1. Before Using the Product

Thank you for purchasing the FD5000 series. This manual should be passed on to the person who operates the product. Examine the product for damage caused by transportation or any other defects. If you find any damage or defects, contact the sales agent from which you purchased the product or Fuji Electric Instruments Co., Ltd.

1.1 Model Code

The model lineup of the FD5000 series is shown below. Check that the model code and specifications of your product match those you specified when ordering.

FD5000 Series

2. Mounting the Product

2.1 Dimensions for Cutting Panel

Cut the panel for mounting according to the following dimensions.

2.2 Mounting the Product to the Panel

To mount the FD5000 to the panel, remove its fittings and insert it through the hole in the front of the panel. From the back of the panel, fix the product to the panel with the fittings.
8.2 Common Specifications

Display: 3-segment LED display (character height: 142 mm on main display and 8 mm on sub-display).

Polarity indication: Automatically indicated when the calculated result is negative.

Indication range: -9999 to 9999

Over-range alarm: OL or OL for input signals outside the indication range.

Decimal point: Can be set at an arbitrary digit.

Zero indication: Leading zero suppression

External control: HOLD, PH, D2 (reset for frequency measuring unit)

Operating temperature and humidity range: 0 to 90°C, 35 to 85% RH (non-condensing)

Storage temperature and humidity range: -10 to 70°C, 60% RH or less

Power supply: 100 to 240 V AC ±10% for AC power supply unit

5 to 95 V DC for DC power supply unit

Power consumption: 7W max. (AC power supply)

External dimensions: 96 mm (W) x 46 mm (D) x 148.5 mm (H)

Weight: 450g

Withstand voltage: 2000 V AC for 1 min between power terminals and input terminal, and between power terminals and each output terminal (AC power supply)

500 V DC for 1 min between power terminals and input terminal, and between power terminals and each output terminal (DC power supply)

500 V DC for 1 min between input terminal and each output terminal, and between analog output terminal and communication terminals

2000 VAC for 1 min between each output terminal (common to both AC and DC power supply)

Insulation resistance: 100 MΩ between the above terminals when 500 V DC is applied

Conformity standard: EN61010-1

Grounding environment: Category II, Pollution degree 2

Altitude: 2000m max

Fuse: K15072 10A (DC power supply)

8.3 Output Specifications

8.3.1 Output for Comparison

Conditions for comparison

Judgment values

Indicated value > Upper limit judgment value → HI

Lower limit judgment value ≤ Indicated value ≤ Upper limit judgment value → LO

HI

LO

Control system: Microcomputer operating system

Judgment value setup range: -9999 to 9999

Hysteresis: Can be set in the range of 1 to 999 digits for each judgment value

Operating speed: Depends on the sampling rate.

Output method: Relay contact output ( Mills and break contacts for HI and LO and make contacts for GO)

Output rating: 240 V AC, 8 A (resistive load) and 30 V DC, 8 A (resistive load)

Mechanical life: 20,000,000 times or more

Electric life: 100,000 times or more (Resistance load)

8.3.2 Frequency Measuring Unit (500Vms)

8.3.3 Input Voltage Unit (Input level)

8.3.4 Process Signal Measuring Unit

8.3.5 Analog Output

8.3.6 Serial Communication

4. Components and their Functions

The front panel design of the FD5000 series of unit meters differs depending on the display unit selected. The names and functions of each unit are as shown below.
5.4.5 Method of Setting Linearization Data
The linearization function means a function that changes the slope of straight lines in the relationship between the input and indication by connecting the relations at arbitrary points. Linearization data are set using the input value (indicated value before correction) and the output value (indicated value after correction) at each arbitrary point.  

6. Control Functions
6.1 Hold Function
The Hold function temporarily retains the indication. The hold function is enabled by shortcircuiting the HOLD and COM terminals or setting both terminals to the same voltage level. As a result, the display unit retains the indication given at that moment.

6.2 Digital Zero Function
The Digital Zero function zeroes the indication given at an arbitrary timing. Therefore, the function shows the amount of change from the point of zeroing. However, this function serves as an indication resetting function for a frequency measuring unit. Thus, the Digital Zero function can be used to reset the indication when there is no input signal at all.

Note that, with control of the Digital Zero function can be achieved by means of terminal control or front panel keys. In the case of terminal control, the Digital Zero function is executed by shortcircuiting the DZ and COM terminals or setting both terminals to the same voltage level. The indication at that moment is stored. In the case of control with the front panel keys, hold down the Digital Zero key and press the Indication/reset key for about 1 second to zero the indication at that moment.

Note: Control with the terminal controls takes priority over operation with the front panel keys. The Digital Zero function is disabled if the control terminals are made to go through the off-off-on sequence with the function enabled by means of the front panel keys.

6.3 Peak Hold Function
The Peak Hold function retains one of the maximum (peak hold)/minimum (valley hold)/maximum - minimum (peak-valley hold) values and provides output for that value. Selection from these values is made using the condition data. The peak hold function is enabled by shortcircuiting the PH and COM terminals or setting both terminals to the same voltage level.

7. Output Function
7.1 Comparison Output Function
The FD5000 series of unit meters is designed so that the two judgment values HI and LO can be set for the measured (indicated) value to provide the results of judgment as relay contact output. (This function is effective when the meter is equipped with a comparison output unit.) For details on the contact ratings and other specifications, refer to the section “Output Specifications.”

7.2 Analog Output Function
The FD5000 series of unit meters can output an analog signal for an indicated value (when the meter is equipped with an analog output unit). There are four output ranges, 0 to 1 V/0 to 10 V/1 to 5 V/0 to 20 mA, from which a selection can be made using the condition data. In addition, the analog output of the A5000 series allows for arbitrary output scaling. This scaling can be achieved by setting the indication value for an output of the maximum scale value (20 mA for 4–20 mA output range) in the A0IL parameter of the scaling data.

7.3 RS-485 Interface Function
The FD5000 series can be equipped with an RS-485 interface (when the meter is provided with an RS-485 unit). For details on the RS-485 function, see the separate manual on communication functions.

7.4 RS-232C Interface Function
The FD5000 series can be equipped with an RS-232C interface (when the meter is provided with an RS-232C unit). For details on the RS-232C function, see the separate manual on communication functions.

8. Specifications and External Dimensions
8.1 Input Specifications
8.1.1 DC Voltage Measuring Unit (range 11)

<table>
<thead>
<tr>
<th>Range</th>
<th>Measurement</th>
<th>Indication</th>
<th>Highest resolution</th>
<th>Input range</th>
<th>Maximum permissible error</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>0.086 V</td>
<td>±0.1 mV</td>
<td>±0.1 V</td>
<td>0.001 V</td>
<td>±0.2 % of FSO</td>
<td>±0.5 % of FSO</td>
</tr>
</tbody>
</table>

Input circuit: Single-ended type  
Operating system: A and Z conversion  
Maximum sampling rate: 125 times per second  
Noise rejection ratio: FMR (normal mode rejection) 50 dB or more (30 or 60 Hz)

8.1.2 DC Voltage Measuring Unit (range 12 to 15)

<table>
<thead>
<tr>
<th>Range</th>
<th>Measurement</th>
<th>Indication</th>
<th>Highest resolution</th>
<th>Input range</th>
<th>Maximum permissible error</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.038 V</td>
<td>±0.1 mV</td>
<td>±0.1 V</td>
<td>0.001 V</td>
<td>±0.2 % of FSO</td>
<td>±0.5 % of FSO</td>
</tr>
</tbody>
</table>

Input circuit: Single-ended type  
Operating system: A and Z conversion  
Maximum sampling rate: 125 times per second  
Noise rejection ratio: FMR (normal mode rejection) 50 dB or more (30 or 60 Hz)

8.1.3 DC Current Measuring Unit

<table>
<thead>
<tr>
<th>Range</th>
<th>Measurement</th>
<th>Indication</th>
<th>Highest resolution</th>
<th>Input range</th>
<th>Maximum permissible error</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>±0.001 A</td>
<td>±0.1 mA</td>
<td>±0.1 A</td>
<td>0.001 A</td>
<td>±0.2 % of FSO</td>
<td>±0.5 % of FSO</td>
</tr>
</tbody>
</table>

Input circuit: Single-ended type  
Operating system: A and Z conversion  
Maximum sampling rate: 125 times per second  
Noise rejection ratio: FMR (normal mode rejection) 50 dB or more (30 or 60 Hz)
5.4 Information on Each Parameter

This section explains comparator data and shows a typical example of setting the HI side judgment value. The same method applies to all other parameters.

5.4.1 Method of Setting Condition Data

This section shows a typical example of setting the peak hold parameter. The same method applies to all other parameters.

5.4.2 Method of Setting Comparator Data

This section explains comparator data and shows a typical example of setting the HI side judgment value. The same method applies to all other parameters.

5.4.3 Method of Setting Scaling Data

This section explains comparator data and shows a typical example of setting the full scale indication parameter. The same method applies to all other parameters.

5.4.4 Method of Setting Calibration Data

Actual load calibration means that calibration is carried out by applying actually measured pressure to a sensor such as a load cell connected to the meter.

Note: For the process signal measuring unit, set the full scale input value to 5.000 for the 1 V range and to 20.00 for the 2 A range, and set the offset input value to 1.000 for the 1 V range and 4.00 for the 2 A range.

The following explains the frequency measuring unit. (The same method applies to the full scale indication parameter.)

Determine the revolution speed (rpm) using the rotary encoder set to 20 pulses per minute.

Determine the measurement range by calculating the maximum frequency. The figure below shows an example where the revolution ratio is to a maximum speed of about 100 rpm.

Note: The setup conditions are HI side judgment value > LO side judgment value, HI side judgment value ≥ LO side judgment value > LO side hysteresis, and LO side judgment value ≥ HI side judgment value- HI side hysteresis. If these conditions are not satisfied, an error indication appears and the display returns to the HI side judgment value setup.

5.4.5 Method of Setting Selection Data

This section explains comparator data and shows a typical example of setting the full scale indication parameter. The same method applies to all other parameters.

Note: For the Digital limiter, values larger than the DLHI setpoint are not indicated even if signals greater than the value set in the DLHI parameter are input (for DILLO parameter, values smaller than the DILLO setpoint are not indicated).