



SmartRelay

FL1F

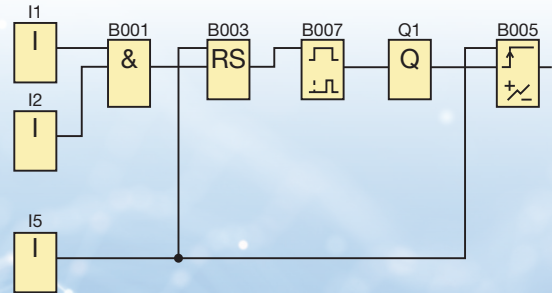
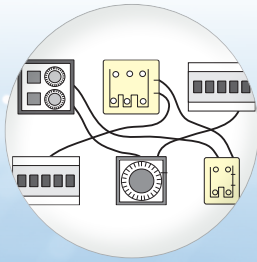


IDEC SmartRelay

Compact yet powerful, the IIoT-ready SmartRelay
with extensive functionality

IDEC CORPORATION

Simplify everything – from relay and timer control to remote monitoring



■ The FL1F is a smart solution for simplifying complex wiring, including relays, timers, and counters. It supports up to a 10A output and features a message display function.

■ Programming is easy: simply placing and connecting the function blocks.

Highly versatile

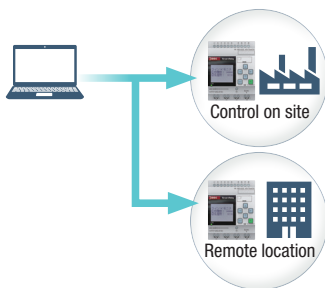
- 6 types of I/O expansion modules, supporting up to 12 units, up to 60 I/O points
- 100 to 240V AC/DC, 24VDC
- 24V AC/DC, 12/24V DC
- Basic model without LCD display available

Environmental resistance

- Operating temperature range: -20 to +55°C

Easy maintenance

- Compatible with microSD memory cards.
- Clock backup for 20 days.
- Automatic clock adjustment via NTP.
- Programs can be uploaded and downloaded remotely via Ethernet.

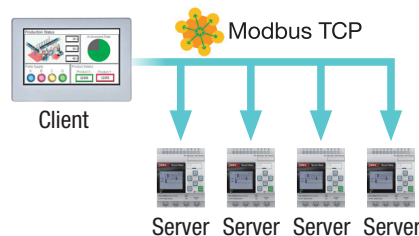


Minimizes development time

- Equipped with a simulation function and online testing capabilities.
- With 2 additional function blocks for float/integer conversion, a total of 46 types are now available.

Supports Modbus TCP communication

- Can connect to peripheral devices via Modbus TCP communication (e.g., servers).



Easy-to-read LCD display

- Errors, alerts, and other issues are displayed based on their status level.



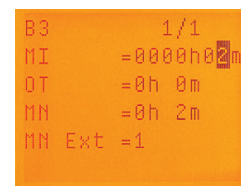
Message display

- With the scrolling function, the Base Module can display up to 192 half-width characters (16 per line x 6 lines), while the text display supports up to 240 half-width characters (20 per line x 6 lines).



Change settings on site

- Use the LCD display and control switches to adjust parameters while the module remains in place.



Applications

Agricultural greenhouses



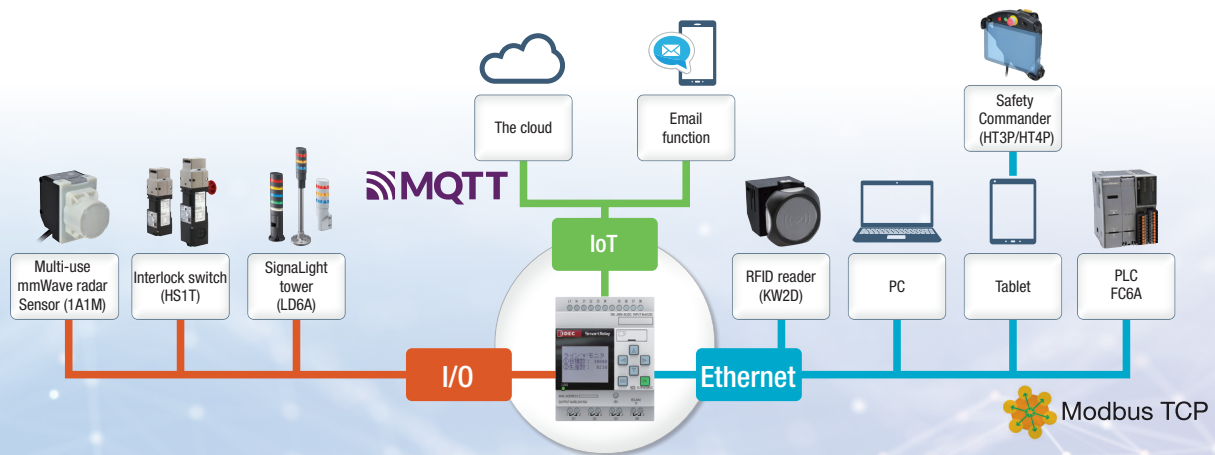
Roller shutters



Pump control



Enhanced network support capabilities



Email function

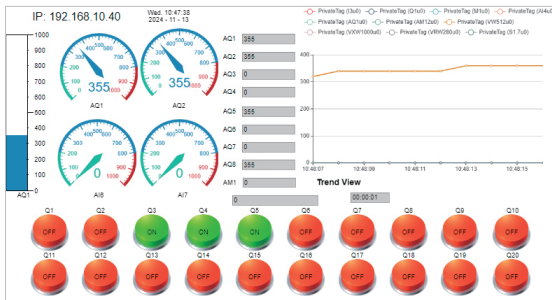
- When a status changes or a process ends, this feature automatically sends an email to a designated group of recipients.

Example emails

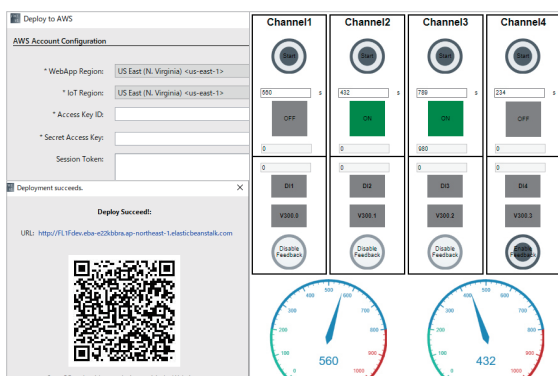
- The floodwater level sensor in Hatch 1 has reached Alert Level 1.
- Process 1 for machining equipment 1 is now complete.
- An abnormality has been detected in the discharge pressure for drain pump 1.

Web server function (FL1F WEB EDITOR)

- Remote monitoring via PC or smart devices.
- Improved usability for creating almost any type of browser screen imaginable.
 - Icon/text size can be changed to 100, 125, or 150%.
 - The graphics library has been improved.



- Deployment to AWS: design web pages with the FL1F WEB EDITOR, deploy them to AWS, and manage them efficiently from the cloud.



MQTT network protocol support

- You can use MQTT to connect to cloud platforms such as AWS, Azure, and Alibaba.



View data logs online

- Files can also be exported to a local PC.

Row No	Time	A11	A12
1	2024-11-22 11:28:09	1	1
2	2024-11-22 11:28:12	1	1
3	2024-11-22 11:28:14	1	1
4	2024-11-22 11:28:17	1	1
5	2024-11-22 11:28:19	1	1

Batch download for projects

- The same project can be downloaded to multiple destinations.

Name	IP Address	Subnet Mask	Gateway	MAC address	Device Type	Status
FL1F F56_1	192.168.189.3	255.255.255.0	192.168.0.1	4C-E7-05-58-AD-9F	BM	Available
FL1F F56_2	192.168.0.3	255.255.255.0	192.168.189.57	4C-E7-05-58-AD-01	BM	Available

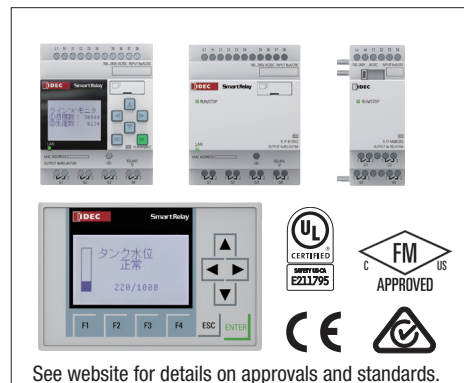
Batch download of network projects

- Each project set up in the network view can be downloaded to its designated communication destination.
- When downloading, selecting the target base module enables you to download the corresponding set of projects in a batch.

Name	IP Address	Subnet Mask	Gateway	Device Type
FL1F F56_1	192.168.189.3	255.255.255.0	192.168.189.57	BM
FL1F F56_2	192.168.0.3	255.255.255.0	192.168.0.1	BM

Enhances both performance and ease of use

- Maximum of 60 I/O points (with expansions) (24DI + 20DO + 8AI + 8AO)
- Maximum programming capacity: 8500 bytes (400 function blocks)
- Operating temperature range: -20 to +55°C (*1) (*2)
- On models with an LCD display, you can not only edit and monitor function block programs, but also add or delete them. The user interface allows for intuitive operation, enabling quick program modifications.
- Base Modules with a built-in LCD display feature a 3-color backlight. The display can show 8 characters x 6 lines (full-width characters), for improved visibility and clarity.
- Data is stored in non-volatile memory, ensuring unlimited backup time.



See website for details on approvals and standards.

- With the built-in clock function, the clock backup lasts up to 20 days (at an ambient temperature of 25°C). Additionally, the NTP function automatically adjusts the clock when connected to the Internet. (*1)
- Equipped with a microSD memory card slot, enabling program downloading and data logging using commercially available memory cards.
- Ethernet communication port (RJ45) as the standard port. No cables are needed for downloading or uploading user programs. It also supports Modbus TCP communication (server/client, up to 16 connections) for easy control of peripheral equipment. (*1)
- Web server function available. With the FL1F WEB EDITOR function in WindLGC, easily create visually impactful web pages using the drag-and-drop feature. Users can design virtually any type of display screen.
- With 1:n communication support, users can build a system with up to 16 connections.
- New function blocks have been added, including float-to-integer and integer-to-float conversion blocks. (*1)
- The "FL1F Access Tool" allows for easy operation and control using familiar Microsoft Excel® functionality. (*1) (*3)
- The FL1F's text display is a backlit LCD (160 x 96 dots) available in 3 colors: white, amber, and red. It can display up to 10 characters x 6 lines (full-width characters) and supports scrolling, blinking, and bar graph displays.

*1) When FS is 05 or later. WindLGC Ver. 8.2 or later is required for FS 05 or later. *2) When FS is 04 or earlier: 0 to +55°C.

*3) Compatible with Microsoft Office Excel 2007, 2010, 2013, 2016, 2019, and Excel 365.

FL1F

Base modules

Quantity: 1

Rated power voltage	Input signal	Output signal	Display	Clock	I/O points	Weight (approx.)	Part No.
24V DC	DC (*4) I1, I2, I7 and I8 are used for digital/analog inputs	Transistor	Yes	Yes	8/4 points	195g	FL1F-H12SCD
12/24V DC		Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCE
			—			200g	FL1F-B12RCE
24V AC/DC	AC/DC (*4)	Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCA
			—			200g	FL1F-B12RCA
100 to 240V AC/DC		Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCC
			—			200g	FL1F-B12RCC

*4) With NPN/PNP sensor input. For details, see "Input internal circuits" on P8.

Expansion I/O modules (*5) (*6)

Quantity: 1

Type	Rated power voltage	Input signal	Output signal	I/O points	Weight (approx.)	Part No.
Input/Output	24V DC	DC(*7)	Transistor	4/4 points	95g	FL1F-M08B1S2
	12/24VDC	DC	Relay	4/4 points	130g	FL1F-M08B2R2
	24V AC/DC	AC/DC(*7)	Relay	4/4 points	130g	FL1F-M08D2R2
	100 to 240V AC/DC	AC/DC	Relay	4/4 points	130g	FL1F-M08C2R2
Analog Input	12/24V DC	Analog	—	2/0 points	95g	FL1F-J2B2
Analog Output	24V DC	—	Analog	0/2 points	95g	FL1F-K2BM2

*5) I/O points within the range of the maximum expansion I/O points can be used.

*6) 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).

*7) With NPN/PNP sensor input. For details, see "Input internal circuits" on P8.

Text display for FL1F

Quantity: 1

Power supply specifications	Weight (approx.)	Part No.
24V AC/DC 12V DC	220g	FL1F-RD1

Options

Quantity: 1

Name	Part No.
Application Software: WindLGC(*8)	FL9Y-LP1CDW
Mounting Clip and Waterproof Gasket for Text Display(*9)	FL1F-KW1
IDEC SmartRelay User's Manual (English)	FL9Y-B1789

*8) DVD-ROM (including online help manual)

*9) Supplied with a Text Display, it includes a gasket, four mounting clips, and a power supply connector.

Base Module Specifications

Part No.		FL1F-H12SCD	FL1F-H12RCE FL1F-B12RCE	FL1F-H12RCA FL1F-B12RCA	FL1F-H12RCC FL1F-B12RCC
Power supply	Rated power voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC
	Operating 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	—	—	50/60Hz (47 to 63Hz)	50/60Hz (47 to 63Hz)
	Current draw	25 to 50mA (24V DC) 1.2A (with max. load on digital output)	50 to 165mA (12V DC) 25 to 90mA (24V DC)	60 to 185mA (24V AC) 25 to 100mA (24V DC)	23 to 60Hz (100V AC) 15 to 25mA (240V AC) 12 to 23mA (100V DC) 5 to 15mA (240V DC)
	Allowable momentary power interruption	—	2ms (12V DC) 5ms (24V DC)	5ms (24V AC/DC)	10ms (100V AC/DC) 20ms (240V AC/DC)
	Power consumption	1.2W (24V DC)	2.0W (12V DC) 2.2W (24V DC)	4.4W (24V AC) 2.4W (24V DC)	4.6W (100V AC) 6.0W (240V AC) 2.3W (100V DC) 3.6W (240V DC)
	Reverse polarity protection	Yes	Yes	—	—
Clock	Backup duration	20 days (+25°C Typ.)	20 days (+25°C Typ.)	20 days (+25°C Typ.)	20 days (+25°C Typ.)
	Clock accuracy	±2 sec/day (Typ.)	±2 sec/day (Typ.)	±2 sec/day (Typ.)	±2 sec/day (Typ.)
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)
	High-speed input ^{*1}	4 (I3, I4, I5, I6), 5 kHz maximum	4 (I3, I4, I5, I6), 5 kHz maximum	—	—
	Analog input points	4 (I1, I2, I7, I8)	4 (I1, I2, I7, I8)	—	—
	Analog input range	0 to 10V DC (max. rated input: 28.8V DC)	0 to 10V DC (max. rated input: 28.8V DC)	—	—
	Input 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	5.8kΩ	4.8kΩ	610kΩ
		Analog input	80kΩ	—	—
	Electrical isolation	—	—	—	—
	Operating range	OFF voltage	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC
		ON voltage	≥ 12V DC min.	≥ 8.5V DC min.	≥ 79V AC/DC
		OFF current	< 0.9 mA (I3 to I6) < 0.07 mA (I1, I2, I7, I8)	< 0.88 mA (I3 to I6) < 0.07 mA (I1, I2, I7, I8)	< 0.05 mA (AC) < 0.06 mA (DC)
		ON current	≥ 2.1 mA (I3 to I6) ≥ 0.18 mA (I1, I2, I7, I8)	≥ 1.5 mA (I3 to I6) ≥ 0.12 mA (I1, I2, I7, I8)	≥ 0.08 mA (AC) ≥ 0.13 mA (DC)
	Input delay time	Turn ON time	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	1.5 ms (Typ.)	100V AC: 40ms (Typ.) 240V AC: 30ms (Typ.) 100V DC: 25ms (Typ.) 240V DC: 20ms (Typ.)
		Turn OFF time	1.5 ms (Typ.) ≤ 1.0 ms (I3 to I6)	15ms (Typ.)	100V AC: 45ms (Typ.) 240V AC: 70ms (Typ.) 100V DC: 60ms (Typ.) 240V DC: 75ms (Typ.)
	Maximum wire length	Less than 100m (*2)	Less than 100m (*2)	Less than 100m (*2)	Less than 100m (*2)
Analog input	Input error	±1.5% of full scale	±1.5% of full scale	—	—
	Digital resolution	10 bits (0 to 1000)	10 bits (0 to 1000)	—	—
	Sampling interval	300ms	300ms	300ms	300ms
Output	Output signal	Transistor source output	Relay contact	Relay contact	Relay contact
	Output points/Contact configuration	4 pointss (separate)	4NO contacts	4NO contacts	4NO contacts
	Electrical isolation	Not isolated	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 current	Power supply voltage	—	—	—
	Rated load current	0.3A max.	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC
	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, 12V DC (reference value)	10 mA, 12V DC (reference value)	10 mA, 12V DC (reference value)
	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

After power-up, the FL1F takes a maximum of 1.2 seconds (when using a micro SD card) to RUN mode.

*1) When selecting frequency trigger function.

*2) 10m when connected to analog input (twisted pair cable)

Expansion I/O Module Performance Specifications

Part No.		FL1F-M08B1S2	FL1F-M08B2R2	FL1F-M08D2R2	FL1F-M08C2R2	FL1F-J2B2	FL1F-K2BM2
Power supply specifications	Rated voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC	12/24V DC	24V DC
	Operating 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	25 to 40 mA	20 to 90 mA (12V DC) 15 to 50 mA (24V DC)	40 to 100 mA (24V AC) 15 to 50 mA (24V DC)	23 to 46 mA (100V AC) 15 to 30 mA (240V AC) 12 to 29 mA (100V DC) 5 to 15 mA (240V DC)	25 to 30 mA	30 to 82 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)	10 ms (typ.) (12/24V DC)	10 ms (typ.)
	Power consumption	1.0W	1.1W (12V DC) 1.2W (24V DC)	2.6W (24V AC) 1.2W (24V DC)	4.6W (100V AC) 7.2W (240V AC) 2.9W (100V DC) 3.6W (240V DC)	0.4W (12V DC) 0.7W (24V DC)	2.0W
	Reverse polarity protection	Yes	Yes	—	—	Yes	Yes
Input specifications	Input signal	DC input	DC input	AC/DC input	AC/DC input	Analog input	—
	Input points	4	4	4	4	—	—
	Isolation	—	—	—	—	—	—
	Input voltage range	< 5V DC	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC	—	—
	Operating range	OFF voltage	≥ 12V DC	≥ 8.5V DC	≥ 12V AC/DC	—	—
		ON voltage	< 0.88 mA	< 0.88 mA	< 1.1 mA	—	—
		OFF current	≥ 2.1 mA	≥ 1.5 mA	≥ 2.63 mA	—	—
		ON current	2.1mA minimum	1.5mA minimum	2.63mA minimum	—	—
	Input delay time	Turn ON time	1.5 ms (Typ.)	1.5 ms (typ.)	1.5 ms (typ.)	—	—
		Turn OFF time	1.5 ms (Typ.)	1.5 ms (typ.)	15 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 specifications	Wire length from power source	Less than 100m	Less than 100V	Less than 100V	Less than 100V	10m (twisted pair shielded cable)	—
	Output signal	Transistor source output	Relay contact	Relay contact	Relay contact	—	—
	Output Points/Contact Configuration	4 points (separate)	4NO contacts	4NO contacts	4NO contacts	—	—
	Electrical 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	—	—
	Rated load current	0.3A maximum	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2 A at 120V DC 0.1 A at 240V DC	—	—
	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 (reference value)	10 mA, 12V DC (reference value)	10 mA, 12V DC (reference value)	—	—
	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	—	—	—	—	—	±2.5%
	External load resistance	—	—	—	—	—	Voltage: 5 kΩ minimum Current: 250Ω maximum
	Analog output cycle	—	—	—	—	—	50 ms (typ.)
	Wire length from power supply	—	—	—	—	—	10m (twisted-pair shielded cable)

Text display performance specifications

Power voltage	24V AC/DC 12V DC
Operating voltage range	20.4 to 26.4V AC 10.2 to 28.8V DC
Allowable power frequency	47 to 63Hz
Current draw	12V DC: 150mA (Typ.) 24V DC: 75mA (Typ.) 24V AC: 145mA (Typ.) (*1)
Data transmission rate	10/100M full/half duplex data transmission rate
Display	FSTN graphic display (W x H: 160 x 96 dots) LED backlight (white, amber, red)
Font type	English, Spanish, Russian, Chinese, Italian, Turkish, German, Dutch, French, Japanese
Displayable string	1 screen 6 lines x 20 columns
Keyboard	Membrane keypad
Installation	Panel mount
Dimensions (W x H x D)	128.2 x 86 x 38.7 mm

*1) 75 mA when FS is 03

LCD display and backlights

Backlight life (*2)	20,000 hours
Display life (*3)	50,000 hours

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

*3) Backlight durability is the number of hours taken for the light to become 50% of the original brightness.

General specifications (common)

	Specifications	Testing standard
Operating temperature	Horizontal mount Vertical mount	Cold: IEC 60068-2-1 Hot: IEC 60068-2-2
Storage/transportation temperature	-40 to +70°C (*4)	—
Relative humidity	10 to 95% (no condensation)	IEC 60068-2-30
Altitude or atmospheric pressure	During operation: 1080 to 795hPa (0m to 2000m) During transportation: 1080 to 660hPa (0 to 3,500m)	—
Operating environment	Free from corrosive gases	—
Degree of protection	IP20	—
Vibration resistance	5 to 8.4Hz (amplitude: 3.5mm) 8.4 to 150Hz (acceleration 9.8m/s ²)	IEC 60068-2-6
Shock resistance	3 times each in 3 axes 147m/s ²	IEC 60068-2-27
Drop test (packaged)	0.3m	IEC 60068-2-32
Emission	Restriction Class B Group 1 Restriction Class B	EN 61000-6-3 EN 61000-6-4
Electrostatic discharge	8kV Aerial discharge 6kV contact discharge	IEC 61000-4-2
Radiated field immunity	80MHz to 1000MHz and 1.4GHz to 2.0GHz 10V/m, 80% AM (1kHz) 2.0GHz to 6.0GHz 3V/m, 80% AM (1kHz)	IEC 61000-4-3
Fast transient/burst	2kV (power input/output)	IEC 61000-4-4
Surge immunity (*7)	1kV (power line) normal 2kV (power line) common	IEC 61000-4-5
Surge immunity (Low voltage (12V or 24V) (Applicable to SmartRelay modules)	With surge arrester (e.g. BVT AD24): 1kV line-to-line, 2kV line-to-ground Without surge arrester: 0.5kV between lines, 1kV between line and ground	—
Applicable wire	2.5mm ² (for one wire) 1.5mm ² (for two wires)	—
Terminal	Finger-safe European terminal block (*8)	—

*4) No freezing

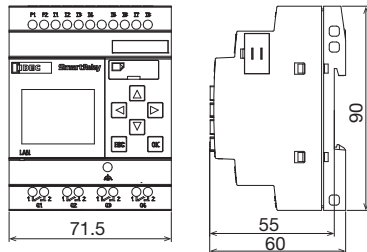
*5) Base module: 0 to 55°C when FS is 04 or earlier Text display: 0 to 55°C when FS is 03 or earlier

*6) No condensation

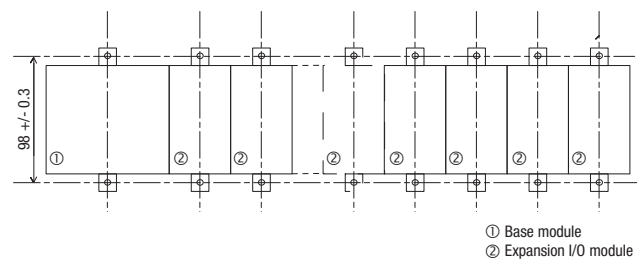
*7) For protection against surge noise on DC power supply types (FL1F-H12RCE/B12RCE, FL1F-H12SCD, FL1F-H12RCA/B12RCA), use surge absorbers, noise cut transformers, or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.

*8) Recommended tightening torque: 0.8N·m

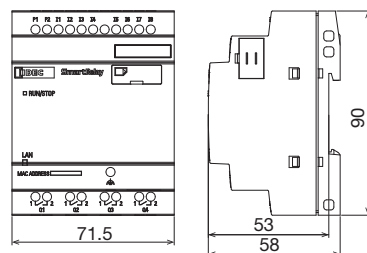
Base Module (with display) (*9)



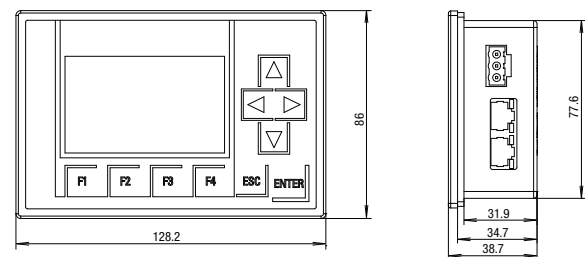
Mounting hole layout (using mounting slides)



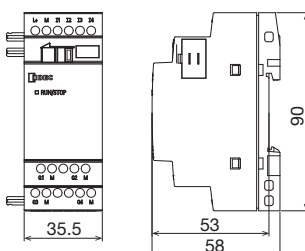
Base Module (without display) (*9)



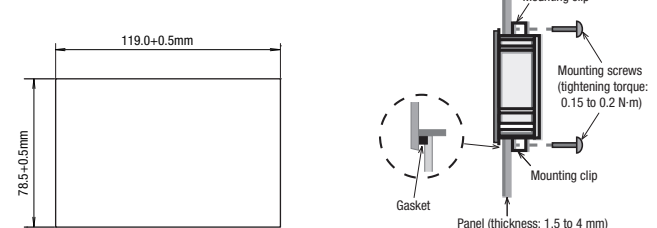
Text display



Expansion I/O Module (*10)



(Panel Cutout)



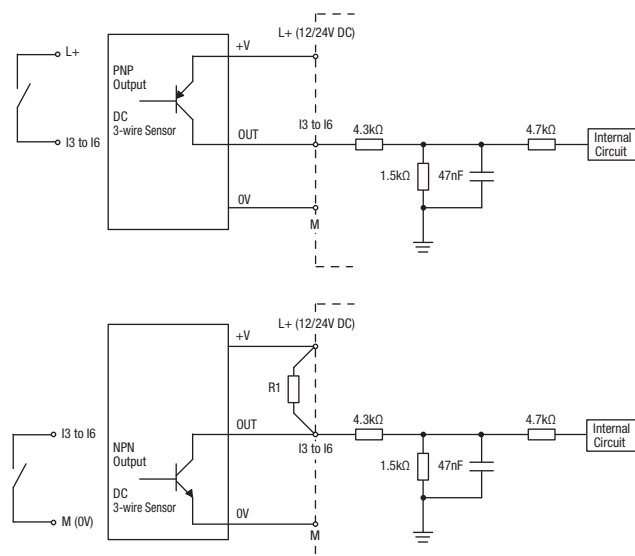
*8) The position and number of holes at the bottom of the side vary depending on the module. However, the overall dimensions remain unchanged.

*9) The position and number of protrusions and holes on the side vary depending on the module. However, the overall dimensions remain unchanged.

Input Internal Circuits

DC Input

FL1F-H12SCD/-H12RCE /-B12RCE
FL1F-M08B1S2/-M08B2R2



When using a NPN output sensor, connect an external resistor (I3 to I6):

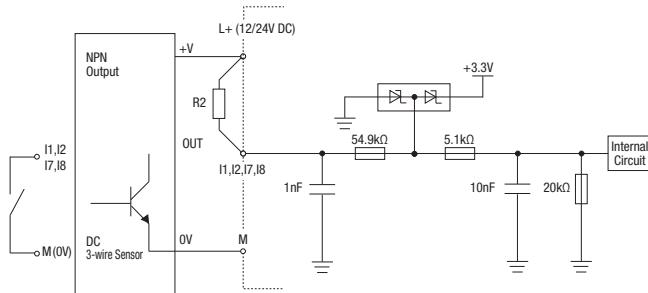
FL1F-H12SCD:

For power voltage 24V DC: $R1 \leq 4k\Omega$, 1/4W

FL1F-H12RCE, -B12RCE

For power voltage 24V DC: $R1 \leq 8.1k\Omega$, 1/4W

For power voltage 12V DC: $R1 \leq 1.5k\Omega$, 1/4W



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 a NPN output sensor, connect an external resistor (I1, I2, I7, I8):

FL1F-H12SCD:

For power voltage 24V DC: $R2 \leq 50k\Omega$, 1/8W

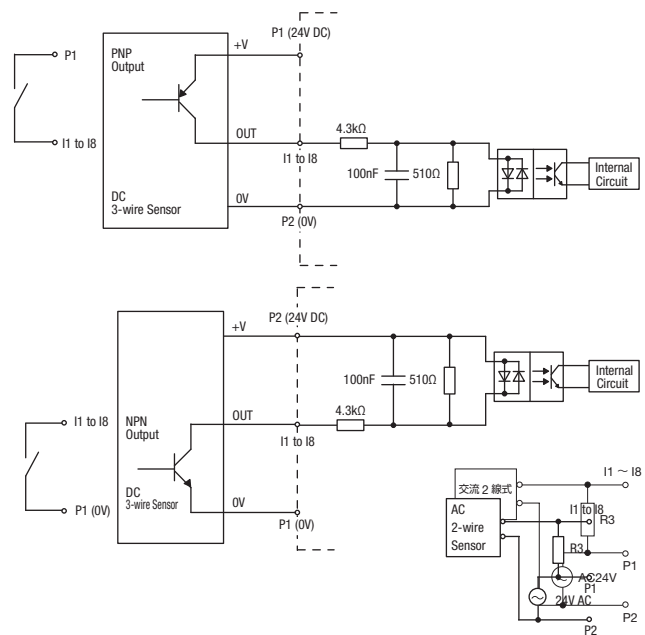
FL1F-H12RCE, -B12RCE

For power voltage 24V DC: $R2 \leq 100k\Omega$, 1/8W

For power voltage 12V DC: $R2 \leq 19k\Omega$, 1/8W

24V AC/DC Input

FL1F-H12RCA /-B12RCA
FL1F-M08D2R2



Bleeder resistance (R3) calculation

R3 must satisfy the following three conditions.

Condition 1: $R3 (\Omega) \leq \frac{\text{Maximum input OFF voltage} (= 5VAC)}{\text{Maximum sensor leakage current (A)}}$

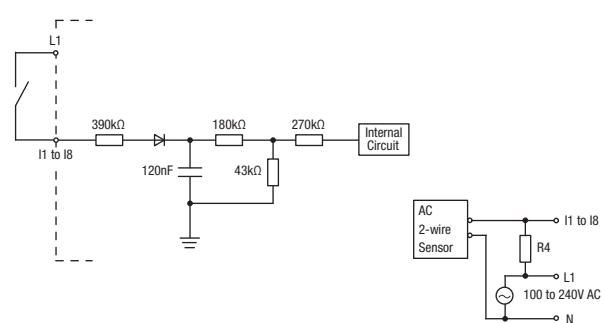
Condition 2: $R3 (\Omega) \leq \frac{\text{Sensor power voltage (V)}}{\text{Maximum sensor load current (A)}}$

The voltage drop across the load (R3) must be less than 5V while the sensor is turned off.

Condition 3: $P_{R3} (W) \leq \frac{(\text{Sensor power voltage (V)})^2}{R3 \text{ resistance} (\Omega)} \times 3$ (3: recommended allowance)

100 to 240V AC/DC

FL1F-H12RCC /-B12RCC
FL1F-M08C2R2



Bleeder resistance (R4) calculation

R4 must satisfy the following three conditions.

Condition 1: $R4 (\Omega) \leq \frac{\text{Maximum input OFF voltage} (= 40VAC)}{\text{Maximum sensor leakage current (A)}}$

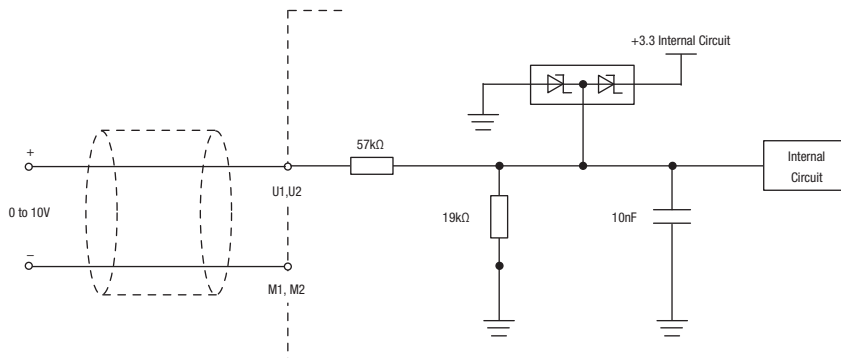
Condition 2: $R4 (\Omega) \leq \frac{\text{Sensor power voltage (V)}}{\text{Maximum sensor load current (A)}}$

The voltage drop across the load (R4) must be less than 40V while the sensor is turned off.

Condition 3: $P_{R4} (W) \leq \frac{(\text{Sensor power voltage (V)})^2}{R4 \text{ resistance} (\Omega)} \times 3$ (3: recommended allowance)

Analog Voltage Input

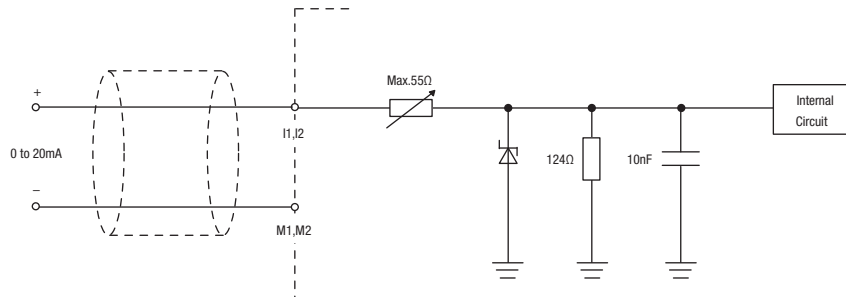
FL1F-H12SCD/-H12RCE /-B12RCE
FL1F-J2B2



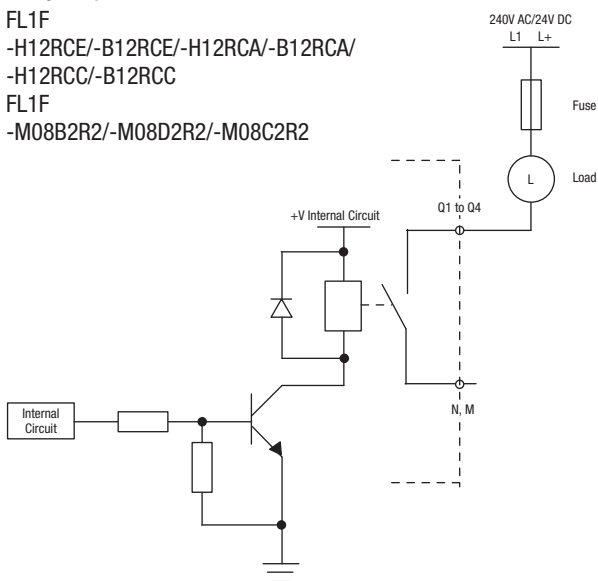
Use a twisted pair cable, and keep the cable as short as possible.

Analog Current Input

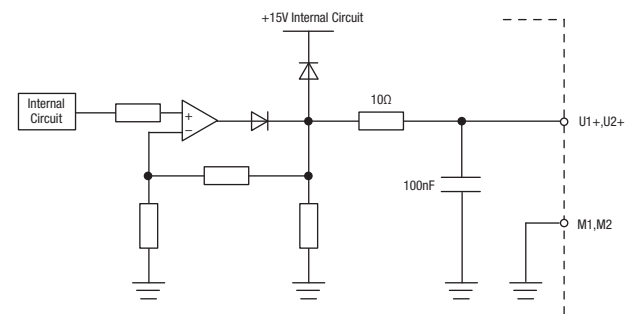
FL1F-J2B2

**Output internal circuits****Relay Output**

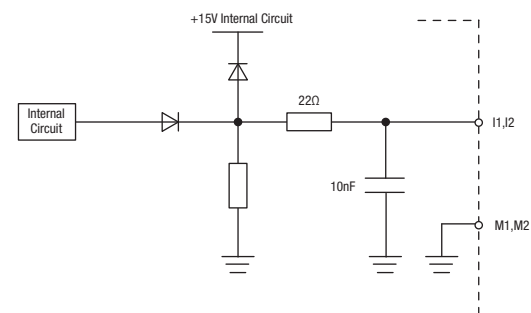
FL1F
-H12RCE/-B12RCE/-H12RCA/-B12RCA/
-H12RCC/-B12RCC
FL1F
-M08B2R2/-M08D2R2/-M08C2R2

**Analog output**

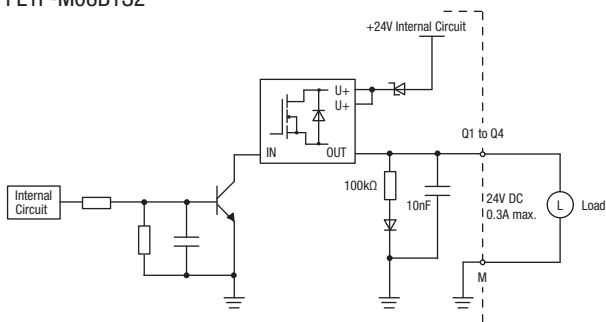
FL1F-K2BM2
(0-10V DC)

**Analog output**

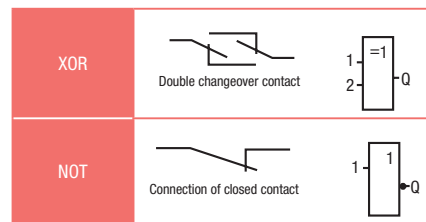
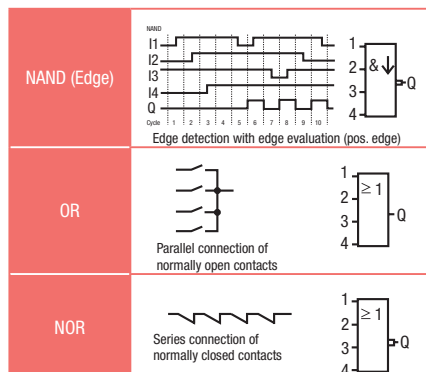
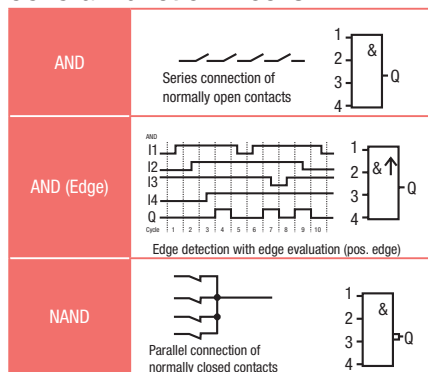
(0-20, 4-20 mA)

**DC Output (Transistor Source Output)**

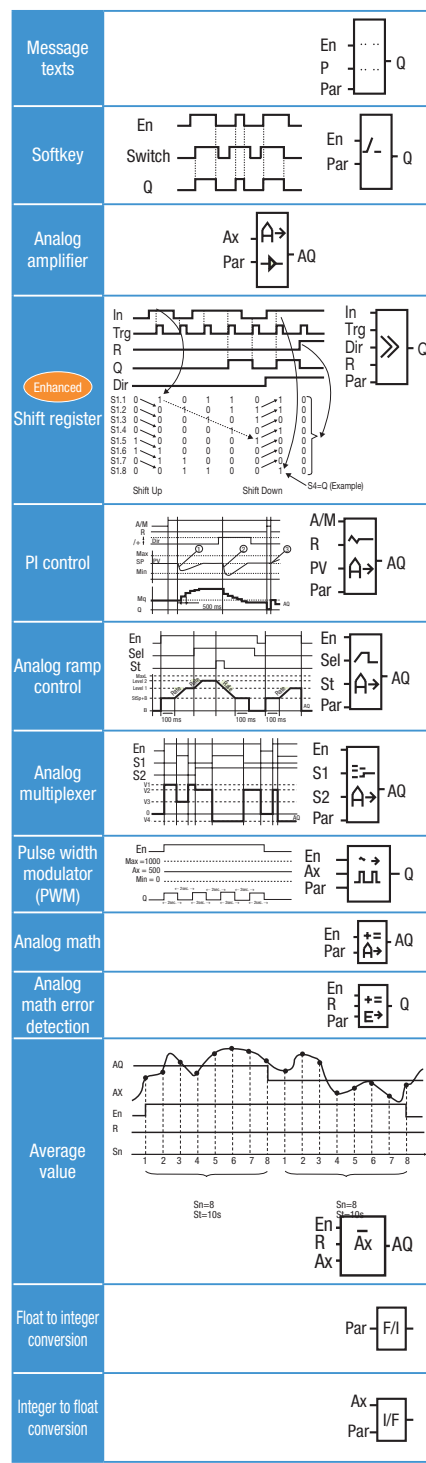
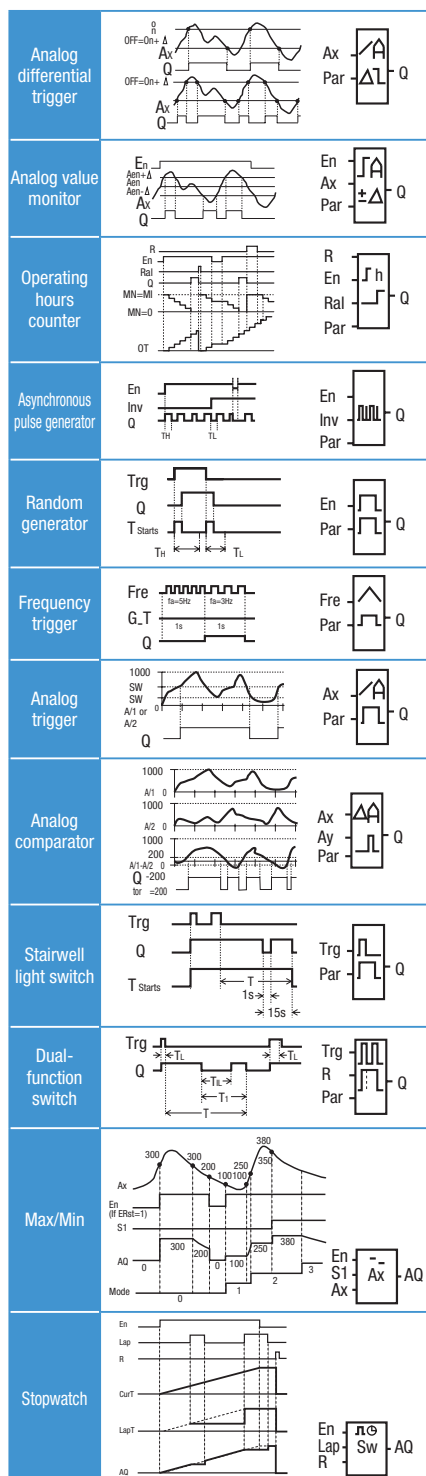
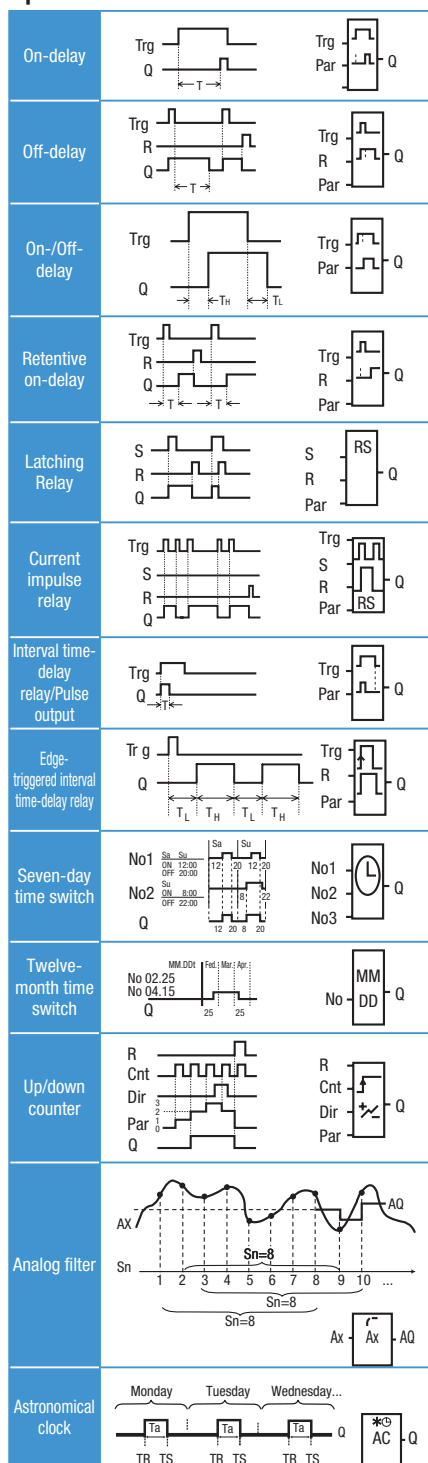
FL1F-H12SCD
FL1F-M08B1S2



General Function Blocks



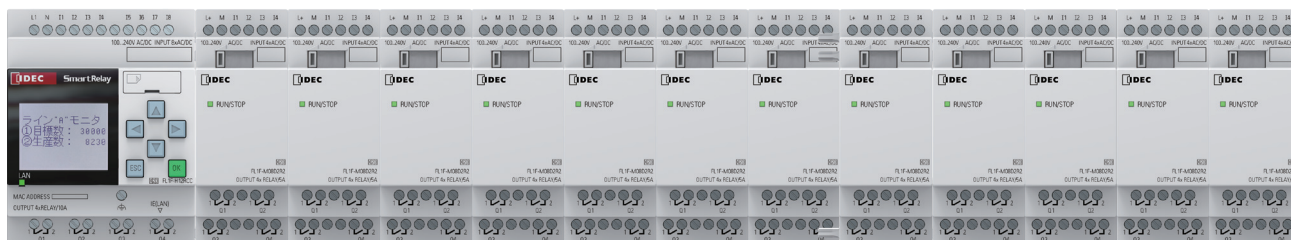
Special Function Blocks



Instructions

Module Expansion

Base Module connects up to 12 Expansion I/O Modules and maximum 60 I/Os can be used according to the combinations shown below.



- For the terminal arrangement and wiring of the module, please be sure to read FL1F user's manual.
- Before connecting and disconnecting modules, turn power off.
- A maximum of 24 digital inputs, 8 analog inputs, 20 digital outputs, 8 analog outputs can be used by using a combination of a Base Module and Expansion I/O Modules.
- When using modules of the same power voltage, supply power to the Base Module and Expansion I/O Modules using one power supply. When supplying power to the modules using different power supplies, supply power to the Base Module and Expansion I/O Module at the same time. Or, supply power to the Expansion I/O Module before the Base Module. Expansion I/O module may not be recognized if power is supplied to the Expansion I/O Module after the Base Module. When power is supplied to the modules from different power supplies, the fast transient burst is 1 kV (IEC61000-4-4).
- 100 to 240V AC/DC modules cannot be connected to the right side of 12/24V DC, 24V DC, or 24V AC/DC modules.
- For optimal and high-speed communication performance between Base Module and Expansion I/O Modules, install the input/output modules first, then the analog modules.
- Approvals are as follows:
 BV: Bureau Verites (France)
 DNV GL: (Norway)
 LR: Lloyd's Register of Shipping (UK)
 NK: (Japan)
- The following are the conditions of marine standards approval.
 - Modules of rated power voltage 12/24V AC/DC: Use at 24V DC
 - Modules of 12/24V DC and 24V DC: Use a surge protection device Part no. 918 402/918 422 made by DEHN+SÖHNE or equivalent.
 - For applications on a bridge or decks, a noise filter Part no. B84113-C-B-30 (made by TDKEPCOS) or equivalent is used (FL1F-RD1 cannot be used on a bridge or deck).
 - Contact IDEC for the environment where FL1F can be used.

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.

General instructions

Do not disassemble, repair, or modify the product. Otherwise, electric shock, fire, or malfunction may occur.

Power-up

- After power-up, FL1F takes a maximum of 1.2 seconds (when using a micro SD card) to RUN mode. During power-up, a timer appears on models with a display. When using the FL1F without display, the red LED flashes, then the green LED flashes when RUN mode starts.
- Time taken to change to RUN mode
1.2 seconds maximum

Ordering Terms and Conditions

Thank you for using IDEC Products.

By purchasing products listed in our catalogs, datasheets, and the like (hereinafter referred to as "Catalogs") you agree to be bound by these terms and conditions. Please read and agree to the terms and conditions before placing your order.

1. Notes on contents of Catalogs

- (1) Rated values, performance values, and specification values of IDEC products listed in this Catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.
Also, durability varies depending on the usage environment and usage conditions.
- (2) Reference data and reference values listed in Catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.
- (3) The specifications / appearance and accessories of IDEC products listed in Catalogs are subject to change or termination of sales without notice, for improvement or other reasons.
- (4) The content of Catalogs is subject to change without notice.

2. Note on applications

- (1) If using IDEC products in combination with other products, confirm the applicable laws / regulations and standards.
Also, confirm that IDEC products are compatible with your systems, machines, devices, and the like by using under the actual conditions. IDEC shall bear no liability whatsoever regarding the compatibility with IDEC products.
- (2) The usage examples and application examples listed in Catalogs are for reference purposes only. Therefore, when introducing a product, confirm the performance and safety of the instruments, devices, and the like before use. Furthermore, regarding these examples, IDEC does not grant license to use IDEC products to you, and IDEC offers no warranties regarding the ownership of intellectual property rights or non-infringement upon the intellectual property rights of third parties.
- (3) When using IDEC products, be cautious when implementing the following.
 - i. Use of IDEC products with sufficient allowance for rating and performance
 - ii. Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that an IDEC product fails
 - iii. Wiring and installation that ensures the IDEC product used in your system, machine, device, or the like can perform and function according to its specifications
- (4) Continuing to use an IDEC product even after the performance has deteriorated can result in abnormal heat, smoke, fires, and the like due to insulation deterioration or the like. Perform periodic maintenance for IDEC products and the systems, machines, devices, and the like in which they are used.
- (5) IDEC products are developed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use an IDEC product for these applications, unless otherwise agreed upon between you and IDEC, IDEC shall provide no guarantees whatsoever regarding IDEC products.
 - i. Use in applications that require a high degree of safety, including nuclear power control equipment, transportation equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.), equipment for use in outer space, elevating equipment, medical instruments, safety devices, or any other equipment, instruments, or the like that could endanger life or human health
 - ii. Use in applications that require a high degree of reliability, such as provision systems for gas / waterworks / electricity, etc., systems that operate continuously for 24 hours, and settlement systems
 - iii. Use in applications where the product may be handled or used deviating from the specifications or conditions / environment listed in the Catalogs, such as equipment used outdoors or applications in environments subject to chemical pollution or electromagnetic interference
If you would like to use IDEC products in the above applications, be sure to consult with an IDEC sales representative.

3. Inspections

We ask that you implement inspections for IDEC products you purchase without delay, as well as thoroughly keep in mind management/maintenance regarding handling of the product before and during the inspection.

4. Warranty

(1) Warranty period

The warranty period for IDEC products shall be three (3) years after purchase or delivery to the specified location. However, this shall not apply in cases where there is a different specification in the Catalogs or there is another agreement in place between you and IDEC.

(2) Warranty scope

Should a failure occur in an IDEC product during the above warranty period for reasons attributable to IDEC, then IDEC shall replace or repair that product, free of charge, at the purchase location / delivery location of the product, or an IDEC service base. However, failures caused by the following reasons shall be deemed outside the scope of this warranty.

- i. The product was handled or used deviating from the conditions / environment listed in the Catalogs
 - ii. The failure was caused by reasons other than an IDEC product
 - iii. Modification or repair was performed by a party other than IDEC
 - iv. The failure was caused by a software program of a party other than IDEC
 - v. The product was used outside of its original purpose
 - vi. Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and Catalogs
 - vii. The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from IDEC
 - viii. The failure was due to other causes not attributable to IDEC (including cases of force majeure such as natural disasters and other disasters)
- Furthermore, the warranty described here refers to a warranty on the IDEC product as a unit, and damages induced by the failure of an IDEC product are excluded from this warranty.

5. Limitation of liability

The warranty listed in this Agreement is the full and complete warranty for IDEC products, and IDEC shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to an IDEC product.

6. Service scope

The prices of IDEC products do not include the cost of services, such as dispatching technicians. Therefore, separate fees are required in the following cases.

- (1) Instructions for installation / adjustment and accompaniment at test operation (including creating application software and testing operation, etc.)
- (2) Maintenance inspections, adjustments, and repairs
- (3) Technical instructions and technical training
- (4) Product tests or inspections specified by you

The above content assumes transactions and usage within your region. Please consult with an IDEC sales representative regarding transactions and usage outside of your region. Also, IDEC provides no guarantees whatsoever regarding IDEC products sold outside your region.

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