

Think Automation and beyond...



FL1E



LONWORKS®

IDEC SmartRelay

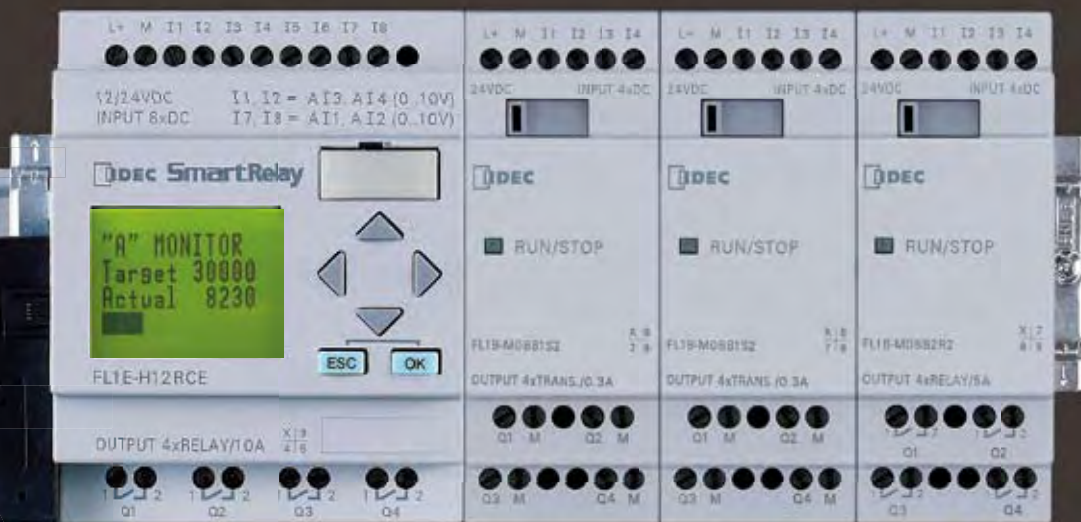


AS-Interface



<http://smart.idec.com>

IDEC CORPORATION



FL1E IDEC SmartRelay

FL1E IDEC SmartRelay



Small LCD panel supports 10 languages

Scrollable messages and characters of various languages provide more flexibility.

- English, Japanese, Chinese (GB-2312), German, French, Italian, Turkish, Dutch, and Russian characters available
- Backlight time can be set.
- Adjustable contrast
- 50 screens with a maximum of 48 characters per screen can be displayed.



Digital/Analog Input

Eight digital inputs: 4 high-speed digital (I3 to I6) with up to 5 kHz response frequency and 4 digital/analog compatible (I1, I2, I7, I8)

(Applicable models: FL1E-H12RCE/FL1E-B12RCE/FL1E-H12SND)

NPN/PNP Sensor Input

Output from NPN/PNP sensors can be inputted without external resistance. This enables a wider selection of input devices, saving wiring time.

(Applicable models: FL1E-H12RCA/FL1E-B12RCA/FL1B-M08D2R2)



Digital Output

Use outputs for controlling lights, small motors, and solenoid valves up to 10A.

Expandability

Can be combined with FL1B expansion I/O modules and communication modules, and an FL1D analog output module for system configuration.

Program Size

Large (3,800 bytes maximum) program size allows for easy programming using function blocks, without a concern for program size (within the programmable bytes).

Program Size	No. of Programmable Blocks	Message Display	Bar Graph	Internal Marker	REM	Relays/Timers
3,800 bytes	200	50	32	27	250	Unlimited

New Function Blocks (3 types)

Analog math is enhanced by combining function blocks that process analog signals, providing a variety of applications.

See page 4.



Control Buttons

Easy programming using 6 buttons. No tools necessary for changing parameters even while mounted on a panel.



Multi-function Interfaces

A memory cartridge stores a user program and the communication cable for WindLGC can be installed/removed easily, allowing for an easy system changeover.



New cartridges to suit a range of different applications

Memory cartridge (FL1E-PM4)

Stores a user program. Equipped with a protection function to prevent unauthorized program changes or copying.



Battery cartridge (FL1E-PB1)

Extends the data backup life up to 2 years.



Memory/battery cartridge (FL1E-PG1)

Has both memory and battery functions.

WindLGC Ver. 6.*

Programming software for the FL1E is upgraded to WindLGC Ver. 6.*. WindLGC is upgraded not only for easier programming, but also for more convenience in debugging.



Download Demo Version

<http://www.idec.com/download>

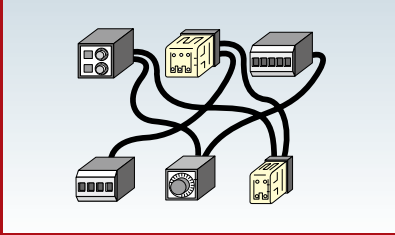
Upward Compatible

User Program

User programs for the preceding FL1A, FL1B, FL1C, and FL1D IDEC SmartRelays can be imported to the FL1E using WindLGC Ver. 6.* and the memory cartridge.

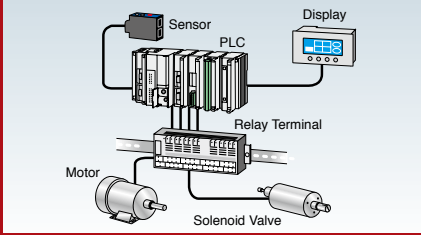
Smart Concept

Replaces relays, timers, and counters



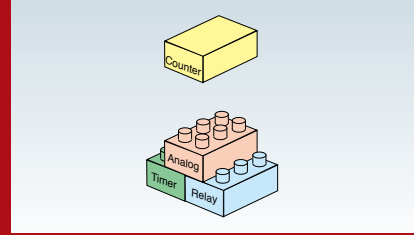
Change your complicated system of multiple relays, timers, and counters to a single IDEC SmartRelay.

Smaller system than using a PLC



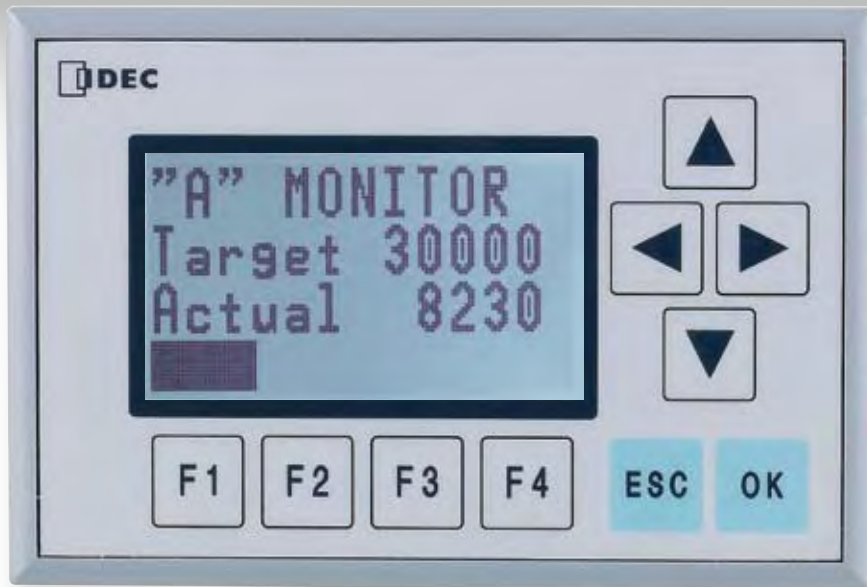
The IDEC SmartRelay replaces many functions of peripheral equipment of the programmable logic controller. Features 10A max. output contacts and up to 48 display characters.

Reduces your workload



39 different types of function blocks make it possible to perform various control operations easily.

Easy-to-see display with more variety of characters and graphs. Advanced control is made possible with PWM and analog math. Easy-to-use text display is added!



FL1E Text Display



FL1E Text Display

The messages on the LCD panel of the base module can be seen clearly on the new panel-mount text display. Wide-size LCD screen (61.0 x 33.0 mm) and large control buttons provide excellent visibility and ease of operation. IP65 protection.

Wide-size text display improves operability.



Excellent visibility reduces operation errors.

Note: Programs cannot be edited on the text display.



Flexible operation, such as on-site parameter changes and monitoring is made possible.



Four membrane pushbuttons are provided.

Can be also used for turning on back-light and starting/stopping programs.



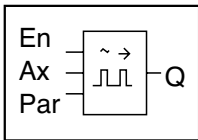
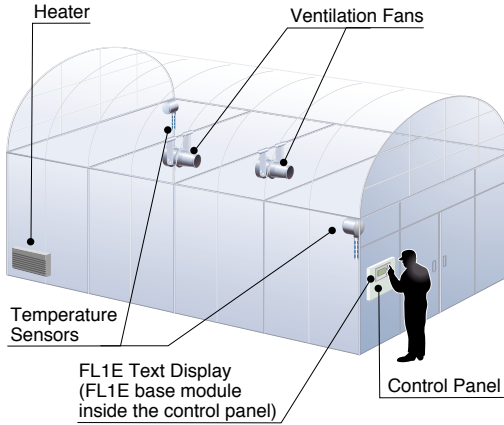
Buttons of the same style as the base module are supplied. Parameter changes and monitoring screen scroll can be accomplished.

Programs cannot be edited on the text display.

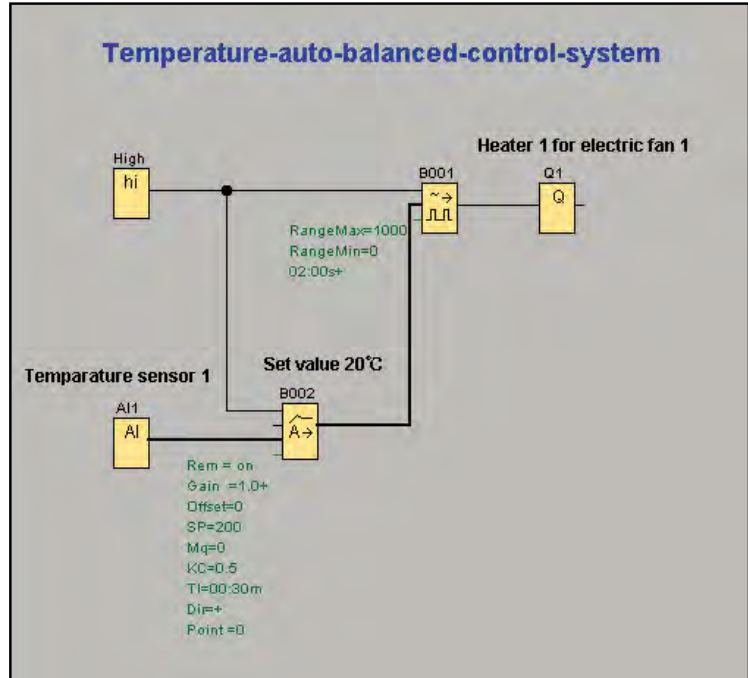
The FL1E text display requires the FL1E base module as a controller.

Pulse width modulator (PWM) Analog input value (Ax) is modulated to pulsed digital output signals.

Heater is controlled to maintain the temperature inside a green house.
When the temperature decreases to 20°C and below, a digital output is turned on to start the heater.

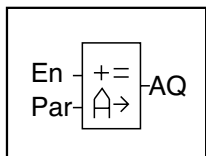


Pulse Width Modulator (PWM)

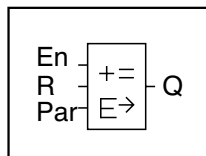


Analog math and analog error detection Four analog parameters are used for arithmetic operation to obtain the analog solution.

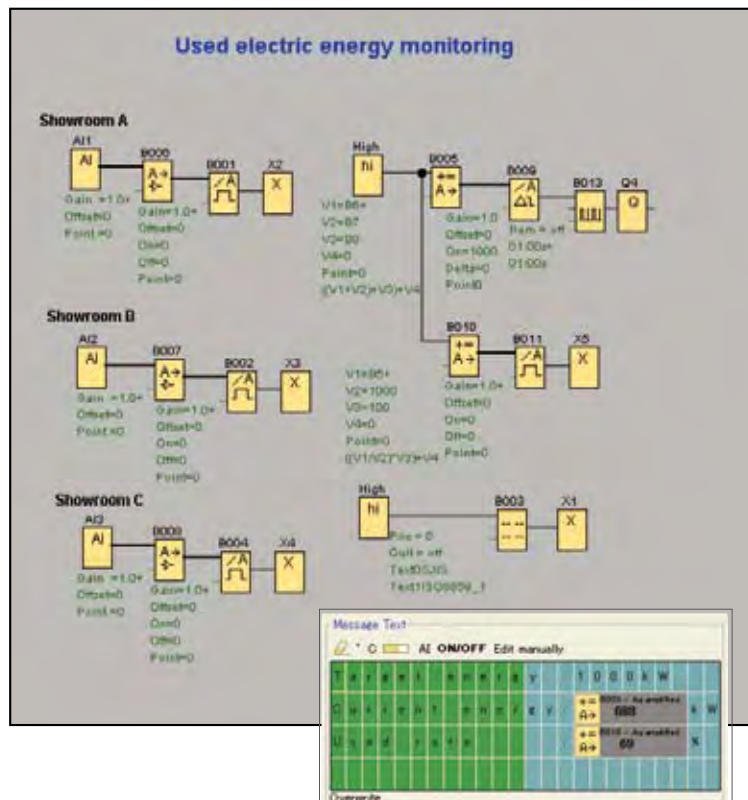
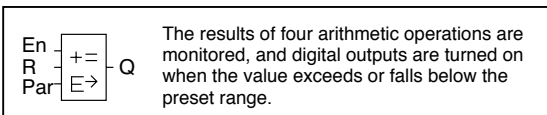
The average value of power used in show rooms A, B, and C is obtained and monitored. If the value exceeds the target value, a warning sign is illuminated to encourage energy-saving.



Analog Math



Analog Math Error Detection



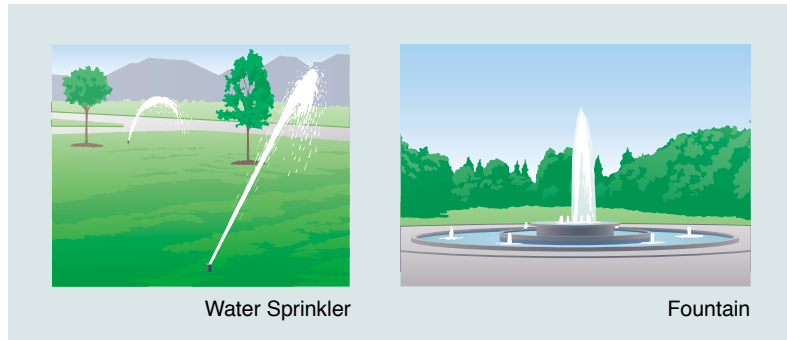
The standard solution for Smart engineers!

Replaces timers and counters.

Control of equipment and system incorporating various controls is made possible.

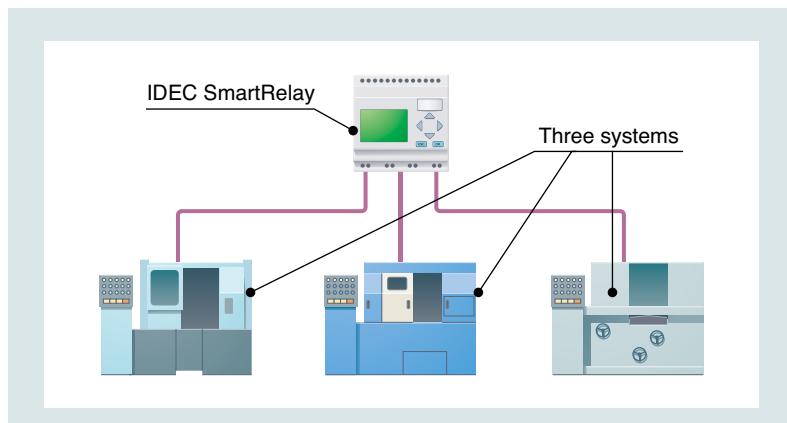
Timing control for a water sprinkler and fountain system

The IDEC SmartRelay can replace weekly timers for controlling the timing of water sprinklers and fountains. The duration of the water flow can be changed depending on the hour, and the clock can be rewritten by using the buttons on the FL1E. Reducing mounting space and cost.



Data acquisition system of machine operating hours

With an operating hours counter function, the current counter value can be read on the LCD panel on the IDEC SmartRelay. One IDEC SmartRelay can count operating hours of multiple machines, making it possible to obtain information such as operating conditions and replacement period of consumable components.



Other Application Examples

Cargo lifting equipment

Movement control of patient transfer systems

Automatic ship mast lifting machines

Air shower operating machines

Water sprinkler control

Drainage pump control

Conveyor belts

Ice-cream mixer control

Pipe driver control for PVC greenhouse

Forward/reverse motor rotation monitoring buzzer control, tower light control

Semi-automatic wire cutting machines

Monitoring of machine operating time

Analog sensor disconnection detection device, analog value monitoring device

Control panel temperature, humidity monitoring device

Car park warning light control

IC storage box heater control

Operating time adjustment device for game machines in amusement arcades

Fluid level control device

...and more!

The IDEC SmartRelay is successfully used not only in areas of factory automation but also in various control equipment.

FL1E Base Modules



	FL1E-H12SND	FL1E-H12RCE	FL1E-H12RCA	FL1E-H12RCC
Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC
Input	DC input: 8 points (PNP) (Analog 4 points)	DC input: 8 points (PNP) (Analog 4 points)	AC/DC input: 8 points (PNP/NPN input)	AC/DC input: 8 points (PNP input)
Output	Transistor output: 4 points	Relay output: 4 points	Relay output: 4 points	Relay output: 4 points
Programming Function	With	With	With	With
Clock Function	With (Note)	With	With	With

Note: FL1E-H12SND of Ver. 4 and before does not have clock function.



	FL1E-B12RCE	FL1E-B12RCA	FL1E-B12RCC
Power Voltage	12/24V DC	24V AC/DC	100 to 240V AC/DC
Input	DC input: 8 points (PNP) (Analog 4 points)	AC/DC input: 8 points (PNP/NPN input)	AC/DC input: 8 points (PNP input)
Output	Relay output: 4 points	Relay output: 4 points	Relay output: 4 points
Programming Function	Without	Without	Without
Clock Function	With	With	With

Initialization Time: After power-up, the FL1E takes a maximum of 10 seconds (when using a memory cartridge or memory/battery cartridge) or 9 seconds (without using any cartridges or when using a battery cartridge) for initialization. When initialization is complete, the FL1E is automatically set to RUN mode.

Expansion I/O Modules

Combination I/O Modules



	FL1B-M08B1S2	FL1B-M08B2R2	FL1B-M08D2R2	FL1B-M08C2R2
Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC
Input	DC input: 4 points (PNP input)	DC input: 4 points (PNP input)	AC/DC input: 4 points (PNP/NPN input)	AC/DC input: 4 points (PNP input)
Output	Transistor output: 4 points	Relay output: 4 points	Relay output: 4 points	Relay output: 4 points
Max. Expansion Modules	4	4	4	4

Analog Modules



	FL1B-J2B2 Analog Input Module	FL1D-K2BM2 Analog Output Module
Power Voltage	12/24V DC	24V DC
Analog I/O Points	Analog input: 2 points	Analog output: 2 points
Analog I/O Range	Voltage input: 0-10V DC Current input: 0-20 mA	Voltage output: 0-10V DC Current output: 0-20, 4-20 mA
Resolution	10 bits	10 bits
Max. Expansion Modules	4	1

Max. Expansion Modules



Use of a base module and expansion I/O modules of the same power voltage rating is recommended, with power supplied to all modules using one power supply.

Maximum number of connectable modules per base module:

- 4 combination I/O modules
- 4 analog input modules
- 1 analog output module

Maximum number of I/O points*

- Digital input: 24**
- Digital output: 16**
- Analog input: 8**
- Analog output: 2**

* The maximum number includes the I/O points of the base module and the expansion I/O modules.

- Base module
- Combination I/O module
- Analog input module
- Analog output module

Module Combination and Allocation Numbers

1. Maximum configuration when using a base module without analog inputs

	FL1E-H12RCA	FL1B-M08B2R2	FL1B-J2B2	FL1D-K2BM2
Digital Input: I	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24			
Analog Input: AI			3 4 5 6 7 8	
Analog Output: AQ				1 2
Digital Output: Q	1 2 3 4	5 6 7 8 9 10 11 12 13 14 15 16		

Note 1: Digital inputs: 24, analog inputs: 6, digital outputs: 16, analog outputs: 2

Note 2: AI3 to AI8 are allocated to the analog input module.

2. Maximum configuration when using two analog inputs on the base module

	FL1E-H12RCE	FL1B-M08B2R2	FL1B-J2B2	FL1D-K2BM2
Digital Input: I	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24			
Analog Input: AI		1 2	3 4 5 6 7 8	
Analog Output: AQ				1 2
Digital Output: Q	1 2 3 4	5 6 7 8 9 10 11 12 13 14 15 16		

Note 1: Digital inputs: 22, analog inputs: 16, analog outputs: 2

Note 2: Analog inputs AI3 and AI4 are allocated to the analog input module.

Note 3: When using two analog inputs on the FL1E base module, allocation of I/O numbers has a compatibility with the FL1D series.

3. Maximum configuration when using four analog inputs on the base module

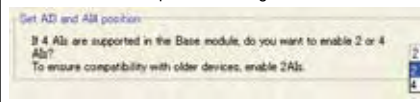
	FL1E-H12RCE	FL1B-M08B2R2	FL1B-J2B2	FL1D-K2BM2
Digital Input: I	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24			
Analog Input: AI	3 4	1 2	5 6 7 8	
Analog Output: AQ				1 2
Digital Output: Q	1 2 3 4	5 6 7 8 9 10 11 12 13 14 15 16		

Note 1: Digital inputs: 20, analog inputs: 8, digital outputs: 16, analog outputs: 2

Note 2: Using WindLGC Ver. 6.+, allocate AI3 and AI4 to the base module. AI5 to AI8 are allocated to the analog input module.

For users using analog inputs:

By setting the embedded analog input number using the WindLGC Ver. 6.+, I/O numbers can be allocated to the base module and expansion analog module.



AS-Interface Communication Module FL1B-CAS2



The AS-Interface communication module provides an optimum solution for savings in cables, installation space, and wiring cost and the possibility for decentralized control.

- Virtual I/O points: 4 input points, 4 output points.
- FL1B-CAS2 is compatible with AS-Interface Ver. 2.0.

Combination and I/O Allocation Examples

Using expansion I/O modules

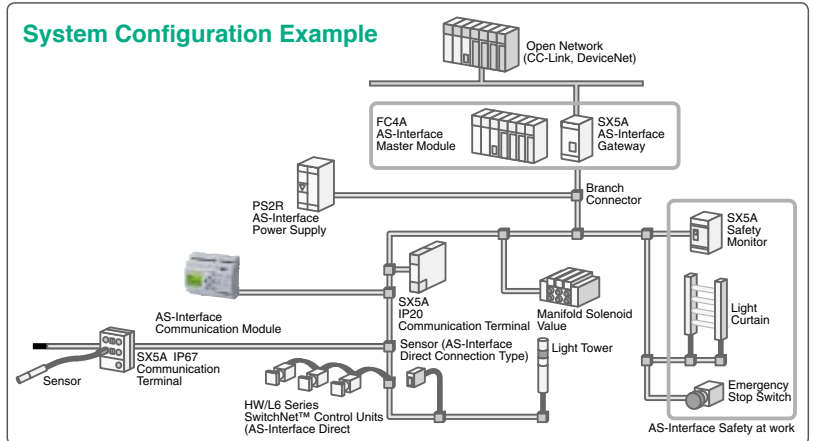
- When using 4 analog inputs on the base module

	FL1E-H12RCE				FL1B-M08B2R2				FL1B-CAS2							
Digital Input: I	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Analog Input: AI	3	4			1	2					5	6				
Digital Output: Q	1	2	3	4					5	6	7	8	9	10	11	12

FL1B-J2B2

Note 1: I/O numbers are automatically allocated starting with the base module.
 Note 2: When the base module with analog inputs is used, the subsequent numbers will be allocated to the analog input modules.

System Configuration Example



- Base module
- Combination I/O module
- Analog input module
- AS-Interface communication module



For SwitchNet® and IDEC AS-Interface devices, see catalogs No. EP1143, EP1043 and EP1025.

LONWORKS® Communication Module FL1B-CL1C12



Combination of easy-to-program IDEC SmartRelay and LONWORKS® communication module achieves remote control and monitoring on a LONWORKS® network.

- Max. virtual input points: 16 points
- Max. virtual output points: 12 points
- Max. virtual analog input points: 8 points

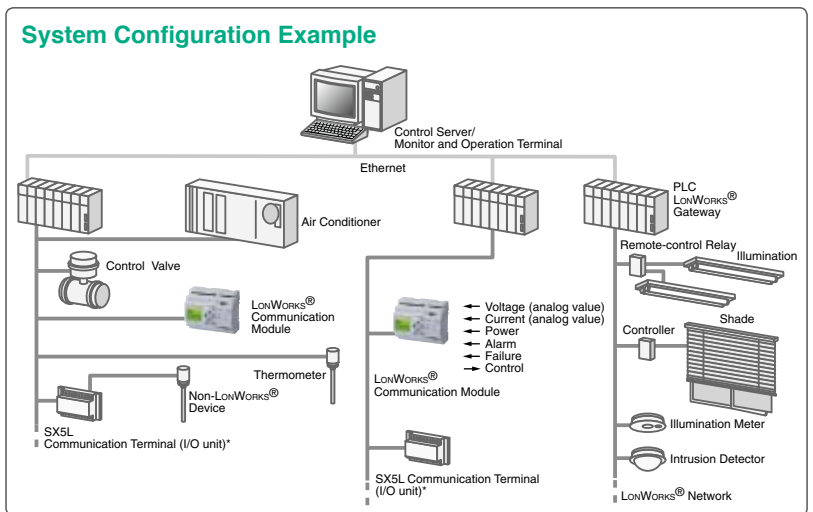
(Number of I/O points depends on the combination of modules.)

An external interface file (XIF extension) unique to each LONWORKS® communication module is needed to communicate through the LONWORKS® network. The XIF file can be downloaded from the following website.

<http://www.idec.com/download>

* Terminal block type communication terminal: I/O unit installed with standard network variables (SNVT)

System Configuration Example



- Base module
- LONWORKS® communication module
- Combination I/O module
- Analog input module
- Analog output module



For details about SX5L LONWORKS® communication terminals, see catalog No. EP995.

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Module Combination and Allocation Numbers

1. Maximum number of I/O points when using LONWORKS® communication module

	FL1D-H12RCC								FL1B-CL1C12															
Digital Input: I	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Analog Input: AI	3	4							1	2	3	4	5	6	7	8								
Digital Output: Q	1	2	3	4					5	6	7	8	9	10	11	12	13	14	15	16				

2. Using expansion I/O module (using 4 analog inputs on the base module)

	FL1D-H12RCE				FL1B-M08B2R2				FL1B-CL1C12															
Digital Input: I	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Analog Input: AI	3	4			1	2											7	8						
Digital Output: AQ																	1	2						
Digital Output: Q	1	2	3	4					5	6	7	8	9	10	11	12	13	14	15	16				

FL1B-J2B2 FL1D-K2B2

Note 1: One LONWORKS® communication module can be used with a base module and must be mounted at the far right end of the row.
 Note 2: I/O numbers are automatically allocated starting with the base module.
 Note 3: When the base module with analog inputs is used, the subsequent numbers will be allocated to the analog input modules and LONWORKS® communication module.

WindLGC reduces development and debugging time of simple and complex programming



WindLGC Ver. 6.* Programming Software for IDEC SmartRelays

WindLGC features user-friendly debugging functions such as simulation and online test functions. Not only writing programs but also configuring, confirming, changing the messages on the base module and text display can be completed.

Programming

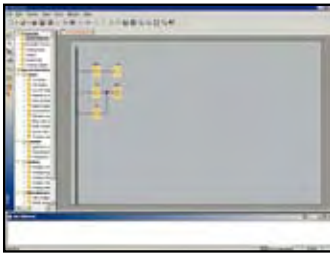
Programs can be configured using the drag-and-drop method quickly and easily.

Co GF SF Function Block Programming

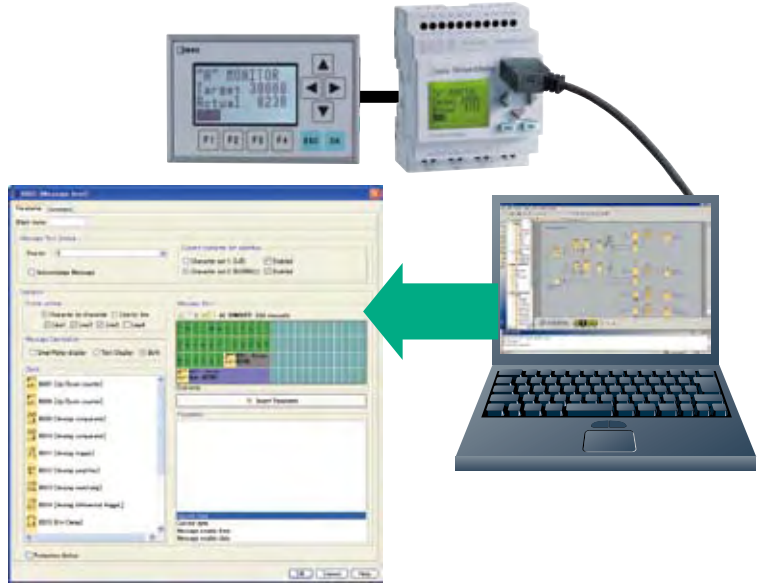


Function block parameters are entered and modified in the function block dialog boxes.

Ladder Programming



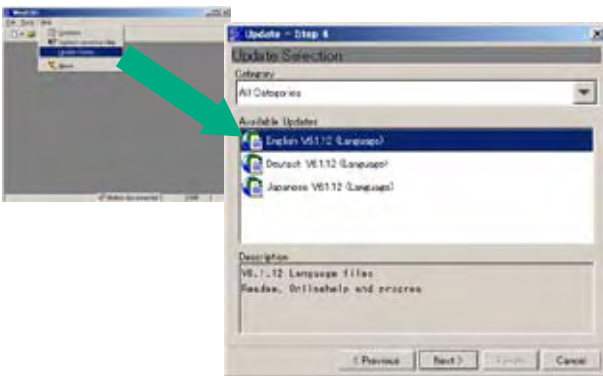
In addition to function block, WindLGC can program using ladder for the IDEC SmartRelay. When downloading the user program to the base module, ladder diagrams are converted into function block diagrams.



For details, see the user's manual and FAQ available at the following website.

<http://www.idec.com/support>

Update Center



WindLGC 6.* System Requirements

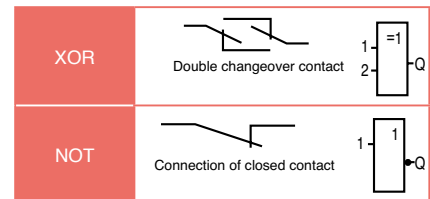
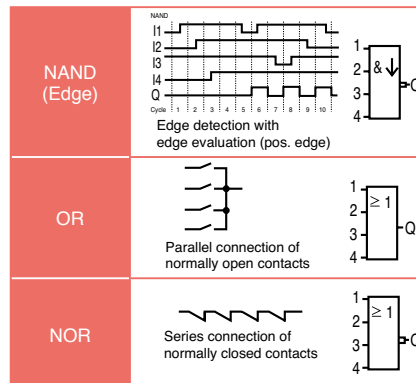
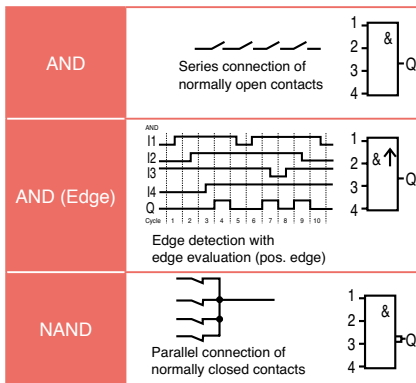
CPU	Pentium III 500MHz
OS	Windows® 98 SE/Me/ NT4.0/2000/XP/Vista (except for 64 bit)
Hard disk space	90 MB
RAM	256 MB
Display	800×600 pixels, 256 colors (1024 × 768 recommended)

Free upgrade from WindLGC Ver. 3 can be downloaded from the update center or IDEC website through the Internet.

<http://www.idec.com/download>

To upgrade WindLGC Ver. 5.0.20 or Ver. 5.0.22 to Ver. 6.*, upgrade the software to Ver. 5.0.23 beforehand.

GF General Function Blocks

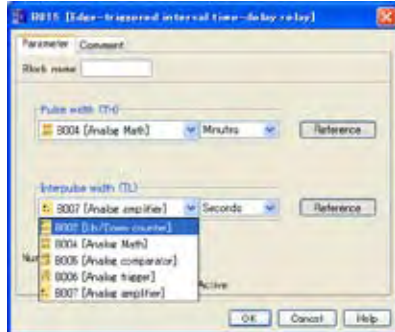


WindLGC Ver. 6.*: New Functions

Updated Improvement of function blocks 1

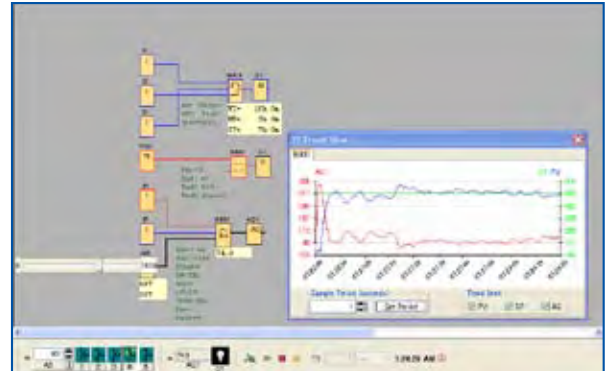
The addition of function blocks that can be set as parameters makes it possible to achieve optimization of the entire program and flexible programming through the coordination of function blocks necessary for programming.

No. of function blocks which can be set as parameters	22
No. of function blocks which can be used as parameter preset values	8



Updated Improvement of function blocks 2

When using simulation or online test on WindLGC, changes of analog output values (AQ), current values (PV), and set-values (SP) can be shown in a trend graph for easy monitoring of the changes. Sampling period can be also chosen in one-second increments, so that the chronological changes can be confirmed accurately and more easily.



· SP (Set Point) obtained by referring to the analog value of the linked function block can also be shown in the trend graph (WindLGC V.6.1.16 and up).

SF Special Function Blocks

On-delay			Analog differential trigger			Message texts	
Off-delay			Analog value monitor			Softkey	
On-/Off-delay			Operating hours counter			Analog amplifier	
Retentive on-delay			Asynchronous pulse generator			Shift register	
Latching Relay			Random generator			PI control	
Current impulse relay			Frequency trigger			Analog ramp control	
Interval time-delay relay/ Pulse output			Analog trigger			Analog multiplexer	
Seven-day time switch			Analog comparator			Pulse width modulator (PWM)	
Twelve-month time switch			Stairwell light switch			Analog math	
Up/down counter			Dual-function switch			Analog math error detection	

FL1E IDEC SmartRelay

New IDEC SmartRelay with enhanced performance and visibility! Advanced features enable pulse width modulation (PWM) and analog maths functions.

- A maximum of 200 function blocks can be programmed, including 27 internal relays, 50 message displays, and an unlimited number of timers and counters to achieve powerful control operations (program capacity 3,800 bytes).
- 10A relay outputs eliminate the need for external relays.
- Expandable up to 24 digital inputs, 16 digital outputs, 8 analog inputs, and 2 analog outputs.
- AS-Interface and LONWORKS® communication modules enable decentralized control.
- An optional text display available. Easy operation from the control panel.
- All base and expansion modules are UL/c-UL listed, FM approved, IEC61131/VDE0631 compliant, Australian EMC compliant, and marine certified (ABS, BV, DNV, GL, Lloyd's Register, and Class NK.)*



* Surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is required for marine certification when using 12/24V and 24V DC SmartRelay modules.



Types

• Base Modules

Package Quantity: 1

Rated Power Voltage	Input Signal	Output Signal	Display	Clock	I/O Points	Weight (approx.)	Type No.
24V DC	DC I1, I2, I7 and I8 are used for digital/analog inputs	Transistor	Yes	Yes (Note 1)	8/4 points	150g	FL1E-H12SND
12/24V DC		Relay	Yes	Yes	8/4 points	190g	FL1E-H12RCE
24V AC/DC	AC/DC (Note 2)	Relay	Yes	Yes	8/4 points	180g	FL1E-B12RCE
			—			190g	FL1E-H12RCA
100 to 240V AC/DC	AC/DC	Relay	Yes	Yes	8/4 points	180g	FL1E-B12RCA
			—			195g	FL1E-H12RCC
			—			185g	FL1E-B12RCC

Note 1: Note: FL1E-H12SND of Ver. 5 has clock function. Ver. 2, 3, and 4 do not have clock function.

Note 2: With NPN/PNP sensor input. For details, see "Input Internal Circuits" on page 14.

• Expansion I/O Modules

Package Quantity: 1

Type	Rated Power Voltage	Input Signal	Output Signal	I/O Points	Weight (approx.)	Type No.
Input/Output	24V DC	DC	Transistor	4/4 points	90g	FL1B-M08B1S2
	12/24VDC	DC	Relay	4/4 points	125g	FL1B-M08B2R2
	24V AC/DC	AC/DC *	Relay	4/4 points	125g	FL1B-M08D2R2
	100 to 240V AC/DC	AC/DC	Relay	4/4 points	130g	FL1B-M08C2R2
Analog Input	12/24V DC	Analog	—	2/0 points	80g	FL1B-J2B2
Analog Output	24V DC	—	Analog	0/2 points	90g	FL1D-K2BM2

* With NPN/PNP sensor input. For details, see "Input Internal Circuits" on page 14.

• I/O points within the maximum number of expandable I/O points can be used.

• Use of a base module and expansion I/O modules of the same power voltage rating is recommended, with power supplied to all modules using one power supply. When power is supplied to the modules from different power supplies, the fast transient noise is 1 kV (IEC61000-4-4).

• Communication Modules

Package Quantity: 1

Name	Rated Power Voltage	I/O Points	Weight (approx.)	Type No.
AS-Interface Communication Module	30V DC (AS-Interface rated voltage)	Input: 4 points Output: 4 points	75g	FL1B-CAS2
LONWORKS® Communication Module	24V AC/DC	Input: 16 points Analog input: 8 points Output: 2 points	85g	FL1B-CL1C12

• An external interface file (XIF extension) unique to each LONWORKS® communication module is needed to communicate through the LONWORKS® network. The XIF file can be downloaded from: <http://www.idec.com/download/>

• Text Display for FL1E

Package Quantity: 1

Rated Power Voltage	Weight (approx.)	Type No. (Ordering Type No.)	Remarks
24V AC/DC 12V DC	220g	FL1E-RD1	Supplied with text display cable, mounting clip and waterproof gasket

• Option

Name	Type No.	Ordering Type No.	Package Quantity	Remarks
Application Software Program WindLGC	FL9Y-LP1CDW	FL9Y-LP1CDW	1	CD-ROM (incl. online help manual)
Communication Cable	FL1A-PC1	FL1A-PC1	1	
USB Communication Cable	FL1E-PC2	FL1E-PC2	1	
Memory Cartridge	FL1E-PM4	FL1E-PM4	1	With read/write protect function
Battery Cartridge	FL1E-PB1	FL1E-PB1	1	Backup duration 2 years (typ.)
Memory/Battery Cartridge	FL1E-PG1	FL1E-PG1	1	
Mounting Clip for Base Module	FL1B-PSP1	FL1B-PSP1PN05	5	Supplied with a module
Mounting Clip and Waterproof Gasket for Text Display	FL1E-KW1	FL1E-KW1	1	Supplied with text display
Text Display Cable	FL1E-RDC1	FL1E-RDC1	1	Length: 2.5m
Lens Removal Tool	MT-101	MT-101	1	For removing memory and cartridges
IDEC SmartRelay User's Manual (English)	FL9Y-B1090	FL9Y-B1090	1	Downloadable from:
LONWORKS® Communication Module User's Manual (English)	FL9Y-B695	FL9Y-B695	1	http://www.idec.com/download/

Base Module Specifications

Base Module Type No.		FL1E-H12SND	FL1E-H12RCE FL1E-B12RCE	FL1E-H12RCA FL1E-B12RCA	FL1E-H12RCC FL1E-B12RCC	
Power Supply	Rated Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC	
	Allowable Voltage Range	20.4 to 28.8V DC	10.8 to 28.8V DC	20.4 to 26.4V AC 20.4 to 28.8V DC	85 to 265V AC 100 to 253V DC	
	Rated Frequency	—	—	47 to 63 Hz	47 to 63 Hz	
	Current Draw	40 to 75 mA (24V DC)	60 to 175 mA (12V DC) 40 to 100 mA (24V DC)	76 to 182 mA (12V DC) 40 to 100 mA (24V DC)	25 to 40 mA (100V AC) 20 to 30 mA (240V AC) 10 to 25 mA (100V DC) 6 to 15 mA (240V DC)	
	Allowable Momentary Power Interruption	—	2 ms Typ. (12V DC) 5 ms Typ. (24V DC)	5 ms Typ. (24V AC/DC)	10 ms Typ. (100V AC/DC) 20 ms Typ. (240V AC/DC)	
	Power Consumption	1.0 to 1.8W (24V DC)	0.7 to 2.1W (12V DC) 1.0 to 2.4W (24V DC)	1.8 to 4.4 VA (24V AC) 1.0 to 2.4W (24V DC)	2.8 to 4.6 VA (100V AC) 4.8 to 7.2 VA (240V AC) 1.1 to 2.9 W (100V DC) 1.4 to 3.6 W (240V DC)	
	Reverse Polarity Protection	Yes	Yes	—	—	
Clock	Backup Duration	80 hours (Note 1) (Note 5)	80 hours (Note 1)	80 hours (Note 1)	80 hours (Note 1)	
	Clock Accuracy	±5 sec/day maximum (Note 5)	±5 sec/day maximum	±5 sec/day maximum	±5 sec/day maximum	
Input	Input Signal	DC	DC	AC/DC	AC/DC	
	Input Points	8 (I1 to I8)	8 (I1 to I8)	8 (I1 to I8)	8 (I1 to I8)	
	Analog Input Points	4 (I1, I2, I7, I8)	4 (I1, I2, I7, I8)	—	—	
	High-speed Input (Note 2)	4 (I3, I4, I5, I6), 5 kHz maximum	4 (I3, I4, I5, I6), 5 kHz maximum	—	—	
	Analog Input Range	0 to 10V DC (max. rated input: 28.8V DC)	0 to 10V DC (max. rated input: 28.8V DC)	—	—	
	Analog Input Error	±1.5 (of full scale)	±1.5 (of full scale)	—	—	
	Analog Input Resolution	10 bits (0 to 1000)	10 bits (0 to 1000)	—	—	
	Allowable Voltage Range	0 to 28.8V DC	0 to 28.8V DC	0 to 26.4V AC 0 to 28.8V DC	0 to 265V AC 0 to 253V DC	
	Input Impedance	Digital Input	3.5 kΩ	3.5 kΩ	4.8 kΩ	840 kΩ
		Analog Input	72 kΩ	72 kΩ	—	—
	Isolation	—	—	—	—	
	Operating Range	OFF Voltage	< 5V DC	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC
		ON Voltage	≥ 12V DC	≥ 8.5 V DC	≥ 12V AC/DC	≥ 79V AC ≥ 79V DC
		OFF Current	< 0.85 mA (I3 to I6) < 0.05 mA (I1, I2, I7, I8)	< 0.85 mA (I3 to I6) < 0.05 mA (I1, I2, I7, I8)	< 1.0 mA	< 0.03 mA
		ON Current	≥ 2 mA (I3 to I6) ≥ 0.15 mA (I7, I8)	≥ 1.5 mA (I3 to I6) ≥ 0.1 mA (I1, I2, I7, I8)	≥ 2.5 mA	≥ 0.08 mA (AC) < 0.12 mA (DC)
	Turn ON Time	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	1.5 ms (Typ.)	100V AC: 50 ms (Typ.) 240V AC: 30 ms (Typ.) 100V DC: 25 ms (Typ.) 240V DC: 15 ms (Typ.)	
	Turn OFF Time	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	15 ms (Typ.)	100V AC: 65 ms (Typ.) 240V AC: 105 ms (Typ.) 100V DC: 95 ms (Typ.) 240V DC: 125 ms (Typ.)	
	Wire Length	100m (Note 3)	100m (Note 3)	100m	100m	
	Output	Output Signal	Transistor source output	Relay output	Relay output	Relay output
Output Points/ Contact Configuration		4 points (separate)	4NO contacts	4NO contacts	4NO contacts	
Isolation		—	Isolated	Isolated	Isolated	
Dielectric Strength (between power/input terminals and output terminals)		—	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	
Output Voltage		External power voltage	—	—	—	
Maximum Load Current		0.3A maximum	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	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	
Surge Current		—	30A maximum	30A maximum	30A maximum	
Short-circuit Protection		Built-in current limiting resistor: Approx. 1A	External fuse required: 16A maximum	External fuse required: 16A maximum	External fuse required: 16A maximum	
Minimum Switching Load		—	10 mA, 2V 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 million operations (no load, 10 Hz)	10 million operations (no load, 10 Hz)	10 million operations (no load, 10 Hz)	
Electrical Life		—	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	
Switching Rate		Mechanical Load (Note 4)	—	10 Hz	10 Hz	10 Hz
	Electrical Load	10 Hz	—	—	—	
	Resistive Load/Lamp Load	10 Hz	2 Hz	2 Hz	2 Hz	
	Inductive Load	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	

Note 1: 2 year backup duration (typ.) when battery cartridge or memory/battery cartridge is used.

Note 2: When selecting frequency trigger function and up/down counter function.

Note 3: 10m when connected to analog input (twisted pair cable)

Note 4: For fluorescent lamps, if the inrush current exceeds the allowable value, use an appropriate relay.

Note 5: FL1E-H12SND of Ver. 4 and before does not have clock function.

Initialization Time: After power-up, the FL1E takes a maximum of 10 seconds (when using a memory cartridge or memory/battery cartridge) or 9 seconds (without using any cartridges or when using a battery cartridge) for initialization. When initialization is complete, the FL1E is automatically set to RUN mode.

Expansion I/O Module Specifications

Expansion I/O Module Type No.		FL1B-M08B1S2	FL1B-M08B2R2	FL1B-M08D2R2	FL1B-M08C2R2	FL1B-J2B2	FL1D-K2BM2	
Power Supply	Rated Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC	12/24V DC	24V DC	
	Allowable Voltage Range	20.4 to 28.8V DC	10.8 to 28.8V DC	20.4 to 26.4V AC 20.4 to 28.8V DC	85 to 265V AC 100 to 253V DC	10.8 to 28.8V DC	20.4 to 28.8V DC	
	Rated Frequency	—	—	50/60Hz (47 to 63Hz)	50/60Hz (47 to 63Hz)	—	—	
	Current Draw	30 to 45 mA	30 to 140 mA (12V DC) 20 to 75 mA (24V DC)	120 to 146 mA (24V AC) 20 to 75 mA (24V DC)	34 to 45 mA (100V AC) 30 to 32 mA (240V AC) 5 to 15 mA (100V DC) 5 to 10 mA (240V DC)	25 to 50 mA	35 to 90 mA	
	Allowable Momentary Power Interruption	—	2 ms (typ.) (12V DC) 5 ms (typ.) (24V DC)	5 ms (typ.) (24V AC/DC)	10 ms (typ.) (100V AC/DC) 20 ms (typ.) (240V AC/DC)	5 ms (typ.) (12/24V DC)	5 ms (typ.)	
	Power Consumption	0.8 to 1.1W	0.3 to 1.7W (12V DC) 0.4 to 1.8W (24V DC)	2.4 to 4.3VA (24V AC) 0.4 to 1.8W (24V DC)	3.9 to 4.1VA (100V AC) 7.4 to 7.6VA (240V AC) 0.5 to 1.8W (100V DC) 1.2 to 2.4W (240V DC)	0.3 to 0.6W (12V DC) 0.6 to 1.2W (24V DC)	0.9 to 2.2W	
	Reverse Polarity Protection	Yes	Yes	—	—	Yes	Yes	
Input	Input Signal	DC input	DC input	AC/DC input	AC/DC input	Analog input	—	
	Input Points	4	4	4	4	—	—	
	Isolation	—	—	—	—	—	—	
	Allowable Voltage Range	0 to 28.8V DC	0 to 28.8V DC	0 to 26.4V AC 0 to 28.8V DC	0 to 265V AC 0 to 253V DC	—	—	
	Operating Range	OFF Voltage	< 5V DC	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC	—	—
		ON Voltage	≥ 12V DC	≥ 8.5V DC	≥ 12V AC/DC	≥ 79V AC ≥ 79V DC	—	—
		OFF Current	< 0.85 mA	< 0.85 mA	< 1.0 mA	< 0.03 mA	—	—
		ON Current	≥ 2 mA	≥ 1.5 mA	≥ 2.5 mA	≥ 0.08 mA	—	—
	Turn ON Time	1.5 ms (Typ.)	1.5 ms (typ.)	1.5 ms (typ.)	100V AC: 50 ms (typ.) 240V AC: 30 ms (typ.) 100V DC: 25 ms (typ.) 240V DC: 15 ms (typ.)	—	—	
	Turn OFF Time	1.5 ms (Typ.)	1.5 ms (typ.)	15 ms (typ.)	100V AC: 65 ms (typ.) 240V AC: 105 ms (typ.) 100V DC: 95 ms (typ.) 240V DC: 125 ms (typ.)	—	—	
	Analog Input Points	—	—	—	—	2	—	
	Analog Input Range	—	—	—	—	0 to 10V (max. rated input: 28.8V) 0 to 20 mA (max. rated input: 40 mA)	—	
	Digital Resolution	—	—	—	—	10 bits (0 to 1000)	—	
	Input Error	—	—	—	—	±1.5% (of full scale)	—	
Input Impedance	—	—	—	—	76 kΩ (0 to 10V) 250Ω (0 to 20mA)	—		
Sampling Cycle	—	—	—	—	50ms	—		
Output	Wire Length	100m	100m	100m	100m	10m (twisted-pair shielded cable)	—	
	Output Signal	Transistor source output	Relay output	Relay output	Relay output	—	Analog output	
	Output Points/Contact Configuration	4 points (separate)	4NO contacts	4NO contacts	4NO contacts	—	—	
	Isolation	—	Isolated	Isolated	Isolated	—	—	
	Dielectric Strength (between power/input terminals and output terminals)	—	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	—	—	
	Output Voltage	External power voltage (20.4 to 28.8V DC)	—	—	—	—	—	
	Maximum Load Current	0.3A maximum	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A 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	Built-in current limiting resistor: Approx. 1A	External fuse required: 16A maximum	External fuse required: 16A maximum	External fuse required: 16A maximum	—	Yes	
	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 million operations (no load, 10 Hz)	10 million operations (no load, 10 Hz)	10 million operations (no load, 10 Hz)	—	—	
	Electrical Life	—	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	—	—	
	Analog Output Points	—	—	—	—	—	2	
	Analog Output Range	—	—	—	—	—	Voltage: 0-10V DC Current: 0-20, 4-20 mA	
	Digital Resolution	—	—	—	—	—	10 bits (0 to 1000)	
	Output Error (of full scale)	—	—	—	—	—	Voltage output: ±2.5% Current output: ±3%	
	Output Impedance	—	—	—	—	—	Voltage: 5 kΩ minimum Current: 250Ω maximum	
	Analog Value Conversion Interval	—	—	—	—	—	50 ms (typ.)	
	Wire Length	—	—	—	—	—	10m (twisted-pair shielded cable)	
Switching Rate	Mechanical Load (Note)	—	10 Hz	10 Hz	10 Hz	—	—	
	Electrical Load	10 Hz	—	—	—	—	—	
	Resistive Load/Lamp Load	10 Hz	2 Hz	2 Hz	2 Hz	—	—	
	Inductive Load	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz	—	—	

Note: For fluorescent lamps, if the inrush current exceeds the allowable value, use an appropriate relay.

General Specifications

Item	Specifications	Standard
Operating Temperature	Horizontal Mounting	Cold: IEC60068-2-1 Hot: IEC60068-2-2
	Vertical Mounting	
Storage/Transportation Temperature	-40 to +70°C (no freezing)	—
Relative Humidity	10 to 95% (no condensation)	IEC60068-2-30
Atmospheric Pressure	795 to 1080 hPa	—
Operating Condition	No corrosive gas	—
Degree of Protection	IP20	—
Vibration Resistance	5 to 8.4 Hz, amplitude 3.5 mm 8.4 to 150 Hz, acceleration 9.8 m/s ²	IEC60068-2-6
Shock Resistance	147 m/s ²	IEC60068-2-27
Drop Test (packaged)	0.3m	IEC60068-2-32
Emissions	Limit class B Group 1 (Note 1)	EN55011/A EN55022/B EN50081-1
Electrostatic Discharge Immunity	8 kV air discharge 6 kV contact discharge (Note 2)	IEC61000-4-2
Radiation Field Immunity	Field Strength: 1 V/m and 10 V/m	IEC61000-4-3
Fast Transient Burst	2 kV (power line) 1 kV (I/O signal line) (Note 3)	IEC61000-4-4
Surge Immunity (Note 4) (FL1E-H12RCC, FL1E-B12RCC only)	1 kV (power line) normal 2 kV (power line) common	IEC61000-4-5
Communication Cable	0.5 to 2.5 mm ² (one wire) 0.5 to 1.5 mm ² (two wires)	—
Terminal Style	Finger-safe type (Note 5)	—

Note 1: Class A for AS-Interface communication module

Note 2: 8 kV (air discharge), 4 kV (contact discharge) for AS-Interface communication module

Note 3: 1 kV (criteria A), 2 kV (criteria B) for AS-Interface communication module

Note 4: For protection against surge noise on DC power supply types (FL1E-H12RCE/B12RCE, FL1E-H12SND, FL1E-H12RCA/B12RCA), use surge absorbers, noise cut transformers, or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.

Note 5: Tightening torque 0.4 to 0.5 N·m

Text Display Specifications

• Specifications

Dimensions (W × H × D)	128.2 × 86 × 38.7 mm
Weight (approx.)	220g
Installation	Panel cut-out using mounting clips
Keyboard	Membrane keypad with 10 keys
Display	FSTN graphic display (W × H: 128 × 64 dots) LED backlight

• Power Supply

Power Voltage	24V AC/DC 12V DC
Allowable Voltage Range	20.4 to 26.4V AC 10.2 to 28.8V DC
Allowable Voltage Frequency	47 to 63Hz
Power Consumption	12V DC: 65 mA (Typ.) 24V DC: 40 mA (Typ.) 24V AC: 90 mA (Typ.)
Data Transmission Rate	19200 baud

• LCD Display / Backlight

LCD Display Durability (Note 1)	50,000 hours
Backlight Durability (Note 2)	20,000 hours

*Connect the text display and the base module using the text display cable (2.5m). The text display cable can be extended up to 10m using an extension cable (D-sub 9-pin).

Note 1: Display durability is calculated under ordinary operating and storage conditions: room temperature, normal humidity below 65% RH, and not subjected to direct sunlight.

Note 2: Backlight durability is the number of hours taken for the light to become 50% of the original brightness.

AS-Interface Communication Module: FL1B-CAS2

• Specifications

Module Type	AS-Interface slave module
Slave Type	Standard
Profile	I/O code: 7 ID code: F ID2 code: F
Input/Output	Virtual input: 4 Virtual output: 4
Rated AS-Interface Voltage	30V DC (26.5 to 31.6V DC)
Current Draw	70 mA max. (AS-Interface)

• I/O Allocation

Input		Output	
AS-Interface	SmartRelay	SmartRelay	AS-Interface
Output Data Bit D0	Input In	Output Qm	Input Data Bit D0
Output Data Bit D1	Input In+1	Output Qm+1	Input Data Bit D1
Output Data Bit D2	Input In+2	Output Qm+2	Input Data Bit D2
Output Data Bit D3	Input In+3	Output Qm+3	Input Data Bit D3

• I/O point numbers "n" and "m" of the SmartRelay are automatically allocated by the base module according to the mounted position of the AS-Interface communication module.

• AS-Interface communication module is IP20 terminal type.

• AS-Interface cable is connected to the terminal block.

LONWORKS® Communication Module: FL1B-CL1C12

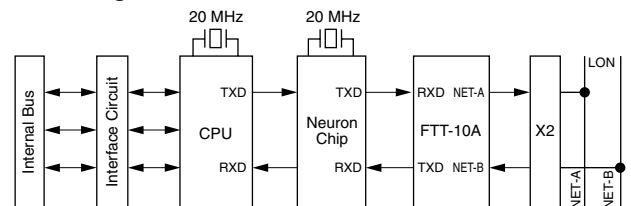
• Specifications

Rated Power Voltage	24V AC/DC (20.4 to 26.4V AC / 20.4 to 28.8V DC)	
Rated Frequency	50/60 Hz (47 to 63 Hz)	
Current Draw	33 mA max.	
Communication System	LON® system	
Transceiver	FTT-10A	
Topology	Bus topology / Free topology	
Transmission Rate	78 kbps	
Neuron Chip	TMPN3120FE5M (Toshiba)	
CPU Clock Frequency	20 MHz	
Transmission Distance	Bus topology	1,400m (only FTT-10A transceiver, when using Level 4 AWG22 cable)
	Free topology	500m total, 400m between nodes (when using Level 4 AWG22 cable)

• Network Variables

	SNVT Type	Application
Input Network Variable	SNVT_obj_request: (Quantity 1)	Request object status
	SNVT_switch: (Quantity 14)	Switch light, alarm, window contact, free inputs/outputs
	SNVT_occupancy: (Quantity 2)	Occupancy
	SNVT_temp_p: (Quantity 1)	Room temperature (°C)
	SNVT_lux: (Quantity 1)	Brightness - lightening level (lux)
Output Network Variable	SNVT_obj_status: (Quantity 1)	Output object status
	SNVT_switch: (Quantity 8)	Switch light, alarm, window contact, free inputs/outputs
	SNVT_occupancy: (Quantity 2)	Occupancy
	SNVT_tod_event: (Quantity 2)	Scheduler program Just current state

• Block Diagram



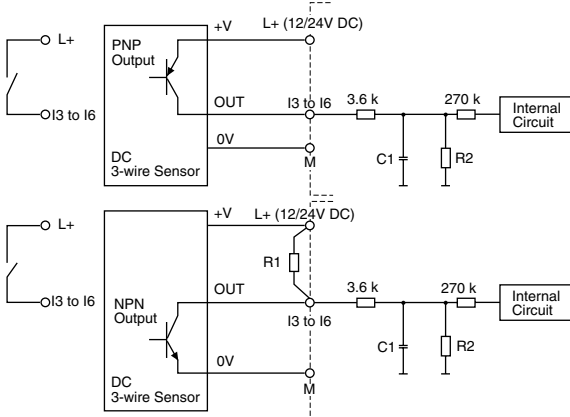
• Configuration Property

	SCPT Type	Application
Configuration Property	SCPTmaxSendTime: (Quantity 12)	Send heartbeat

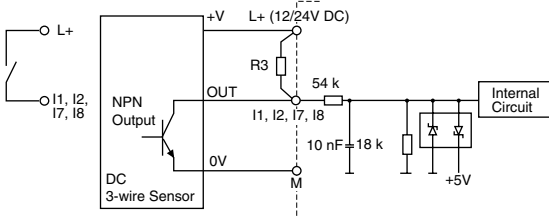
Input Internal Circuits

DC Input

- FL1E-H12SND, -H12RCE, -B12RCE
- FL1B-M08B1S2, -M08B2R2



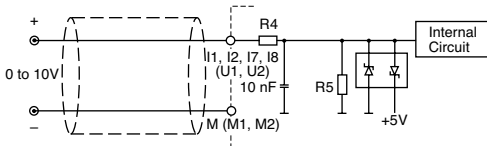
Note 1: When using an NPN output sensor, connect an external resistor (I3 to I6):
 FL1E-H12SND:
 For power voltage 24V DC: R1 ≤ 4 kΩ, 1/4W
 FL1E-H12RCE, -B12RCE:
 For power voltage 24V DC: R1 ≤ 8.1 kΩ, 1/4W
 For power voltage 12V DC: R1 ≤ 1.5 kΩ, 1/4W
 FL1E-H12SND, -H12RCE, -B12RCE:
 R2 = 2.21 kΩ, C1 = 47 nF
 FL1B-M08B1S2, -M08B2R2 (I1 to I4):
 R2 = 2.2 kΩ, C1 = 100 nF



Note 2: I1, I2, I7 and I8 accept both digital and analog inputs. The diagram above is for using I1, I2, I7, and I8 as digital inputs.
 When using an NPN output sensor, connect an external resistor (I1, I2, I7, I8):
 FL1E-H12SND
 For power voltage 24V DC: R3 ≤ 50 kΩ, 1/8W
 FL1E-H12RCE/-B12RCE
 For power voltage 24V DC: R3 ≤ 100 kΩ, 1/8W
 For power voltage 12V DC: R3 ≤ 19 kΩ, 1/8W

Analog Voltage Input

- FL1E-H12SND, -H12RCE, -B12RCE
- FL1B-J2B2



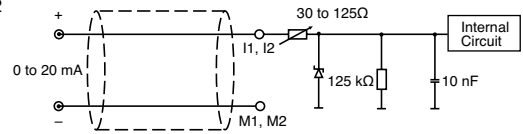
FL1E-H12SND, -H12RCE, -B12RCE:
 R4 = 54 kΩ, R5 = 18 kΩ

FL1B-J2B2:
 R4 = R5 = 38 kΩ

Note 3: I1, I2, I7, and I8 accept both digital and analog inputs. When connecting an analog input, use a twisted pair cable, and keep the cable as short as possible.

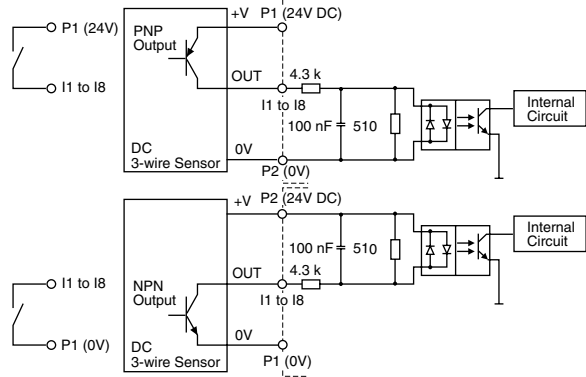
Analog Current Input

- FL1B-J2B2



24V AC/DC Input

- FL1E-H12RCA, -B12RCA
- FL1B-M08D2R2



Note 4: Bleeder resistance (R6) calculation

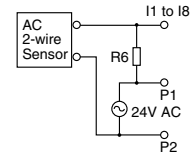
R6 must satisfy the following three conditions.

Condition 1: $R6 (\Omega) \leq \frac{\text{Maximum input OFF voltage} (= 5V \text{ AC})}{\text{Maximum sensor leakage current} (A)}$

Condition 2: $R6 (\Omega) \leq \frac{\text{Sensor power voltage} (V)}{\text{Minimum sensor load current} (A)}$

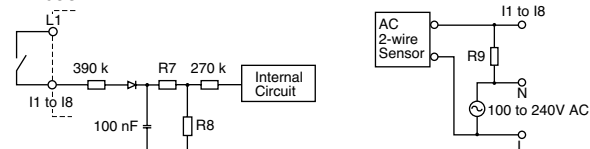
The voltage drop across the load (R6) must be less than 5V while the sensor is turned off.

Condition 3: $Pr6 (W) \geq \frac{\{\text{Sensor power voltage} (V)\}^2}{R6 \text{ resistance} (\Omega)} \times 3$ (3: recommended allowance)



100 to 240V AC/DC

- FL1E-H12RCC, -B12RCC
- FL1B-M08C2R2



FL1E-H12RCC, -B12RCC: R7=180 kΩ, R8=47 kΩ
 FL1E-M08C2R2: R7=390 kΩ, R8=62 kΩ

Note 5: Bleeder resistance (R9) calculation

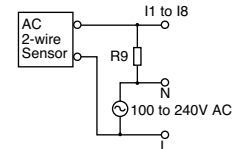
R9 must satisfy the following three conditions.

Condition 1: $R9 (\Omega) \leq \frac{\text{Maximum input OFF voltage} (= 40V \text{ AC})}{\text{Maximum sensor leakage current} (A)}$

Condition 2: $R9 (\Omega) \leq \frac{\text{Sensor power voltage} (V)}{\text{Minimum sensor load current} (A)}$

The voltage drop across the load (R9) must be less than 40V while the sensor is turned off.

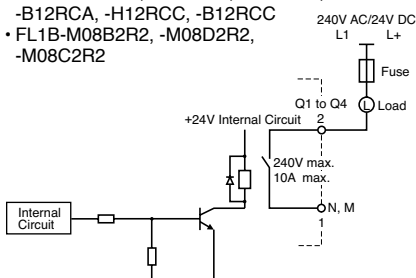
Condition 3: $Pr9 (W) \geq \frac{\{\text{Sensor power voltage} (V)\}^2}{R9 \text{ resistance} (\Omega)} \times 3$ (3: recommended allowance)



Output Internal Circuits

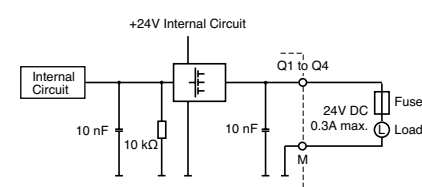
Relay Output

- FL1E-H12RCE, -B12RCE, -H12RCA, -B12RCA, -H12RCC, -B12RCC
- FL1B-M08B2R2, -M08D2R2, -M08C2R2



DC Output (Transistor Source Output)

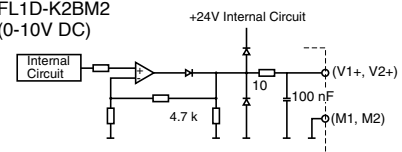
- FL1E-H12SND
- FL1B-M08B1S2



Note 6: When connecting to a DC input type PLC, use a negative common sink input type.

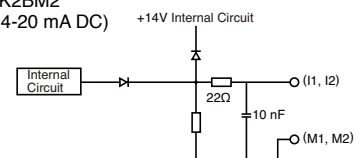
Analog Voltage Output

- FL1D-K2BM2 (0-10V DC)



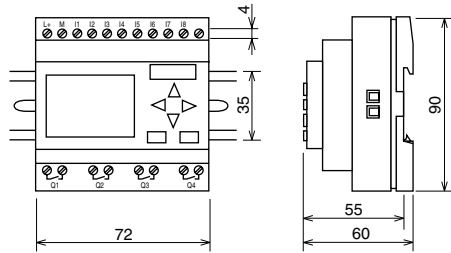
Analog Current Output

- FL1D-K2BM2 (0-20, 4-20 mA DC)

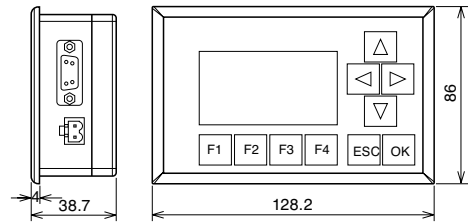


Dimensions

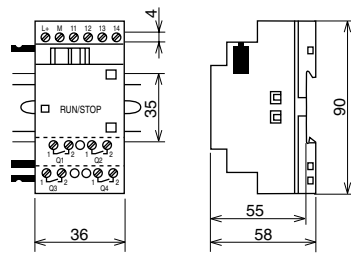
• Base Module



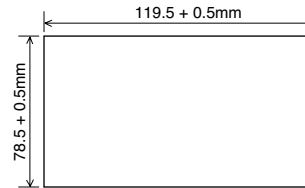
• Text Display



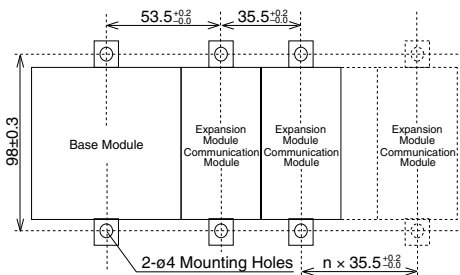
• Expansion I/O Module, Communication Module



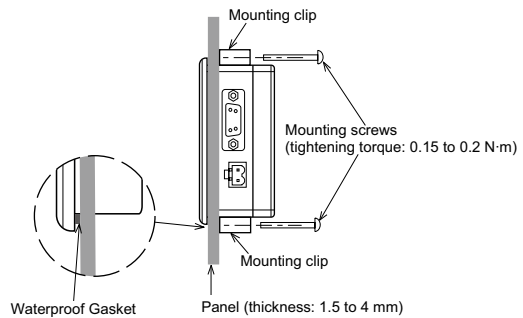
(Panel Cutout)



• Mounting Hole Layout (Using Mounting Slides)



• Panel Mounting



All dimensions in mm.

Instructions

Module Expansion

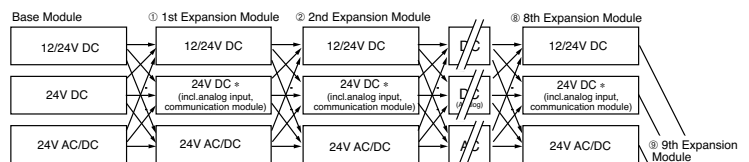
Use the base module, expansion I/O modules, and communication modules according to the combinations shown on the right.



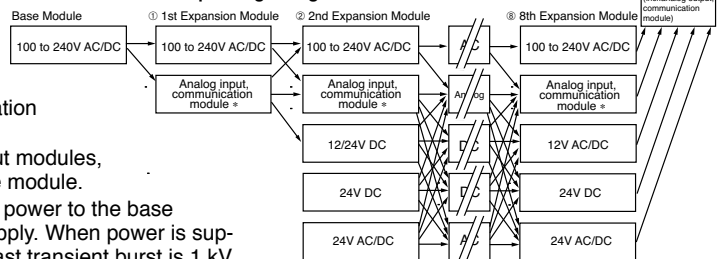
*Only one LONWORKS® communication module can be installed at the far right end of the row.

1. A maximum of 9 expansion I/O modules and communication modules can be connected to a base module.
2. A maximum of 4 combination I/O modules, 4 analog input modules, and 1 analog output module can be connected to a base module.
3. When using modules of the same power voltage, supply power to the base module and expansion I/O modules using one power supply. When power is supplied to the modules from different power supplies, the fast transient burst is 1 kV (IEC61000-4-4).
4. A 100 to 240V AC/DC module cannot be connected to the right side of a 12/24V DC, 24V DC, or 24V AC/DC module.
5. For analog input module and AS-Interface communication module, a module of any voltage can be connected to the left side. To the right side, however, a 100 to 240V AC/DC module cannot be connected.
6. Before connecting and disconnecting modules, turn power off.

Base module of rated operating voltage 12/24V DC, 24V DC, and 24V AC/DC



Base module of rated operating voltage 100V to 240V AC/DC



AS-Interface Communication Module

- A maximum of 4 AS-Interface communication modules can be connected to a base module.
- AS-Interface communication module can be connected to any base module and expansion I/O modules.
- A 100 to 240V AC/DC module cannot be connected to the right side of AS-Interface communication module.

LONWORKS® Communication Module

- LONWORKS® communication module can be connected to any base module and expansion I/O modules.
- Only one LONWORKS® communication module can be installed. Always install the module at the far right end.

Instructions

Wiring

Base Module and Expansion I/O Module

- Connect an IEC60127 approved fuse to the power supply for protection against overload and short circuit.
- Do not connect input wire and communication cable in parallel or near the power line, output line, or motor line. Also make sure that any noise source is not present nearby.
- Use 0.5 to 2.5 mm² wires (for one-wire) or 0.5 to 1.5 mm² wires (for two-wire) for power line, input line, and output line (tightening torque: 0.4 to 0.5 N·m).

LONWORKS® Communication Module

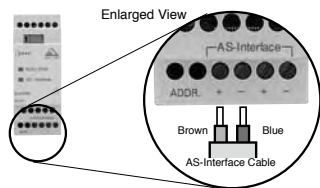
- Use LONWORKS® compatible cables for network wiring of the LONWORKS® communication module.

AS-Interface Communication Module

Purpose	Specification	Type No.
Signal / Power	EPDM (rubber) yellow	F-LINK-ASYE
Signal / Power	TPE (heat-resistant PVC) yellow	F-LINK-ASYT
Auxiliary Power	EPDM (rubber) black	F-LINK-ASBE
Auxiliary Power	TPE (heat-resistant PVC) black	F-LINK-ASBT

*Available from IDEC

- When connecting AS-Interface cable to an AS-Interface communication module, make sure that the brown cable is connected to terminal +, and the blue cable to terminal -. The two + terminals and two - terminals are both connected internally.



Initialization after Power-up

- Initialization starts when the FL1E base module is powered up. When initialization is complete, the FL1E is automatically set to RUN mode. When using the FL1E base module with display, an hourglass appears on the display during the initialization. When using the FL1E without display, the red LED flashes during the initialization.
- Initialization time
 - When a memory cartridge or memory/battery cartridge is used: 10 seconds maximum
 - When a cartridge is not used, or battery cartridge is used: 9 seconds maximum
- *Initialization time varies according to the program size.

⚠ Safety Precautions

- All IDEC SmartRelay devices are manufactured under IDEC's rigorous quality control system, but users must add a backup or failsafe provision to the control system using the device in applications where heavy damage or personal injury may be caused in case the device should fail.
- Turn off the power to the device before installation, removal, wiring, maintenance, and inspection of the device. Failure to turn power off may cause electric shocks or fire hazard.
- Special expertise is required to install, wire, program, and operate the IDEC SmartRelay devices. People without such expertise must not use the IDEC SmartRelay devices.
- Read the user's manual or operating instruction sheet attached to the product to make sure of correct operation.

Specifications and other descriptions in this catalog are subject to change without notice.



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