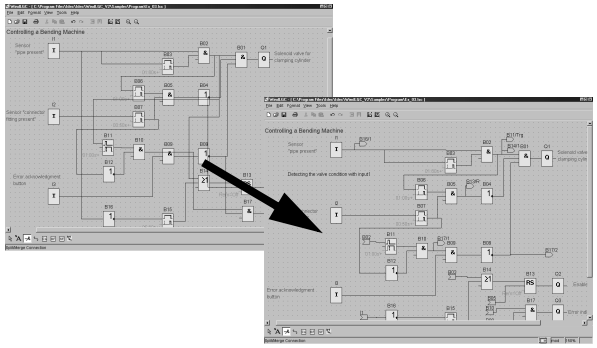
Write and set up a comment on the WindLGC circuit program screen.

Simulation Tool



Confirm the wiring status by simulating on the WindLGC screen. You can simulate the conditions when power is turned on or off.

Split/Reconnect Tool

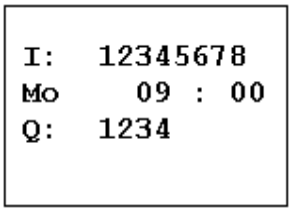


Redraw complicated line connections with this tool in order to eliminate line crossings.

Programming Examples

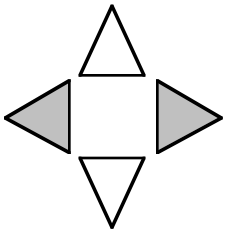
This section will explain and familiarize users with some features of the IDEC SmartRelay. An example program is included in this section to familiarize users with some basic functions in the IDEC SmartRelay. Having learned the basic skills, users can proceed to more advance programming.

Main Menu Screen
When power is connected to the IDEC SmartRelay, one of the two following screens will display. If there is no program in the IDEC SmartRelay, the word "No Program" will be shown. If there is a program in the IDEC SmartRelay, it will automatically switch to Run mode.



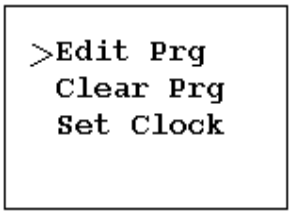
(Run Mode)

Main Menu and Programming Screen



To change the screen to programming mode press ***left***, ***right*** and ***OK*** keys at the same time.

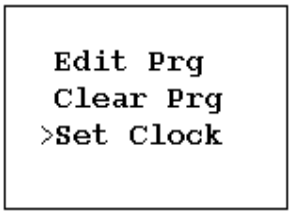
Select ***Program*** and press ***OK*** key.



From this screen users can select ***Edit Program***, ***Clear Program*** or ***Set Clock*** in the IDEC SmartRelay.

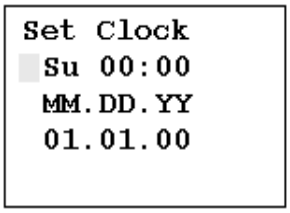
Proceed to ***Set Clock*** section if you want to set the clock now or to ***Example Program*** if you want to skip the Set Clock section and go into programming .

Set Clock:



From this screen select ***Set Clock***.

Press ***OK***.

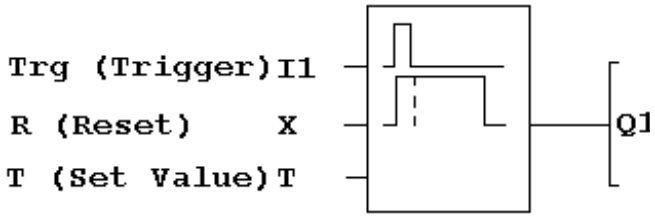


Use the ***left***/ ***right*** keys to move the cursor and the ***up***/***down*** keys to change the setting.

Press ***OK*** after desired setting has been selected.

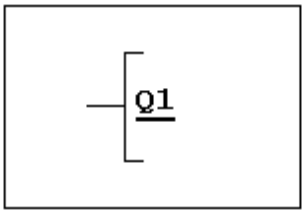
Example Program: OFF Delay Timer
In this example, users will create an off delay timer that will turn on an output ***Q1*** when input ***I1*** is energized and ***Q1*** will turn off 5 seconds later. Users also will be able to go into parameter screen to monitor or change timer preset value.

Complete circuit diagram:



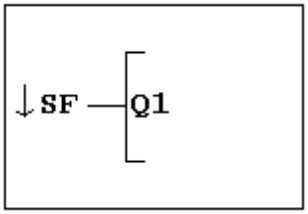
H

Programming Examples con't



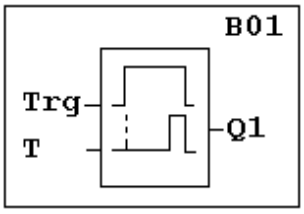
This will be a default screen when ***Edit Prg*** is selected.

Press ***OK***.



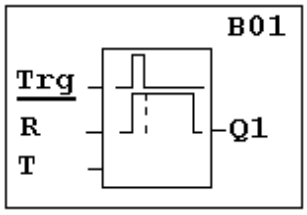
↓Co (constant) will be displayed.

Select ***SF*** (special function) using up/down keys and press OK.



The first function block will be an ON delay. Use the ***up***/***down*** keys and select the ***Off Delay Timer***.

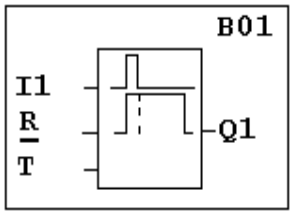
Press ***OK***.



The cursor now has moved to input Trg.

Press ***OK***. ***Co*** will be displayed. Press ***OK*** again. At this point select ***I1*** (using up/down key) as an input trigger.

Press ***OK***.

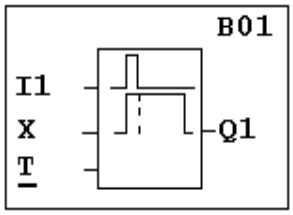


The cursor now moves to input ***R*** (Reset).

Note: Input R is not used in this example.

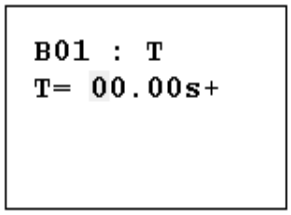
Press ***OK***. Using the same procedures in the previous step. Select ***X*** (do not use) as a Reset input.

Press ***OK***.



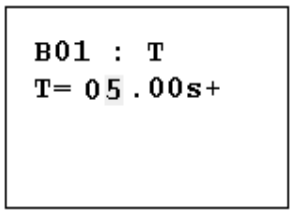
The cursor is now under input T.

Press ***OK***.



The parameter setting screen is now displayed.

Use the ***left***/***right*** keys to move the cursor, and the ***up***/***down*** keys to change the timer preset value.

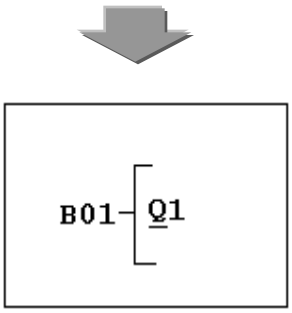


In this example, set timer preset value equal 5 seconds.
Press ***OK***.

Notes:
1. The letter s stands for "second." It can be changed to m for minute or h for hour.
2: A + sign indicates that the preset value can be changed in ***Parameter Mode***. A – sign indicates that the timer preset value can not be changed in Parameter Mode.

H

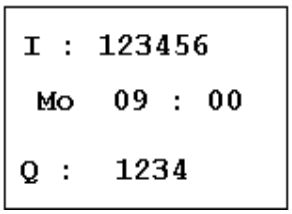
Programming Examples con't



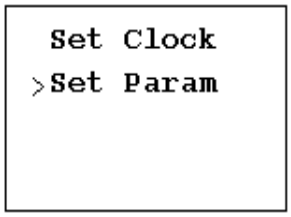
Programming is now complete and the following screen appears.

To run the program, presses ***ESC*** key twice and select Run.

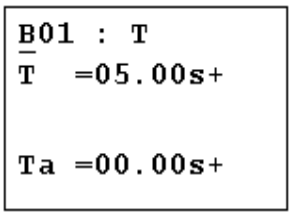
Parameter Mode: Monitoring and Changing the Preset Value



While the IDEC SmartRelay is in ***Run*** mode, press both the ***ESC*** and ***OK*** keys at the same time.

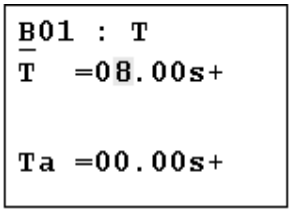


Select ***Set Param*** and press ***OK***.



The timer status of function block 1 (B01) displayed. T is the preset value, and Ta is the current value.

Press ***OK*** to change the preset value.



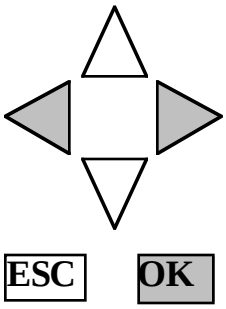
The cursor now moves to the preset value. Use the ***left***/***right*** keys to move the cursor, and the ***up***/***down*** keys to change the value.

Press ***OK*** after desired value has been changed.

Press ***ESC*** key to exit parameter screen.

Download/Upload program with WindLGC software:

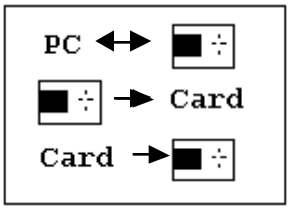
This section will explain how to download a program into the IDEC SmartRelay. Using the same procedures, users can upload a program from IDEC SmartRelay to a PC.



With the communication cable (FL1A-PC1) connected to the IDEC SmartRelay, press the ***left***, ***right*** and ***OK*** keys at the same time.

Select ***PC/Card***...

Press ***OK***.



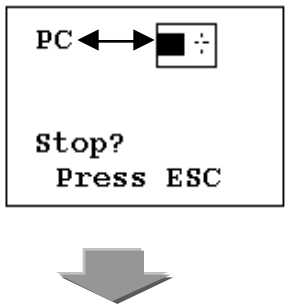
Select ***PC to IDEC SmartRelay*** and press OK.

Note:

=IDEC SmartRelay

H

Programming Examples con't



The setting of the IDEC SmartRelay is now completed. Next step is the PC setting.

Note: These steps can be omitted if the communication cable is connected before power is applied to IDEC SmartRelay. This will be the default screen when power is applied after the communication cable is connected to the IDEC SmartRelay.

PC Setting:

From the menu bar, select ***Tools, Transfer, PC➜ SmartRelay***.

The above error message window will be displayed if the setting in the IDEC SmartRelay does not configure correctly and/or the communication cable is not connected properly.

When downloading is complete, check the operation of the program in the IDEC SmartRelay.

Note: A program can also be downloaded into the IDEC SmartRelay by clicking on the download icon on the standard toolbar.

A program can be uploaded from the IDEC SmartRelay to a PC by clicking on the upload icon on the standard toolbar.

H