

# 6th-Generation IDEC SmartRelay



## BASE MODULE GENERAL SPECIFICATIONS

| Item                                                           |                     | Specifications                                                                | Standard                                |
|----------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------|-----------------------------------------|
| Operating Temperature                                          | Horizontal Mounting | 0 to 55°C (no freezing)                                                       | Cold: IEC60068-2-1<br>Hot: IEC60068-2-2 |
|                                                                | Vertical Mounting   | 0 to 55°C (no freezing)                                                       |                                         |
| Storage/Transportation Temp.                                   |                     | -40 to +70°C (no freezing)                                                    | —                                       |
| Relative Humidity                                              |                     | 10 to 95% (no condensation)                                                   | IEC60068-2-30                           |
| Atmospheric Pressure                                           |                     | 795 to 1080hPa                                                                | —                                       |
| Operating Condition                                            |                     | No corrosive gas                                                              | —                                       |
| Degree of Protection                                           |                     | IP20                                                                          | —                                       |
| Vibration Resistance                                           |                     | 5 to 8.4Hz, amplitude 3.5mm<br>8.4 to 150Hz, acceleration 9.8m/s <sup>2</sup> | IEC60068-2-6                            |
| Shock Resistance                                               |                     | 147m/s <sup>2</sup>                                                           | IEC60068-2-27                           |
| Drop Test (packaged)                                           |                     | 0.3m                                                                          | IEC60068-2-32                           |
| Emissions                                                      |                     | Limit class B Group 1                                                         | EN55011/A<br>EN55022/B<br>EN50081-1     |
| Electrostatic Discharge Immunity                               |                     | 8kV air discharge<br>6kV contact discharge                                    | IEC61000-4-2                            |
| Radiation Field Immunity                                       |                     | Field Strength:<br>1V/m and 10V/m                                             | IEC61000-4-3                            |
| Fast Transient Burst                                           |                     | 2kV (power line)<br>2kV (I/O signal line)                                     | IEC61000-4-4                            |
| Surge Immunity <sup>1</sup><br>(FL1F-H12RCC, FL1F-B12RCC only) |                     | 1kV (power line) normal<br>2kV (power line) common                            | IEC61000-4-5                            |
| Communication Cable                                            |                     | 2.5mm <sup>2</sup> (one wire)<br>1.5mm <sup>2</sup> (two wires)               | —                                       |
| Terminal Style                                                 |                     | Finger-safe type <sup>2</sup>                                                 | —                                       |

1: 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.

2: Tightening torque 0.5 to 0.6N·m

## PRODUCT DESCRIPTION

With an ever-changing market and tough competition, you need an edge to stay on top. This sixth-generation IDEC SmartRelay meets your demands from all small-scale applications by offering more powerful hardware, a new display and full communication options via Ethernet.

## BASE MODULE HIGHLIGHTS

### Embedded RJ45 Ethernet Port

- Remote program download, upload and monitor
- Integrated web server for remote monitoring and control

### Micro SD Card

- Equipped with micro SD slot for program storage, transfer and data logging
- No need for a special memory cartridge

### Data Logging

- Up to 20,000 lines in a file with a maximum of 50 files can be stored in the Micro SD Memory card

### Integrated Web Server

- Easily monitor and control web pages with no HTML knowledge
- Instant monitoring and control using standard web browser like Chrome, IE and Firefox
- View and control I/O status, timer, counters, analog set point and more

### There's an App for that!

- Download iOS and Android App for free
- Using the SmartRelay App, users can view and control any I/O status, timer, counters, and analog set point anywhere and at any time

### 1:N Communication

- FL1F SmartRelays now have the capability to communicate with each other over an Ethernet network
- Up to 16 FL1F SmartRelays can be configured on the network



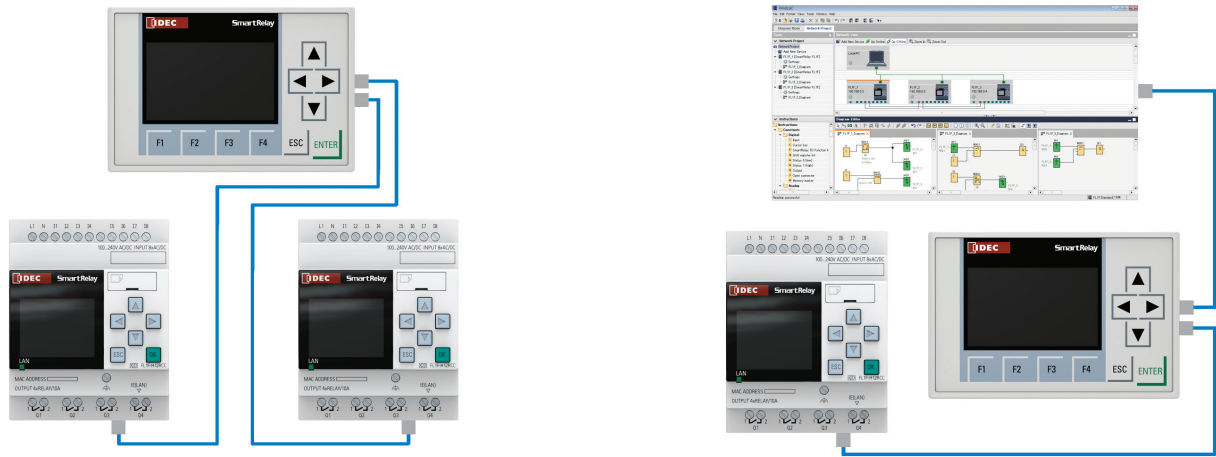
TEXT DISPLAY PANEL HIGHLIGHTS:

New and improved LCD display

- Improved display with 6 lines and 20 characters per line, more than twice as many characters as before
- Selectable white, amber or red backlighting for optical emphasis on alarms and events

Two RJ45 Ethernet ports

- Use a standard Ethernet cable to the connect FL1F base module to the Text Display Panel. A special cable is not required.
- Provide different ways to connect



TEXT DISPLAY SPECIFICATIONS

Text Display General Specifications

| Item                                                           |                     | Specifications                                                    | Standard                                |
|----------------------------------------------------------------|---------------------|-------------------------------------------------------------------|-----------------------------------------|
| Operating Temperature                                          | Horizontal Mounting | 0 to 55°C (no freezing)                                           | Cold: IEC60068-2-1<br>Hot: IEC60068-2-2 |
|                                                                | Vertical Mounting   | 0 to 55°C (no freezing)                                           |                                         |
| Storage/Transportation Temp.                                   |                     | −40 to +70°C (no freezing)                                        | —                                       |
| Relative Humidity                                              |                     | 10 to 95% (no condensation)                                       | IEC60068-2-30                           |
| Atmospheric Pressure                                           |                     | 795 to 1080hPa                                                    | —                                       |
| Operating Condition                                            |                     | No corrosive gas                                                  | —                                       |
| Degree of Protection                                           |                     | IP20                                                              | —                                       |
| Vibration Resistance                                           |                     | 5 to 8.4Hz, amplitude 3.5mm<br>8.4 to 150Hz, acceleration 9.8m/s² | IEC60068-2-6                            |
| Shock Resistance                                               |                     | 147m/s²                                                           | IEC60068-2-27                           |
| Drop Test (packaged)                                           |                     | 0.3m                                                              | IEC60068-2-32                           |
| Emissions                                                      |                     | Limit class B Group 1                                             | EN55011/A<br>EN55022/B<br>EN50081-1     |
| Electrostatic Discharge Immunity                               |                     | 8kV air discharge<br>6kV contact discharge                        | IEC61000-4-2                            |
| Radiation Field Immunity                                       |                     | Field Strength: 1V/m and 10V/m                                    | IEC61000-4-3                            |
| Fast Transient Burst                                           |                     | 2kV (power line)<br>2kV (I/O signal line)                         | IEC61000-4-4                            |
| Surge Immunity <sup>1</sup><br>(FL1F-H12RCC, FL1F-B12RCC only) |                     | 1kV (power line) normal<br>2kV (power line) common                | IEC61000-4-5                            |
| Communication Cable                                            |                     | 2.5mm² (one wire)<br>1.5mm² (two wires)                           | —                                       |
| Terminal Style                                                 |                     | Finger-safe type <sup>2</sup>                                     | —                                       |

1 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.  
2 Tightening torque 0.5 to 0.6N·m

Text Display General Specifications Cont.

|                        |                                                                                       |
|------------------------|---------------------------------------------------------------------------------------|
| Dimensions (W × H × D) | 128.2 × 86 × 38.7 mm                                                                  |
| Weight (approx.)       | 220g                                                                                  |
| Installation           | Panel cut-out using mounting clips                                                    |
| Keyboard               | Membrane keypad                                                                       |
| Display                | FSTN graphic display<br>(W × H: 160 × 96 dots)<br>LED backlight (White, Amber, Red)   |
| Font type              | English, Spanish, Russian, Chinese, Italian, Turkish, German, Dutch, French, Japanese |
| Displayable string     | 1 screen 6 lines × 20 columns                                                         |

Power Supply Specifications

|                             |                                                                    |
|-----------------------------|--------------------------------------------------------------------|
| Power Voltage               | 24V AC/DC<br>12V DC                                                |
| Allowable Voltage Range     | 20.4 to 26.4V AC<br>10.2 to 28.8V DC                               |
| Allowable Voltage Frequency | 47 to 63Hz                                                         |
| Power Consumption           | 12V DC: 145mA (Typ.)<br>24V DC: 70mA (Typ.)<br>24V AC: 75mA (Typ.) |
| Data Transmission Rate      | 10/100M full/half duplex data transmission rate                    |

LCD Display / Backlight Specifications

|                                     |              |
|-------------------------------------|--------------|
| LCD Display Durability <sup>3</sup> | 50,000 hours |
| Backlight Durability <sup>4</sup>   | 20,000 hours |

3 Display durability is calculated under ordinary operating and storage conditions: room temperature, normal humidity below 65% RH, and not subjected to direct sunlight.  
4 Backlight durability is the number of hours taken for the light to become 50% of the original brightness.

PART NUMBERS

Base Module

| Rated Power Voltage | Input Signal                                                   | Output Signal | Display | Clock | I/O Points | Weight (approx.) | Part No.    |
|---------------------|----------------------------------------------------------------|---------------|---------|-------|------------|------------------|-------------|
| 24V DC              | DC<br>I1, I2, I7 and I8 are used for digital/<br>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 <sup>1</sup>                                             | Relay         | Yes     | Yes   | 8/4 points | 240g             | FL1F-H12RCA |
|                     |                                                                |               | —       |       |            | 200g             | FL1F-B12RCA |
| 100 to 240V AC/DC   | AC/DC                                                          | Relay         | Yes     | Yes   | 8/4 points | 240g             | FL1F-H12RCC |
|                     |                                                                |               | —       |       |            | 200g             | FL1F-B12RCC |

1 With NPN/PNP sensor input. For details, see Input Internal Circuits in the Specifications table.

Expansion I/O Module

| Type          | Rated Power Voltage    | Input Signal       | Output Signal | I/O Points | Weight (approx.) | Part No.     |
|---------------|------------------------|--------------------|---------------|------------|------------------|--------------|
| Input/Output  | 24V DC                 | DC                 | Transistor    | 4/4 points | 95g              | FL1F-M08B1S2 |
|               | 12/24VDC               | DC                 | Relay         | 4/4 points | 130g             | FL1F-M08B2R2 |
|               | 24V AC/DC <sup>2</sup> | AC/DC <sup>2</sup> | 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   |

2 With NPN/PNP sensor input. For details, see Input Internal Circuits in the Specifications table.  
I/O points within the maximum number of expandable I/O points can be used.  
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).

Text Display

| Rated Power Voltage | Weight (approx.) | Part Number | Remarks                                |
|---------------------|------------------|-------------|----------------------------------------|
| 24V AC/DC<br>12V DC | 220g             | FL1F-RD1    | Supplied with mounting clip and gasket |

Options

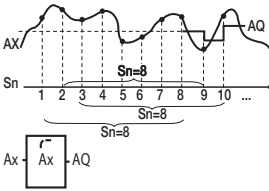
| Description                                          | Part Number   | Package Quantity | Remarks                                 |
|------------------------------------------------------|---------------|------------------|-----------------------------------------|
| Application Software: WindLGC                        | FL9Y-LP1CDW   | 1                | DVD-ROM (incl. online help manual)      |
| Mounting Clip for Base Module                        | FL1F-PSP1PN05 | 5                | Supplied with a module <sup>3</sup>     |
| Mounting Clip and Waterproof Gasket for Text Display | FL1F-KW1      | 1                | Supplied with text display <sup>4</sup> |
| IDECC SmartRelay User's Manual (English)             | FL9Y-B1789    | 1                | Downloadable                            |

3 Supplied with a base module and an expansion module.  
4 Supplied with a text display, it includes a gasket, four mounting clips, and a power supply connector.

NEW FUNCTION BLOCKS

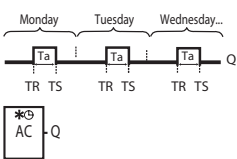
NEW

Analog filter



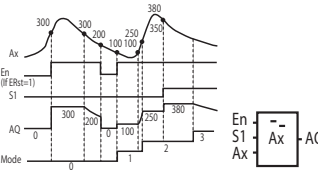
NEW

Astronomical clock



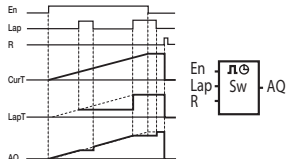
NEW

Max/Min



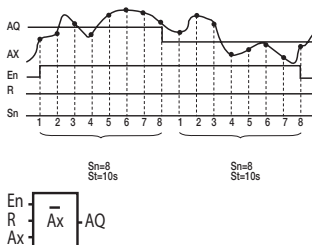
NEW

Stopwatch



NEW

Average value



## BASE MODULE SPECIFICATIONS

| Base Module Type No. |                                                                                | FL1F-H12SCD                                                     | FL1F-H12RCE<br>FL1F-B12RCE                                                                                                                                                                                                                      | FL1F-H12RCA<br>FL1F-B12RCA                                                                                                                                                                                                                      | FL1F-H12RCC<br>FL1F-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<br>20.4 to 28.8V DC                                                                                                                                                                                                            | 85 to 265V AC<br>100 to 253V DC                                                                                                                                                                                                                 |
|                      | Rated Frequency                                                                | —                                                               | —                                                                                                                                                                                                                                               | 47 to 63Hz                                                                                                                                                                                                                                      | 47 to 63Hz                                                                                                                                                                                                                                      |
|                      | Current Draw                                                                   | 15 to 50 mA (24V DC)<br>1.2A (with max. load on digital output) | 30 to 140 mA (12V DC)<br>15 to 90 mA (24V DC)                                                                                                                                                                                                   | 15 to 150mA (12V DC)<br>15 to 130mA (24V DC)                                                                                                                                                                                                    | 15 to 40mA (100V AC)    5 to 10mA (100V DC)<br>15 to 25mA (240V AC)    2 to 8mA (240V DC)                                                                                                                                                       |
|                      | Allowable Momentary Power Interruption                                         | —                                                               | 2ms Typ. (12V DC)<br>5ms Typ. (24V DC)                                                                                                                                                                                                          | 5ms Typ. (24V AC/DC)                                                                                                                                                                                                                            | 10ms Typ. (100V AC/DC)<br>20ms Typ. (240V AC/DC)                                                                                                                                                                                                |
|                      | Power Consumption                                                              | 1.2 W (24V DC)                                                  | 1.7W (12V DC)<br>2.2W (24V DC)                                                                                                                                                                                                                  | 3.6 W (24V AC)<br>3.2 W (24V DC)                                                                                                                                                                                                                | 4.6W (100V AC)    1.2W (100V DC)<br>6.0W (240V AC)    2.0W (240V DC)                                                                                                                                                                            |
|                      | Reverse Polarity Protection                                                    | Yes                                                             | Yes                                                                                                                                                                                                                                             | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
| Clock                | Backup Duration                                                                | 20 days                                                         | 20 days                                                                                                                                                                                                                                         | 20 days                                                                                                                                                                                                                                         | 20 days                                                                                                                                                                                                                                         |
|                      | 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 <sup>1</sup>                                                  | 4 (I3, I4, I5, I6), 5kHz maximum                                | 4 (I3, I4, I5, I6), 5kHz 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)                                                                                                                                                                                                        | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
|                      | 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)                                                                                                                                                                                                                             | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
|                      | Cycle time                                                                     | 300ms                                                           | 300ms                                                                                                                                                                                                                                           | 300ms                                                                                                                                                                                                                                           | 300ms                                                                                                                                                                                                                                           |
|                      | Allowable Voltage Range                                                        | 0 to 28.8V DC                                                   | 0 to 28.8V DC                                                                                                                                                                                                                                   | 0 to 26.4V AC<br>0 to 28.8V DC                                                                                                                                                                                                                  | 0 to 265V AC<br>0 to 253V DC                                                                                                                                                                                                                    |
|                      | Input Impedance                                                                | Digital Input                                                   | 5.8kΩ                                                                                                                                                                                                                                           | 4.8kΩ                                                                                                                                                                                                                                           | 610kΩ                                                                                                                                                                                                                                           |
|                      |                                                                                | Analog Input                                                    | 72kΩ                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
|                      | Isolation                                                                      | —                                                               | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
|                      | Operating Range                                                                | OFF Voltage                                                     | < 5V DC                                                                                                                                                                                                                                         | < 5V AC/DC                                                                                                                                                                                                                                      | < 40V AC<br>< 30V DC                                                                                                                                                                                                                            |
|                      |                                                                                | ON Voltage                                                      | ≥ 12V DC                                                                                                                                                                                                                                        | ≥ 12V AC/DC                                                                                                                                                                                                                                     | ≥ 79V AC    ≥ 79V DC                                                                                                                                                                                                                            |
|                      |                                                                                | OFF Current                                                     | < 0.9mA (I3 to I6)    < 0.07mA (I1, I2, I7, I8)                                                                                                                                                                                                 | < 0.88mA (I3 to I6)    < 0.07mA (I1, I2, I7, I8)                                                                                                                                                                                                | < 1.2mA                                                                                                                                                                                                                                         |
|                      |                                                                                | ON Current                                                      | < 0.9mA (I3 to I6)    < 0.07mA (I1, I2, I7, I8)                                                                                                                                                                                                 | < 0.88mA (I3 to I6)    < 0.07mA (I1, I2, I7, I8)                                                                                                                                                                                                | < 0.05mA (AC)    < 0.06mA (DC)                                                                                                                                                                                                                  |
|                      | Turn ON Time                                                                   | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6)                              | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6)                                                                                                                                                                                                              | 1.5ms (Typ.)                                                                                                                                                                                                                                    | 100V AC: 40ms (Typ.)<br>240V AC: 30ms (Typ.)<br>100V DC: 25ms (Typ.)<br>240V DC: 20ms (Typ.)                                                                                                                                                    |
|                      | Turn OFF Time                                                                  | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6)                              | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6)                                                                                                                                                                                                              | 15ms (Typ.)                                                                                                                                                                                                                                     | 100V AC: 45ms (Typ.)<br>240V AC: 70ms (Typ.)<br>100V DC: 60ms (Typ.)<br>240V DC: 75ms (Typ.)                                                                                                                                                    |
|                      | Wire Length <sup>2</sup>                                                       | 100m                                                            | 100m                                                                                                                                                                                                                                            | 100m                                                                                                                                                                                                                                            | 100m                                                                                                                                                                                                                                            |
| Output               | Output Signal                                                                  | Transistor source output                                        | Relay output                                                                                                                                                                                                                                    | Relay output                                                                                                                                                                                                                                    | Relay output                                                                                                                                                                                                                                    |
|                      | Output Points/<br>Contact Configuration                                        | 4 points (separate)                                             | 4NO contacts                                                                                                                                                                                                                                    | 4NO contacts                                                                                                                                                                                                                                    | 4NO contacts                                                                                                                                                                                                                                    |
|                      | Isolation                                                                      | —                                                               | Isolated                                                                                                                                                                                                                                        | Isolated                                                                                                                                                                                                                                        | Isolated                                                                                                                                                                                                                                        |
|                      | Dielectric Strength<br>(between power/input terminals<br>and output terminals) | —                                                               | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                         | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                         | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                         |
|                      | Output Voltage                                                                 | External power voltage                                          | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               | —                                                                                                                                                                                                                                               |
|                      | Maximum Load Current                                                           | 0.3A maximum                                                    | Resistive load<br>10A at 12/24V AC/DC<br>10A at 100/120V AC<br>10A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC | Resistive load<br>10A at 12/24V AC/DC<br>10A at 100/120V AC<br>10A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC | Resistive load<br>10A at 12/24V AC/DC<br>10A at 100/120V AC<br>10A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC |
|                      | Surge Current                                                                  | —                                                               | 30A maximum                                                                                                                                                                                                                                     | 30A maximum                                                                                                                                                                                                                                     | 30A maximum                                                                                                                                                                                                                                     |
|                      | Short-circuit Protection                                                       | Built-in current limiting resistor:<br>Approx. 1A               | External fuse required:<br>16A maximum                                                                                                                                                                                                          | External fuse required:<br>16A maximum                                                                                                                                                                                                          | External fuse required:<br>16A maximum                                                                                                                                                                                                          |
|                      | Minimum Switching Load                                                         | —                                                               | 10mA, 12V DC (reference value)                                                                                                                                                                                                                  | 10mA, 12V DC (reference value)                                                                                                                                                                                                                  | 10mA, 12V DC (reference value)                                                                                                                                                                                                                  |
|                      | Initial Contact Resistance                                                     | —                                                               | 100mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                                | 100mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                                | 100mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                                |
|                      | Mechanical Life                                                                | —                                                               | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                        | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                        | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                        |
|                      | Electrical Life                                                                | —                                                               | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                            | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                            | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                            |

<sup>1</sup> When selecting frequency trigger function and up/down counter function.

<sup>2</sup> 10m when connected to analog input (twisted pair cable)

Initialization Time: After power-up, the FL1F takes a maximum of 9 seconds (when using a micro SD card) for initialization. When initialization is complete, the FL1F is automatically set to RUN mode.

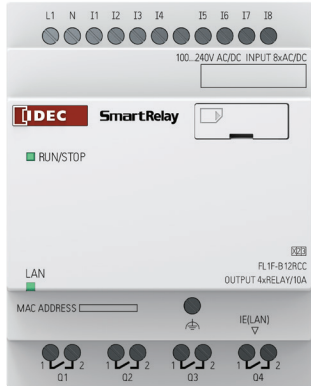
## EXPANSION I/O MODULE SPECIFICATIONS

| Expansion I/O Module Type No. |                                                                             | FL1F-M08B1S2                                   | FL1F-M08B2R2                                                                                                                                                                                                                                 | FL1F-M08D2R2                                                                                                                                                                                                                                 | FL1F-M08C2R2                                                                                                                                                                                                                                 | FL1F-J2B2                                                                      | FL1F-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<br>20.4 to 28.8V DC                                                                                                                                                                                                         | 85 to 265V AC<br>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                                                                | 15 to 40mA                                     | 10 to 80mA (12V DC)<br>10 to 40mA (24V DC)                                                                                                                                                                                                   | 20 to 100mA (24V AC)<br>8 to 50mA (24V DC)                                                                                                                                                                                                   | 10 to 30mA (100V AC)<br>10 to 20mA (240V AC)<br>5 to 15mA (100V DC)<br>5 to 10mA (240V DC)                                                                                                                                                   | 15 to 30mA                                                                     | 15 to 82mA                                   |
|                               | Allowable Momentary Power Interruption                                      | —                                              | 2 ms (typ.) (12V DC)<br>5 ms (typ.) (24V DC)                                                                                                                                                                                                 | 5 ms (typ.) (24V AC/DC)                                                                                                                                                                                                                      | 10ms (typ) (100V AC/DC)<br>20ms (typ.) (240V AC/DC)                                                                                                                                                                                          | 10ms (typ.) (12/24V DC)                                                        | 10ms (typ.)                                  |
|                               | Power Consumption                                                           | 1.0W                                           | 1.0W (12V DC)<br>1.0W (24V DC)                                                                                                                                                                                                               | 2.4W (24V AC)<br>1.2W (24V DC)                                                                                                                                                                                                               | 3.5W (100V AC) 1.8W (100V DC)<br>4.8W (240V AC) 2.4W (240V DC)                                                                                                                                                                               | 0.4W (12V DC)<br>0.8W (24V DC)                                                 | 2.0W                                         |
|                               | 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                                                     | 20.4 to 28.8V DC                               | 10.8 to 28.8V DC                                                                                                                                                                                                                             | 20.4 to 26.4V AC<br>20.4 to 28.8V DC                                                                                                                                                                                                         | 85 to 265V AC<br>100 to 253V DC                                                                                                                                                                                                              | —                                                                              | —                                            |
|                               | Operating Range                                                             | OFF Voltage                                    | < 5V DC                                                                                                                                                                                                                                      | < 5V AC/DC                                                                                                                                                                                                                                   | < 40V AC < 30V DC                                                                                                                                                                                                                            | —                                                                              | —                                            |
|                               |                                                                             | ON Voltage                                     | ≥ 12V DC                                                                                                                                                                                                                                     | ≥ 8.5V DC                                                                                                                                                                                                                                    | ≥ 79V AC ≥ 79V DC                                                                                                                                                                                                                            | —                                                                              | —                                            |
|                               |                                                                             | OFF Current                                    | < 0.88mA                                                                                                                                                                                                                                     | < 0.88mA                                                                                                                                                                                                                                     | < 0.05mA (AC)<br>< 0.06mA (DC)                                                                                                                                                                                                               | —                                                                              | —                                            |
|                               |                                                                             | ON Current                                     | ≥ 2.1mA                                                                                                                                                                                                                                      | ≥ 1.5mA                                                                                                                                                                                                                                      | ≥ 0.08mA (AC)<br>≥ 0.13mA (DC)                                                                                                                                                                                                               | —                                                                              | —                                            |
|                               | Turn ON Time                                                                | 1.5ms (Typ.)                                   | 1.5ms (typ.)                                                                                                                                                                                                                                 | 1.5ms (typ.)                                                                                                                                                                                                                                 | 100V AC: 40 ms (typ.)<br>240V AC: 30 ms (typ.)<br>100V DC: 25 ms (typ.)<br>240V DC: 20 ms (typ.)                                                                                                                                             | —                                                                              | —                                            |
|                               | Turn OFF Time                                                               | 1.5ms (Typ.)                                   | 1.5ms (typ.)                                                                                                                                                                                                                                 | 15ms (typ.)                                                                                                                                                                                                                                  | 100V AC: 45 ms (typ.)<br>240V AC: 70 ms (typ.)<br>100V DC: 60 ms (typ.)<br>240V DC: 75 ms (typ.)                                                                                                                                             | —                                                                              | —                                            |
|                               | Analog Input Points                                                         | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | 2                                                                              | —                                            |
|                               | Analog Input Range                                                          | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | 0 to 10V<br>(max. rated input: 28.8V)<br>0 to 20mA<br>(max. rated input: 40mA) | —                                            |
|                               | Digital Resolution                                                          | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | 10 bits (0 to 1000)                                                            | —                                            |
|                               | Input Error                                                                 | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | ±1.5% (of full scale)                                                          | —                                            |
|                               | Input Impedance                                                             | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | 76kΩ (0 to 10V)<br>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                                                                                                                                                                                                                                 | —                                                                              | —                                            |
|                               | Output Points/Contact Configuration                                         | 4 points (separate)                            | 4NO contacts                                                                                                                                                                                                                                 | 4NO contacts                                                                                                                                                                                                                                 | 4NO contacts                                                                                                                                                                                                                                 | —                                                                              | —                                            |
|                               | Isolation                                                                   | —                                              | Isolated                                                                                                                                                                                                                                     | Isolated                                                                                                                                                                                                                                     | Isolated                                                                                                                                                                                                                                     | —                                                                              | —                                            |
|                               | Dielectric Strength<br>(between power/input terminals and output terminals) | —                                              | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                      | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                      | 2500V AC, 1 minute<br>500V DC, 1 minute                                                                                                                                                                                                      | —                                                                              | —                                            |
|                               | Output Voltage                                                              | External power voltage<br>(20.4 to 28.8V DC)   | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | —                                            |
|                               | Maximum Load Current                                                        | 0.3A maximum                                   | Resistive load<br>5A at 12/24V AC/DC<br>5A at 100/120V AC<br>5A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC | Resistive load<br>5A at 12/24V AC/DC<br>5A at 100/120V AC<br>5A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC | Resistive load<br>5A at 12/24V AC/DC<br>5A at 100/120V AC<br>5A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC<br>3A at 100/120V AC<br>3A at 230/240V AC<br>0.2A at 120V DC<br>0.1A at 240V DC | —                                                                              | —                                            |
|                               | Short-circuit Protection                                                    | Built-in current limiting resistor: Approx. 1A | External fuse required:<br>16A maximum                                                                                                                                                                                                       | External fuse required:<br>16A maximum                                                                                                                                                                                                       | External fuse required:<br>16A maximum                                                                                                                                                                                                       | —                                                                              | Yes                                          |
|                               | Minimum Switching Load                                                      | —                                              | 10mA, 12V DC<br>(reference value)                                                                                                                                                                                                            | 10mA, 12V DC<br>(reference value)                                                                                                                                                                                                            | 10mA, 12V DC (reference value)                                                                                                                                                                                                               | —                                                                              | —                                            |
|                               | Initial Contact Resistance                                                  | —                                              | 100mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                             | 100mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                             | 100 mΩ maximum<br>(at 1A, 24V DC)                                                                                                                                                                                                            | —                                                                              | —                                            |
|                               | Mechanical Life                                                             | —                                              | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                     | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                     | 10 million operations<br>(no load, 10Hz)                                                                                                                                                                                                     | —                                                                              | —                                            |
|                               | Electrical Life                                                             | —                                              | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                         | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                         | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour                                                                                                                                                                         | —                                                                              | —                                            |
|                               | Analog Output Points                                                        | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | 2                                            |
|                               | Analog Output Range                                                         | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | Voltage: 0-10V DC<br>Current: 0-20, 4-20 mA  |
|                               | Digital Resolution                                                          | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | 10 bits (0 to 1000)                          |
|                               | Output Error (of full scale)                                                | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | Voltage output: ±2.5%<br>Current output: ±3% |
|                               | Output Impedance                                                            | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | Voltage: 5kΩ min<br>Current: 250Ω max        |
|                               | Analog Value Conversion Interval                                            | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | 50ms (typ.)                                  |
|                               | Wire Length                                                                 | —                                              | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                                                                                                                                                                                            | —                                                                              | 10m (twisted-pair shielded cable)            |

## DIMENSIONS (All dimensions in mm)



### Base Module (with Display)

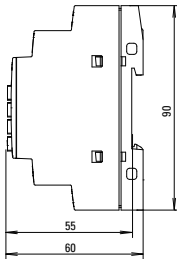
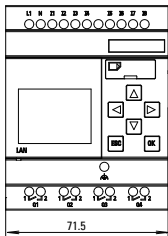


### Base Module (without Display)

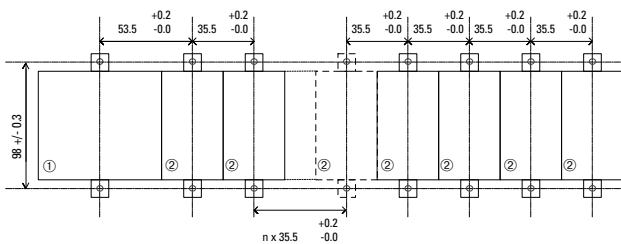


## Expansion I/O Module

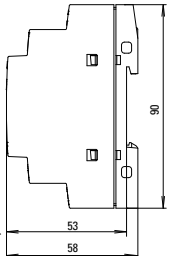
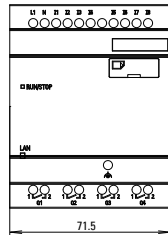
### Base Module (with Display)



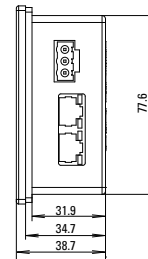
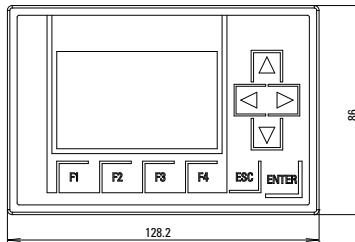
### Mounting Hole Layout (Using Mounting Slides)



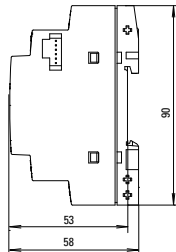
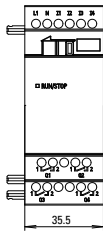
### Base Module (without Display)



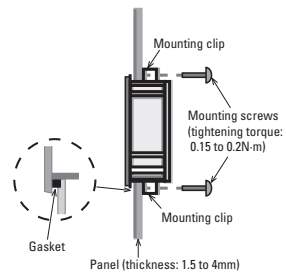
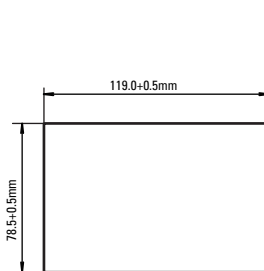
## Text Display



## Expansion I/O Module



**(Panel Cutout)**



Note: Drawings are not to scale