

## Overvoltage/Undervoltage Monitoring Relay for AC and DC Input

- Detect overvoltages or undervoltages (switch selectable) from 4 mV to 300 V.
- Detect undercurrent, reverse current, or overcurrent in DC circuits using shunt (SDV-FL).
- Detect three-phase AC current for under and/or overcurrent using current converter.
- Available in 7 supply voltage configurations.
- Single-function model with ON-delay, OFF-delay, or start-up lock settings (SDV-FH□T).
- Select either AC or DC voltage input.
- Polarity can be specified (SDV-FL) to enable easy reverse current detection.
- Selectable reset value range from 2% to 30% of operating value (SDV-F).
- LED operation indicator.
- UL/CSA approval (SDV-F□).



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Model Number Structure

### ■ Model Number Legend

SDV-□□□□□□  
1 2 3 4 5 6

#### 1. Voltage Sensor

#### 2. Operation

- F: Single-function (overvoltage or undervoltage detection)
- D: Dual-function (overvoltage and undervoltage detection)

#### 3. Operating Voltage Range

- L: 4 to 240 mV (DC input only) (For SDV-F only)
- M: 0.2 to 12 V (AC or DC input)
- H: 10 to 300 V (AC or DC input)

#### 4, 5. Control Power Supply Voltage

- 2: 24 VDC
- 3: 48 VDC
- 4: 100/110 VDC
- 5: 125 VDC
- 51: 200/220 VDC (Single-function models)
- 6: 100/110 VAC
- 61: 120 VAC (Single-function models)
- 7: 200/220 VAC
- 71: 240 VAC (Single-function models)

#### 6. Timing Function (SDV-FH Only (See Note))

- None: Not provided
- T: Provided

**Note:** SDV-FL and SDV-FM models can also be equipped with the timing function as a special specification. Ask your OMRON representative for details.

**Note:** Not possible for the SDV equipped with the timing function (SDV-FH□T).

**SDV-SH** □□□□ (Order Separately)

1      2 3 4 5

1. Shunt (For SDV-FL Only)

2, 3, 4, 5. Rated Current

**Available Models**

| Rated current | Rated voltage | Model           | Rated current | Rated voltage | Model      |
|---------------|---------------|-----------------|---------------|---------------|------------|
| 5 A           | 60 mV         | SDV-SH5         | 75 A          | 60 mV         | SDV-SH75   |
| 7.5 A         |               | SDV-SH7.5       | 100 A         |               | SDV-SH100  |
| 7.5 A         | 100 mV        | SDV-SH7.5 100MV | 150 A         |               | SDV-SH150  |
| 10 A          | 60 mV         | SDV-SH10        | 200 A         |               | SDV-SH200  |
| 15 A          |               | SDV-SH15        | 300 A         |               | SDV-SH300  |
| 20 A          |               | SDV-SH20        | 500 A         |               | SDV-SH500  |
| 30 A          |               | SDV-SH30        | 750 A         |               | SDV-SH750  |
| 50 A          |               | SDV-SH50        | 1,000 A       |               | SDV-SH1000 |

**Note:** All the above listed shunts have an accuracy in the 1.0 class.

**Connecting Socket (Order Separately)**

| Applicable models | Socket                  |       |
|-------------------|-------------------------|-------|
|                   | Type                    | Model |
| SDV-F□□/-FH□T     | Front Connecting Socket | 8PFA1 |
|                   | Back Connecting Socket  | PL08  |
| SDV-D□□           | Front Connecting Socket | 14PFA |
|                   | Back Connecting Socket  | PL15  |

**Ordering Information****Single-function Models****Overvoltage or Undervoltage Detection (Switch Selectable)**

| Control power supply voltage | Input               |                       |             |
|------------------------------|---------------------|-----------------------|-------------|
|                              | DC                  | DC or AC (selectable) |             |
|                              | Input voltage range |                       |             |
|                              | 4 to 240 mV         | 0.2 to 12 V           | 10 to 300 V |
| 24 VDC                       | SDV-FL2             | SDV-FM2               | SDV-FH2     |
| 48 VDC                       | SDV-FL3             | SDV-FM3               | SDV-FH3     |
| 100/110 VDC                  | SDV-FL4             | SDV-FM4               | SDV-FH4     |
| 125 VDC                      | SDV-FL5             | SDV-FM5               | SDV-FH5     |
| 200/220 VDC                  | ---                 | ---                   | SDV-FH51    |
| 100/110 VAC                  | SDV-FL6             | SDV-FM6               | SDV-FH6     |
| 120 VAC                      | ---                 | ---                   | SDV-FH61    |
| 200/220 VAC                  | SDV-FL7             | SDV-FM7               | SDV-FH7     |
| 240 VAC                      | ---                 | ---                   | SDV-FH71    |

**Dual-function Models****Overvoltage and Undervoltage Detection**

| Control power supply voltage | Input: DC or AC (selectable) |             |
|------------------------------|------------------------------|-------------|
|                              | Input voltage range          |             |
|                              | 0.2 to 12 V                  | 10 to 300 V |
| 24 VDC                       | SDV-DM2                      | SDV-DH2     |
| 48 VDC                       | SDV-DM3                      | SDV-DH3     |
| 100/110 VDC                  | SDV-DM4                      | SDV-DH4     |
| 125 VDC                      | SDV-DM5                      | SDV-DH5     |
| 100/110 VAC                  | SDV-DM6                      | SDV-DH6     |
| 200/220 VAC                  | SDV-DM7                      | SDV-DH7     |
| 240 VAC                      | SDV-DM71                     | SDV-DH71    |

- Note:**
1. Inquire about production of models with 120- and 240-VAC control power supply.
  2. Inquire about models with special processing for high-temperature, high-humidity applications.
  3. The ripple factor must be 5% or less for DC power supplies.

## Single-function Models with Timing Function

| Control power supply voltage | Input: DC or AC (selectable); input voltage range: 10 to 300 V |           |              |
|------------------------------|--|-----------|--------------|
|                              | Operating mode   |           |              |
|                              | ON-delay   | OFF-delay | Startup lock |
| 24 VDC                       | SDV-FH2T   |           |              |
| 48 VDC                       | SDV-FH3T   |           |              |
| 100/110 VDC                  | SDV-FH4T   |           |              |
| 125 VDC                      | SDV-FH5T   |           |              |
| 200/220 VDC                  | SDV-FH51T  |           |              |
| 100/110 VAC                  | SDV-FH6T   |           |              |
| 120 VAC                      | SDV-FH61T  |           |              |
| 200/220 VAC                  | SDV-FH7T   |           |              |
| 240 VAC                      | SDV-FH71T  |           |              |

**Note:** Only SDV-FH voltage sensors can be manufactured with a timer.

## Specifications

### Single-function Models

#### Overvoltage or Undervoltage Detection (Switch Selectable)

| Model               | Input voltage            | Selectable operating range  | Selectable reset value range              | Control power supply   |
|---------------------|--------------------------|---|---|--|
| SDV-FL□             | DC                       | 4 to 240 mV<br>(4 to 12 mV, 10 to 30 mV,<br>20 to 60 mV, 40 to 120 mV,<br>80 to 240 mV) | 2% to 30% (related to<br>operating value) | 24, 48, 100/110, 125, 200/220 VDC<br>(see note);<br>100/110, 200/220/240 VAC<br>(50/60 Hz) |
| SDV-FM□             | DC or AC<br>(selectable) | 0.2 to 12 V<br>(0.2 to 0.6 V, 0.5 to 1.5 V, 1 to 3 V,<br>2 to 6 V, 4 to 12 V)           |   |  |
| SDV-FH□<br>SDV-FH□T |                          | 10 to 300 V<br>(10 to 30 V, 25 to 75 V, 50 to 150 V,<br>100 to 300 V)                   |   |  |

**Note:** Ripple is 5% max. with DC power supplies.

### Dual-function Models

#### Overvoltage and Undervoltage Detection

| Model   | Input voltage            | Selectable operating range           |                      |                | Reset value   | Control power supply  |
|---------|--------------------------|--------------------------------------|----------------------|----------------|---|---|
|         |                          | Intermediate voltage of<br>dead band | Dead band<br>voltage |                |   |   |
| SDV-DM□ | DC or AC<br>(selectable) | 0.2 to 12 V                          | 0.2 to 0.6 V         | 0.02 to 0.1 V  | Overvoltage:<br>(Intermediate voltage of<br>dead band + dead band<br>voltage) – (dead band volt-<br>age x 2/3) min.<br>Undervoltage:<br>(Intermediate voltage of<br>dead band – dead band<br>voltage) + (dead band volt-<br>age x 2/3) max. | 24, 48, 100/110, 125 VDC;<br>100/110, 200/220/240 VAC<br>(50/60 Hz) |
|         |                          |                                      | 0.5 to 1.5 V         | 0.05 to 0.25 V |   |   |
|         |                          |                                      | 1 to 3 V             | 0.1 to 0.5 V   |   |   |
|         |                          |                                      | 2 to 6 V             | 0.2 to 1 V     |   |   |
|         |                          |                                      | 4 to 12 V            | 0.4 to 2 V     |   |   |
| SDV-DH□ |                          | 10 to 300 V                          | 10 to 30 V           | 1 to 5 V       |   |   |
|         |                          |                                      | 25 to 75 V           | 2.5 to 12.5 V  |   |   |
|         |                          |                                      | 50 to 150 V          | 5 to 25 V      |   |   |
|         |                          |                                      | 100 to 300 V         | 10 to 50 V     |   |   |

**Note:** 1. Inquire about production of models with 120- and 240-VAC control power supply.  
2. The ripple factor must be 5% or less for DC power supplies.

## ■ Ratings

| Item   | SDV-FL□   | SDV-FM□             | SDV-FH□/FH□T   | SDV-DM□             | SDV-DH□  |
|--|---|---------------------|--|---------------------|--|
| Allowable continuous input overvoltage range | ±10 VDC   | ±150 VDC<br>150 VAC | ±350 VDC<br>(±500 VDC for 1 min)<br>350 VAC<br>(500 VAC for 1 min) | ±150 VDC<br>150 VAC | ±350 VDC<br>(±500 VDC for 1 min)<br>350 VAC<br>(500 VAC for 1 min) |
| Input impedance                              | 1 kΩ  | 50 kΩ               | 2,500 kΩ   | 50 kΩ               | 2,500 kΩ   |
| Control output                               | SPDT  |                     |  | SPST-NO and SPST-NC |  |
|  | Rated load: 5 A at 220 VAC ( $\cos\phi = 1$ ),<br>5 A at 24 VDC ( $\cos\phi = 1$ ),<br>2 A at 220 VAC ( $\cos\phi = 0.4$ ),<br>2 A at 24 VDC (L/R = 7 ms)<br>Max. contact voltage: 250 VAC, 125 VDC<br>Max. contact current: 5 A<br>Max. switching capacity: 1,100 VA ( $\cos\phi = 1$ ), 120 W ( $\cos\phi = 1$ ),<br>440 VA ( $\cos\phi = 0.4$ ), 48 W (L/R = 7 ms) |                     |  |                     |  |
| Power consumption                            | DC: 5 W max.; AC: 5 VA max.   |                     |  |                     |  |
| Ambient temperature                          | -10 to 55°C (with no icing)   |                     |  |                     |  |
| Control supply voltage (see note)            | 24, 48, 100/110, 125, 200/220 VDC; DC operating voltage range: 80% to 130% of control power supply<br>100/110/120, 200/220/240 VAC (50/60 Hz); AC operating voltage range: 85% to 110% of control power supply  |                     |  |                     |  |

Note: The impedance value is a reference value; actual values may vary.

## ■ Characteristics

| Item   | SDV-F□□   | SDV-FH□T      | SDV-D□□   |
|--|---|---------------|---|
| Operating value  | 100% operation for voltage setting  |               |   |
| Setting error  | Operating value: ±2% of operating value<br>(This is the ratio for the setting value.)<br>Reset value: ±7% of reset value<br>(This is the ratio for the setting value.)  |               | ±2% of intermediate voltage of dead band,<br>±1% of dead band voltage   |
| Operating time   | 0.5 s max. (see note)   |               |   |
| Influence of temperature   | 0 to 40°C:<br>±2% max. of operating value<br>(SDV-FL (operating value range: 4 to 12 mV)<br>±4% max. of operating value)<br>-10 to 0°C, 40 to 55°C:<br>±4% max. of operating value<br>(SDV-FL (operating value range: 4 to 12 mV)<br>±8% max. of operating value) |               | 0 to 40°C:<br>±2% max. of dead band voltage<br>-10 to 0°C, 40 to 55°C:<br>±4% max. of dead band voltage             |
| Influence of control power   | ±1% max. of operating value<br>DC operating voltage range: 80% to 130%<br>AC operating voltage range: 85% to 110%   |               | ±1% max. of dead band voltage<br>DC operating voltage range: 80% to 130%<br>AC operating voltage range: 85% to 110% |
| Influence of frequency (Input frequency changed from 10 to 500 Hz for AC input)    | ±1% max. of operating value   |               | ±1% max. of dead band voltage   |
| Influence of waveform (For commercial frequency, single-phase, full-wave AC input) | ±3% max. of operating value   |               | ±3% max. of dead band voltage   |
| Insulation resistance  | 10 MΩ min. (at 500 VDC) between the entire electric circuitry and external case, and between the input terminal and power terminal  |               |   |
| Dielectric strength  | 2,000 VAC for 1 min between the entire electric circuitry and external case, and between the input terminal and power terminal  |               |   |
| Impulse withstand voltage  | ±1.2 x 50 μs, 4,500 V between the entire electric circuitry and external case<br>±1.2 x 50 μs, 3,000 V between power terminals  |               |   |
| Vibration resistance   | Destruction: 10 to 25 Hz, 2-mm double amplitude (2G max.) for 2 hrs each in 3 directions<br>Malfunction: 16.7 Hz, 1-mm double amplitude for 10 min each in 3 directions   |               |   |
| Shock resistance   | Destruction: 294 m/s <sup>2</sup> (30G)<br>Malfunction: 98 m/s <sup>2</sup> (10G)   |               |   |
| Weight   | Approx. 290 g   | Approx. 350 g | Approx. 310 g   |

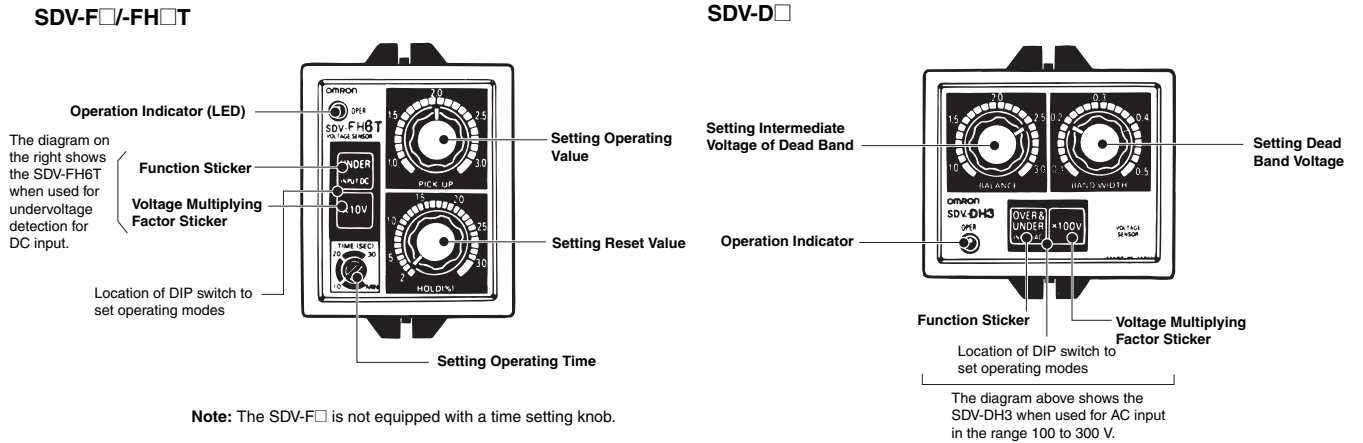
Note: Overvoltage: Operation when voltage is changed from 80% to 120% of the operating value.  
Undervoltage: Operation when voltage is changed from 120% to 80% of the operating value.

## Timing Function

| Item                                | SDV-FH□T                          |
|-------------------------------------|-----------------------------------|
| Setting time                        | 0.5 to 30.0 s (see note)          |
| Operating time accuracy             | ±5% FS max.                       |
| Setting error                       | ±15% FS max.                      |
| Reset time                          | 5 s min.                          |
| Influence of temperature            | ±10% FS max.                      |
| Operating mode (set via DIP switch) | ON-delay, OFF-delay, Startup lock |

**Note:** The time setting range when the startup lock is selected for the operating mode is approximately 1 to 30 s.

## Nomenclature

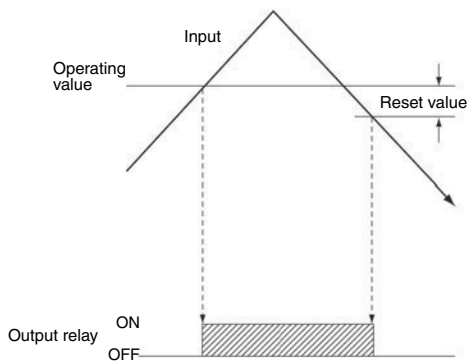


# Operation

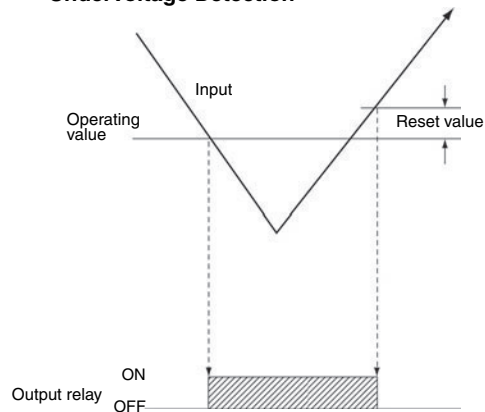
## ■ Timing Charts

### Single-function Models

#### Overvoltage Detection



#### Undervoltage Detection



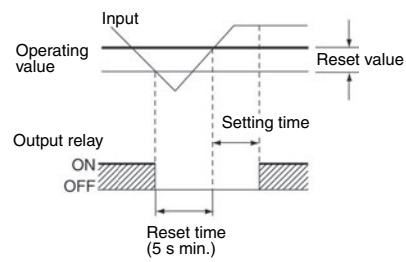
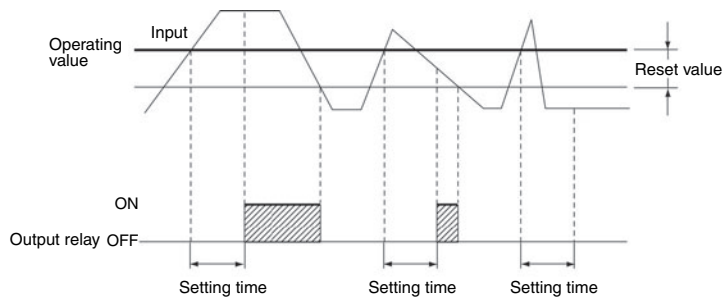
### Note

The reset time must be 5 s or longer to ensure accuracy of the timing operation.

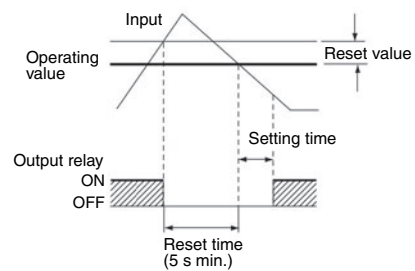
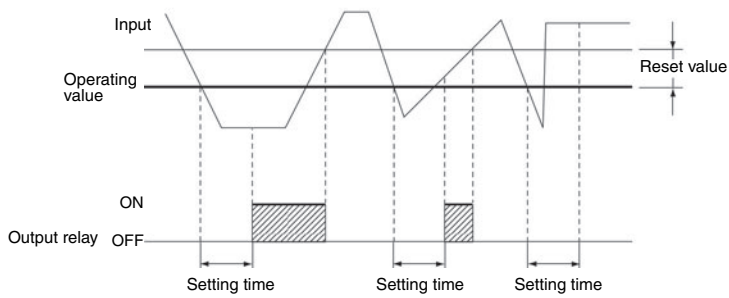
### Single-function Model with Timing Function

SDV-FH□T

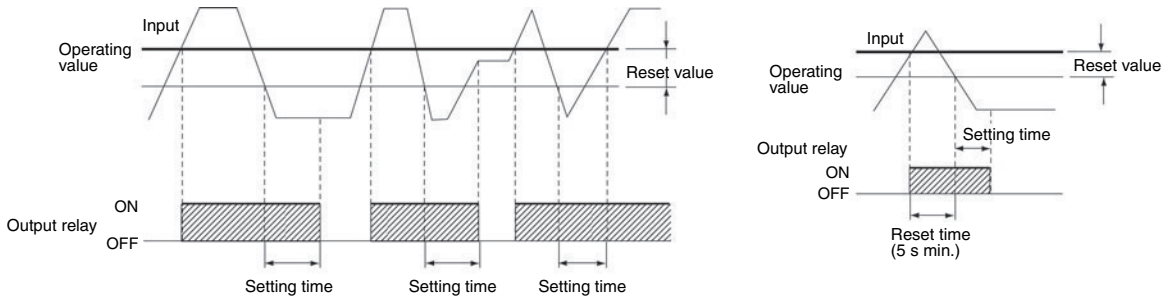
#### ON-delay Overvoltage Detection



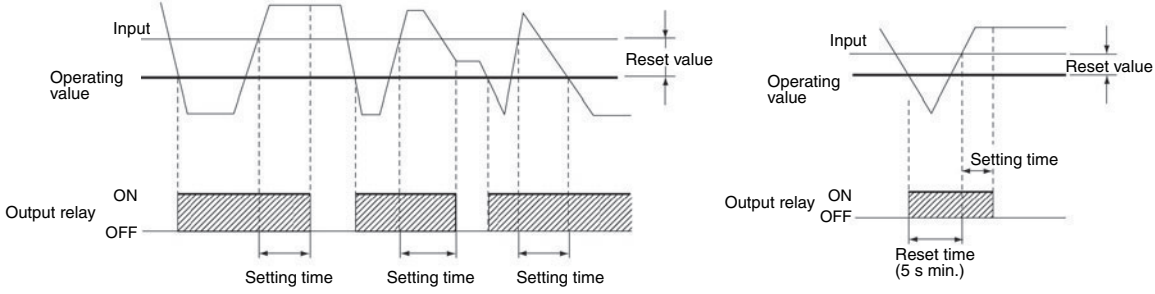
#### ON-delay Undervoltage Detection



**OFF-delay Overvoltage Detection**



**OFF-delay Undervoltage Detection**

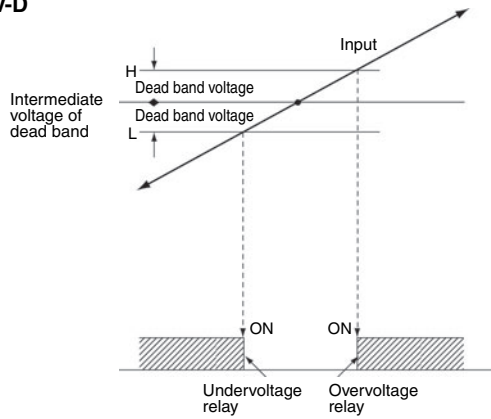


**Startup Lock**



**Note:** The output relays will be forced OFF from the control power supply is turned ON until the set time has expired.

**Dual-function Models  
SDV-D**



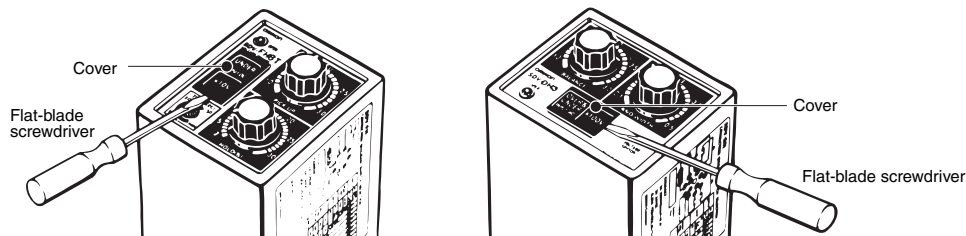
## ■ Setting

(Refer to *Examples of Mode Settings* for details on individual models.)

Set the desired values using the DIP switch and setting knobs on the front panel.

### Opening the DIP Switch Cover

Remove the cover of the compartment containing the DIP switch for various mode settings, and then set the DIP switch according to the SWITCH SELECTION table affixed to the side of the voltage sensor.



### Setting the DIP Switch

Set the DIP switch on the front panel for the required functions, operation inputs, and voltages. Set the switch to the top for ON settings and to the bottom for OFF settings.

- Function (SDV-F): Set to either overvoltage or undervoltage detection.
- Input: Set to either AC or DC input.
- Polarity (SDV-FL□ only): Set polarity or not to specify polarity.  
 “8(+), 7(-)”: Use polarity as shown for pin number.  
 “FREE”: Do not use polarity.
- Multiplying Factor: Set the voltage scale multiplying factor for the required operating voltage setting range.
- TIMER (SDV-FH□T): Select the timing function.  
 Set ON-delay, OFF-delay, lock timer (start lock timer), or TIMER OFF.  
 If TIMER OFF is set, the timing function will not be effective, and the single-function operation will be performed.

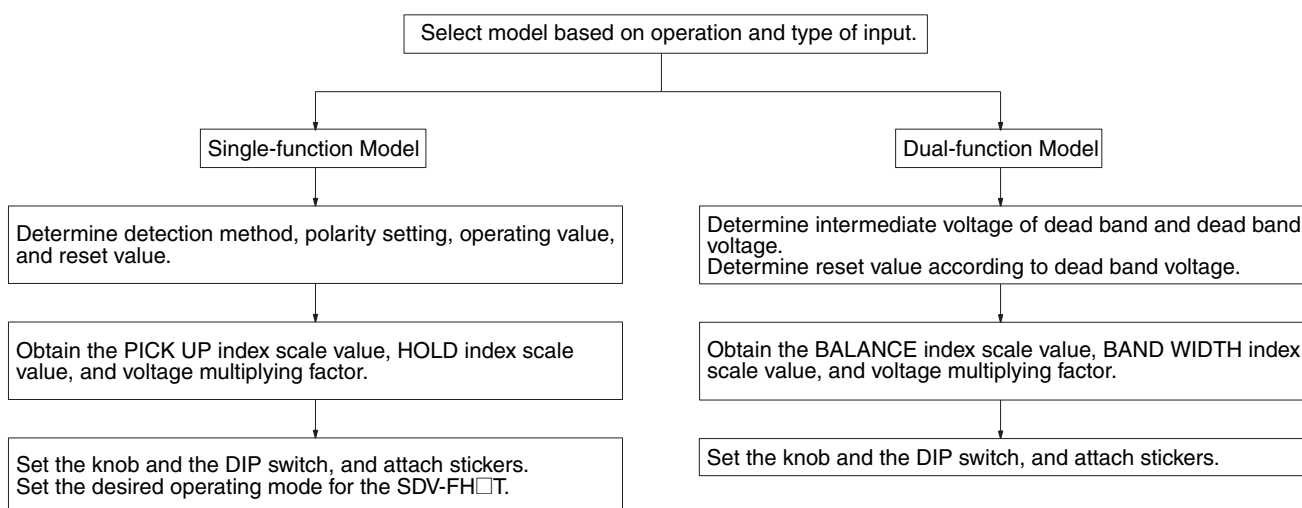
### Setting of Time (SDV-FH□T Only)

Use the time setting knob to set the desired time.

### Closing the DIP Switch Cover

Attach the cover to the compartment housing the DIP switch. Select the stickers for the settings that have been made and attach them to the cover.

### Setting Flowchart





**SDV-FL**

**Switch Selection Table**

|                    |             |   |   |   |   |   |   |
|--------------------|-------------|---|---|---|---|---|---|
| Switch             | ON ●↑       | 1 | 2 | 3 | 4 | 5 | 6 |
|                    | OFF ○↓      | ■ | ■ | ■ | ■ | ■ | ■ |
| Function           | Under       | ● |   |   |   |   |   |
|                    | Over        | ○ |   |   |   |   |   |
| Polarity           | 8 (+) 7 (-) |   | ● |   |   |   |   |
|                    | Free        |   | ○ |   |   |   |   |
| Multiplying factor | x 4 mV      | → |   | ○ | ○ | ○ | ○ |
|                    | x 10 mV     | → |   | ● | ○ | ○ | ○ |
|                    | x 20 mV     | → |   | ○ | ● | ○ | ○ |
|                    | x 40 mV     | → |   | ○ | ○ | ● | ○ |
|                    | x 80 mV     | → |   | ○ | ○ | ○ | ● |

**Accessory Labels**

|                        |        |
|------------------------|--------|
| OVER POL. FREE         | x4 mV  |
| OVER 8 (+) POL. 7 (-)  | x10 mV |
| UNDER POL. FREE        | x20 mV |
| UNDER 8 (+) POL. 7 (-) | x40 mV |
|                        | x80 mV |

**SDV-FM**

**Switch Selection Table**

|                    |                   |   |   |   |   |   |   |
|--------------------|-------------------|---|---|---|---|---|---|
| Switch             | ON ●↑             | 1 | 2 | 3 | 4 | 5 | 6 |
|                    | OFF ○↓            | ■ | ■ | ■ | ■ | ■ | ■ |
| Function           | Under             | ● |   |   |   |   |   |
|                    | Over              | ○ |   |   |   |   |   |
| Input              | AC (20 to 500 Hz) |   | ● |   |   |   |   |
|                    | DC                |   | ○ |   |   |   |   |
| Multiplying factor | x 0.2 V           | → |   | ○ | ○ | ○ | ○ |
|                    | x 0.5 V           | → |   | ● | ○ | ○ | ○ |
|                    | x 1 V             | → |   | ○ | ● | ○ | ○ |
|                    | x 2 V             | → |   | ○ | ○ | ● | ○ |
|                    | x 4 V             | → |   | ○ | ○ | ○ | ● |

**Accessory Labels**

|                |        |
|----------------|--------|
| OVER INPUT DC  | x0.2 V |
| OVER INPUT AC  | x0.5 V |
| UNDER INPUT DC | x1 V   |
| UNDER INPUT AC | x2 V   |
|                | x4 V   |

**SDV-FH**

**Switch Selection Table**

|                    |                   |   |   |   |   |   |                      |
|--------------------|-------------------|---|---|---|---|---|----------------------|
| Switch             | ON ●↑             | 1 | 2 | 3 | 4 | 5 | 6                    |
|                    | OFF ○↓            | ■ | ■ | ■ | ■ | ■ | ■                    |
| Function           | Under             | ● |   |   |   |   | NO USE<br>(see note) |
|                    | Over              | ○ |   |   |   |   |                      |
| Input              | AC (20 to 500 Hz) |   | ● |   |   |   |                      |
|                    | DC                |   | ○ |   |   |   |                      |
| Multiplying factor | x 10 V            | → |   | ○ | ○ | ○ |                      |
|                    | x 25 V            | → |   | ● | ○ | ○ |                      |
|                    | x 50 V            | → |   | ○ | ● | ○ |                      |
|                    | x 100 V           | → |   | ○ | ○ | ● |                      |

**Accessory Labels**

|                |        |
|----------------|--------|
| OVER INPUT DC  | x10 V  |
| OVER INPUT AC  | x25 V  |
| UNDER INPUT DC | x50 V  |
| UNDER INPUT AC | x100 V |

**Note:** "NO USE" indicates that DIP switch setting is not required and the positions of these switches are irrelevant to the operation of the voltage sensor.

## SDV-FH□T

## Switch Selection Table

| Switch             | ON ●↑             | 1                                   | 2                                   | 3                                   | 4                                   | 5                                   | 6                                   | 7                                   | 8                                   | 9                                   | 10                                  |   |
|--------------------|-------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|
|                    | OFF ○↓            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |   |
| Function           | Under             | ●                                   |                                     |                                     |                                     |                                     | NO USE<br>(see note)                |                                     |                                     |                                     | NO USE<br>(see note)                |   |
|                    | Over              | ○                                   |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |   |
| Input              | AC (20 to 500 Hz) | ●                                   |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |   |
|                    | DC                | ○                                   |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |   |
| Multiplying factor | x 10 V            | →                                   |                                     | ○                                   | ○                                   | ○                                   |                                     |                                     |                                     |                                     |                                     |   |
|                    | x 25 V            | →                                   |                                     | ●                                   | ○                                   | ○                                   |                                     |                                     |                                     |                                     |                                     |   |
|                    | x 50 V            | →                                   |                                     | ○                                   | ●                                   | ○                                   |                                     |                                     |                                     |                                     |                                     |   |
|                    | x 100 V           | →                                   |                                     | ○                                   | ○                                   | ●                                   |                                     |                                     |                                     |                                     |                                     |   |
| Timer              | ON-delay          |                                     |                                     |                                     |                                     |                                     |                                     | →                                   | ●                                   | ●                                   |                                     | ● |
|                    | OFF-delay         |                                     |                                     |                                     |                                     |                                     |                                     | →                                   | ●                                   | ●                                   |                                     | ○ |
|                    | Lock timer        |                                     |                                     |                                     |                                     |                                     | →                                   | ○                                   | ○                                   | ●                                   |                                     |   |
|                    | Timer OFF         |                                     |                                     |                                     |                                     |                                     | →                                   | ○                                   | ○                                   | ○                                   |                                     |   |

## Accessory Labels

|                   |        |
|-------------------|--------|
| OVER<br>INPUT DC  | x10 V  |
| OVER<br>INPUT AC  | x25 V  |
| UNDER<br>INPUT DC | x50 V  |
| UNDER<br>INPUT AC | x100 V |

Note: "NO USE" indicates that DIP switch setting is not required and the positions of these switches are irrelevant to the operation of the voltage sensor.

## SDV-DM□

## Switch Selection Table

| Switch             | ON ●↑             | 1                                   | 2                                   | 3                                   | 4                                   | 5                                   |
|--------------------|-------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                    | OFF ○↓            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Input              | AC (20 to 500 Hz) | ●                                   |                                     |                                     |                                     |                                     |
|                    | DC                | ○                                   |                                     |                                     |                                     |                                     |
| Multiplying factor | x 0.2 V           | →                                   | ○                                   | ○                                   | ○                                   | ○                                   |
|                    | x 0.5 V           | →                                   | ●                                   | ○                                   | ○                                   | ○                                   |
|                    | x 1 V             | →                                   | ○                                   | ●                                   | ○                                   | ○                                   |
|                    | x 2 V             | →                                   | ○                                   | ○                                   | ●                                   | ○                                   |
|                    | x 4 V             | →                                   | ○                                   | ○                                   | ○                                   | ●                                   |

## Accessory Labels

|                             |        |
|-----------------------------|--------|
| OVER &<br>UNDER<br>INPUT DC | x0.2 V |
| OVER &<br>UNDER<br>INPUT AC | x0.5 V |
|                             | x1 V   |
|                             | x2 V   |
|                             | x4 V   |

## SDV-DH□

## Switch Selection Table

| Switch             | ON ●↑             | 1                                   | 2                                   | 3                                   | 4                                   | 5                                   |
|--------------------|-------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                    | OFF ○↓            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Input              | AC (20 to 500 Hz) | ●                                   |                                     |                                     |                                     |                                     |
|                    | DC                | ○                                   |                                     |                                     |                                     |                                     |
| Multiplying factor | x 10 V            | →                                   | ○                                   | ○                                   | ○                                   | NO USE<br>(see note)                |
|                    | x 25 V            | →                                   | ●                                   | ○                                   | ○                                   |                                     |
|                    | x 50 V            | →                                   | ○                                   | ●                                   | ○                                   |                                     |
|                    | x 100 V           | →                                   | ○                                   | ○                                   | ●                                   |                                     |

## Accessory Labels

|                             |        |
|-----------------------------|--------|
| OVER &<br>UNDER<br>INPUT DC | x10 V  |
| OVER &<br>UNDER<br>INPUT AC | x25 V  |
|                             | x50 V  |
|                             | x100 V |

Note: "NO USE" indicates that DIP switch setting is not required and the positions of these switches are irrelevant to the operation of the voltage sensor.

## Examples of Mode Setting

### Example 1

For the single-function SDV-FH6, the setting method given below would be used to detect overvoltages with a DC voltage input. The operating value is 15 V and the reset value is 12 V.

**Step 1.** To set the detection method and type of input on the DIP switch.

- Turn OFF pin 1 (function) to specify overvoltage detection.
- Turn OFF pin 2 (input) to specify a DC input.
- Attach the OVER INPUT DC stickers.

**Step 2.** To set the operating value according to the voltage multiplying factor and the PICK UP index scale value.

Voltage multiplying factor setting: The voltage multiplying factor is selected according to the maximum and minimum factors and a sticker is attached. The calculation method is as follows:

The PICK UP index scale value is between 1.0 and 3.0, so calculate the voltage multiplying factor for both 1.0 and 3.0.

$15 \text{ V (Operating value)} / 1 \text{ (PICK UP index scale value)} = 15 \text{ (Maximum multiplying factor)}$

$15 \text{ V (Operating value)} / 3 \text{ (PICK UP index scale value)} = 5 \text{ (Minimum multiplying factor)}$

In this example, pins 3 to 5 are turned OFF and the x10V sticker is attached.

PICK UP index scale value setting: The calculation method is as follows ( $X = \text{index scale}$ ):

$10 \text{ (Voltage multiplying factor)} \times X = 15 \text{ V (Operating value)}$

Therefore,  $X = 1.5$

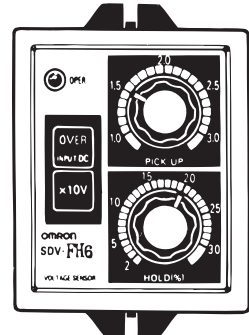
Turn the PICK UP knob to 1.5.

**Step 3.** To set the reset value ( $Y = \text{HOLD index scale value}$ ): Calculate the HOLD percentage as follows:

$12 \text{ V (reset value)} = 15 \text{ V (operating value)} \times (1 - Y)$  Therefore,  $Y = 0.2$

Set the HOLD knob to 20 (%).

SDV-F□□



### Example 2

For the single-function SDV-FH6T, the setting method given below would be used to detect undervoltages with a DC voltage input. The operating value is 20 V and the reset value is 20.4 V. An ON-delay operation is specified and the setting time is 30 s.

**Step 1.** To set the detection method and type of input on the DIP switch.

- Turn ON pin 1 (function) to specify undervoltage detection.
- Turn OFF pin 2 (input) to specify a DC input.
- Attach the UNDER INPUT DC stickers.

**Step 2.** To set the operating value according to the voltage multiplying factor and the PICK UP index scale value.

Voltage multiplying factor setting: The multiplying factor is selected according to the maximum and minimum factors and a sticker is attached. The calculation method is as follows:

The PICK UP index scale value is between 1.0 and 3.0, so calculate the voltage multiplying factor for both 1.0 and 3.0.

$20 \text{ V (Operating value)} / 1 \text{ (PICK UP index scale value)} = 20 \text{ (Maximum multiplying factor)}$

$20 \text{ V (Operating value)} / 3 \text{ (PICK UP index scale value)} = 6.7 \text{ (Minimum multiplying factor)}$

In this example, pins 3 to 5 are turned OFF and the x10V sticker is attached.

PICK UP index scale value setting: The calculation method is as follows ( $X = \text{index scale}$ ):

$10 \text{ (Voltage multiplying factor)} \times X = 20 \text{ V (Operating value)}$

Therefore,  $X = 2$

Turn the PICK UP knob to 2.0.

**Step 3.** To set the reset value ( $Y = \text{HOLD index scale value}$ ): Calculate the HOLD percentage as follows:

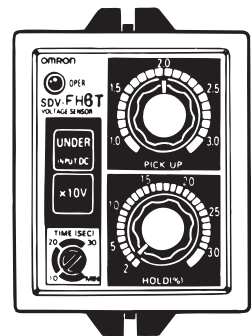
$20.4 \text{ V (reset value)} = 20 \text{ V (operating value)} \times (1 + Y)$  Therefore,  $Y = 0.02$

Set the HOLD knob to 2 (%).

**Step 4.** To set setting time and operating mode.

Set the time setting knob to 30 s and turn the pins 7 to 9 ON to specify ON-delay operation.

SDV-FH□T



### Example 3

For the dual-function SDV-DH3, the setting method given below would be used to detect over and undervoltage with an AC voltage input. The intermediate voltage of dead band is 250 V and the dead band voltage is 20 V.

**Step 1.** To set the detection method and type of input on the DIP switch.

- Turn ON pin 1 (input) to specify a AC input.
- Attach the OVER and UNDER INPUT AC stickers.

**Step 2.** To set the intermediate voltage of dead band according to the BALANCE index scale value and the voltage multiplying factor.

**Voltage multiplying factor setting:** The voltage multiplying factor is selected according to the maximum and minimum factors and a sticker is attached. The calculation method is as follows:

The BALANCE index scale value is between 1.0 and 3.0, so calculate the voltage multiplying factor for both 1.0 and 3.0.

$$250 \text{ V (Intermediate voltage of dead band)} / 1 \text{ (BALANCE index scale value)} = 250 \text{ (maximum multiplying factor)}$$

$$250 \text{ V (Intermediate voltage of dead band)} / 3 \text{ (BALANCE index scale value)} = 83.3 \text{ (maximum multiplying factor)}$$

In this example, pins 2 and 3 are turned OFF and pins 4 is turned ON, and the x100V sticker is attached.

**BALANCE index scale value setting:** The calculation method is as follows for the BALANCE index scale value (X = index scale):

$$100 \text{ (Voltage multiplying factor)} \times X = 250 \text{ V (intermediate voltage of dead band)}$$

$$\text{Therefore, } X = 2.5$$

Turn the BALANCE knob to 2.5.

**Step 3.** To set dead band voltage according to the voltage multiplying factor and BAND WIDTH index scale value.

**BAND WIDTH index scale value setting:**

$$Z \text{ (BAND WIDTH index scale value)} \times 100 \text{ V (voltage multiplying factor)} = 20 \text{ V (dead band voltage)}$$

Therefore, Z = 0.2

Set the DEAD WIDTH knob to 0.2.

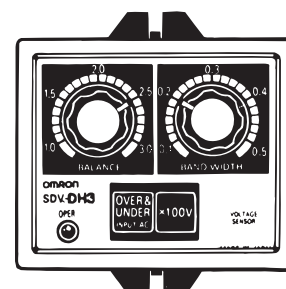
**Step 4.** Reset value for each detection setting: Automatically set according to the dead band voltage setting.

Reset values are calculated for overvoltage detection and undervoltage detection.

$$\text{Overvoltage detection: Reset value} = (250 \text{ V} + 20 \text{ V}) - (20 \text{ V} \times 2/3) = 256.7 \text{ min.}$$

$$\text{Undervoltage detection: Reset value} = (250 \text{ V} - 20 \text{ V}) + (20 \text{ V} \times 2/3) = 243.3 \text{ max.}$$

SDV-D□□

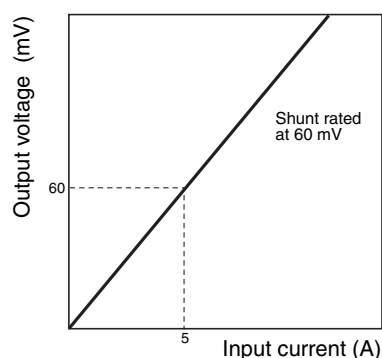


### ■ Shunts (Order Separately)

A shunt is a resistor to convert a DC current into a DC voltage. Use the shunt in combination with SDV-FL to detect undercurrent, reverse current and overcurrent in DC circuits.

**Note:** Select a shunt whose rated current is more than 120% of the current normally flowing in a circuit. The characteristics of the shunt may change or fusing of a resistor element may occur if an overload that is 1,000% of the rated current is applied. Therefore, determine the rated current of the shunt to be used, by taking the circuit conditions into account.

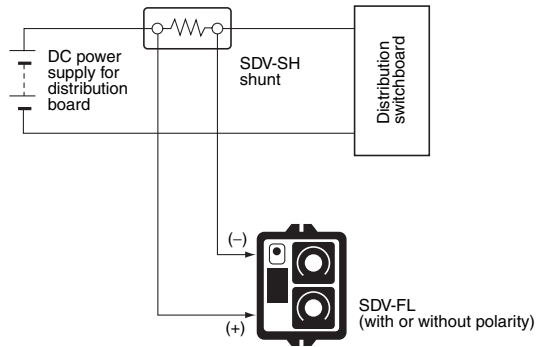
**Characteristics**  
SDV-SH5A (Rated Current: 5 A)



## Application Example

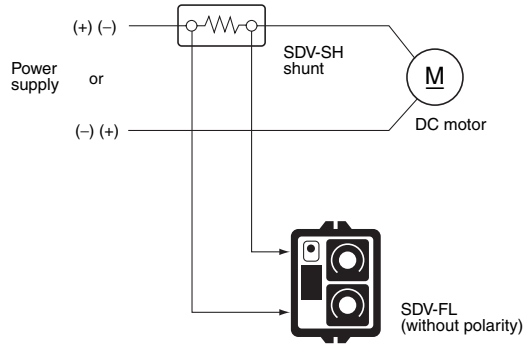
### Current Detection Using the Shunt (SDV-FL)

#### Overload Detection (A)



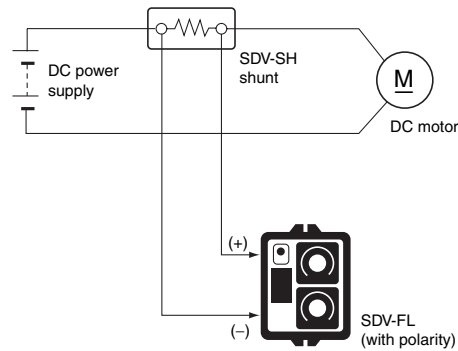
**Example:** Overload detection in a distribution switch board installed in a power substation.

#### Overload Detection (B)



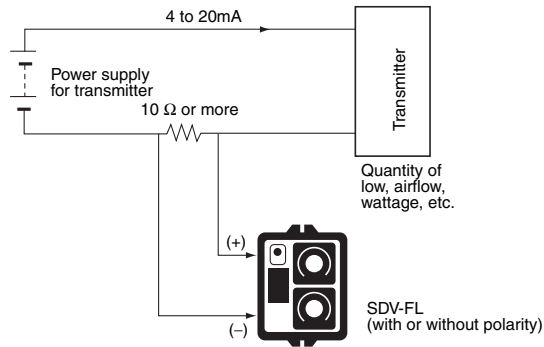
**Example:** Overload detection in equipment such as a motor in a rolling mill when the polarity of the applied voltage to the motor is reversed.

#### Reverse Current Detection (A)



**Example:** Detection when a DC motor is used as a generator (or a generator is used as a motor).

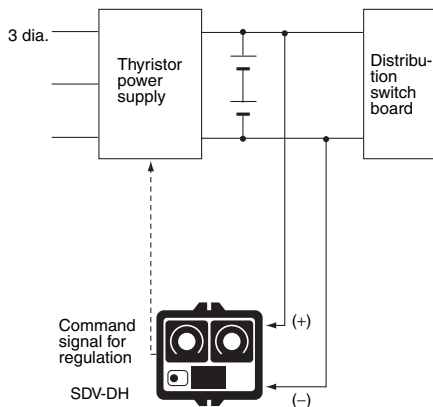
#### Reverse Current Detection (B)



**Example:** Detection of an output current from a transmitter on a control panel.

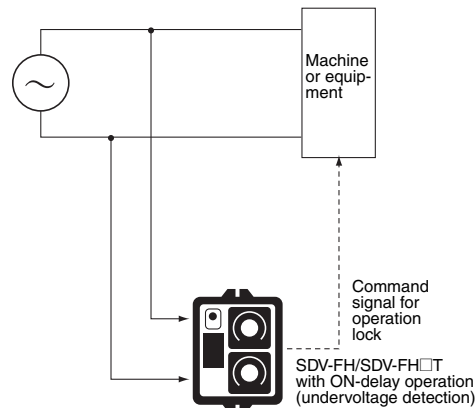
### Voltage Detection (SDV-FM/FH/FH□T/-DM/-DH)

#### Voltage Regulation



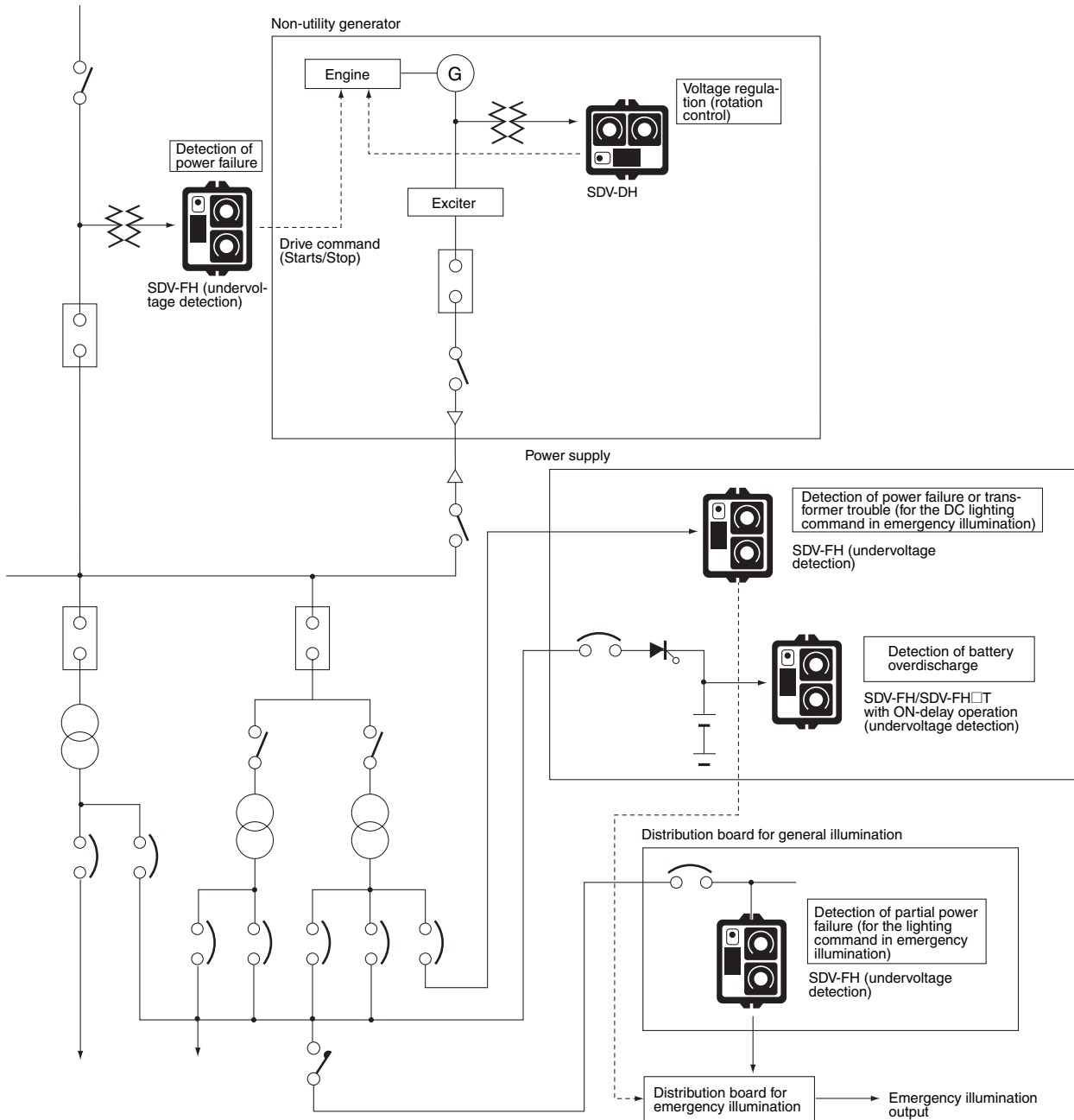
**Example:** Voltage regulation of a power supply unit in the distribution switchboard installed in a power substation.

#### Operation Lock Due to Voltage Drop (Alarm)

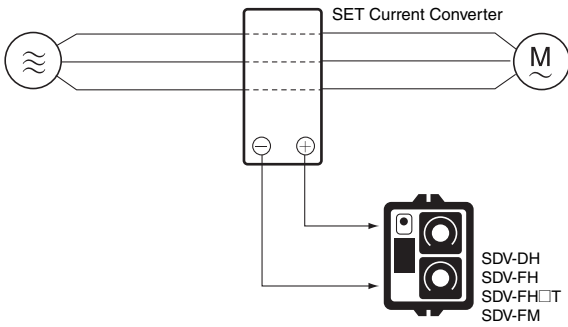


**Example:** Function lock due to voltage drop in a machine or equipment (alarm).

Emergency Power Supply (e.g. Standard Power Receiving/Distributing Facility)



### Three-phase AC Current Detection Using Current Converter

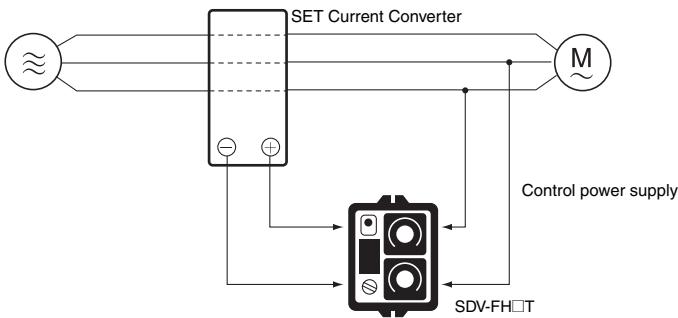


**Example:** Machine motor control, overload detection, undercurrent detection.

### Current Converters (Order Separately)

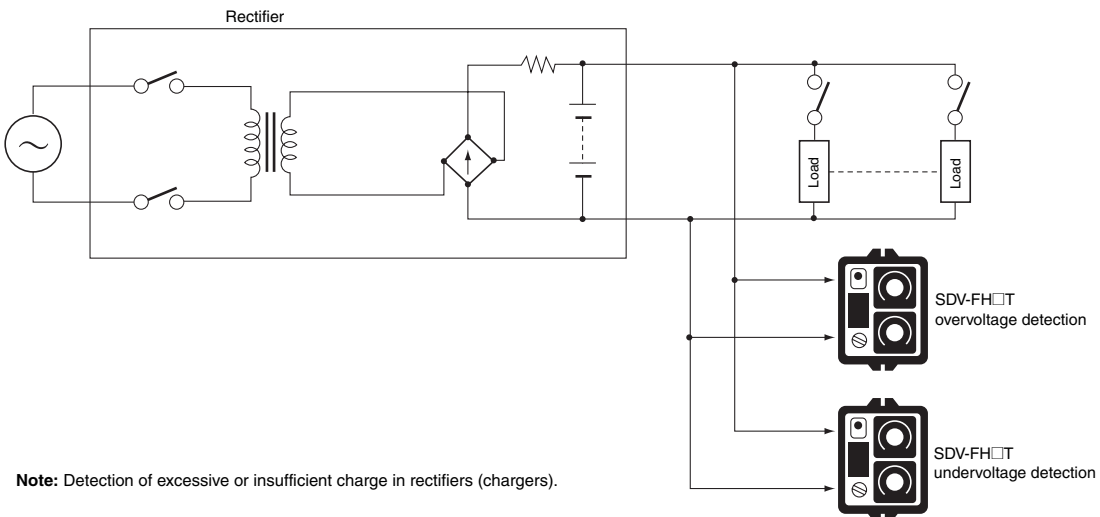
| Model  | Current range |
|--------|---------------|
| SET-3A | 1 to 80 A     |
| SET-3B | 64 to 160 A   |

### Three-phase AC Current Detection with Startup Lock Operation (When Using Same Power Supply for Motor and Control Power Supply)



### Voltage Monitoring in Rectifiers (Chargers) with ON-delay Operation

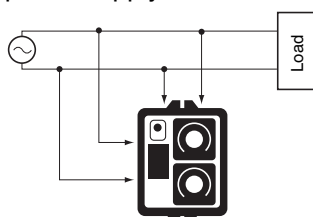
**Example:** To detect only overvoltage and not detect voltages for instantaneous load changes (ON/OFF).



**Note:** Detection of excessive or insufficient charge in rectifiers (chargers).

## ■ Q&A

**Q:** What is necessary to detect undervoltages when using the same power supply for the input voltage and the control power supply?



SDV-F (undervoltage detection)

**A:** The NO contact of the output relay is used for undervoltage detection. Even if the control voltage drops to 85% of the rated voltage (AC power), the operation of the relay can be maintained. Set the mode setting on the DIP switch to overvoltage detection and set the reset value to the value to be detected. Set the operating value of the SDV to a value higher than the reset value.

**Q:** Will the SDV be damaged if the input setting (AC/DC) is incorrect. If not, what will happen?

**A:** The SDV will not be damaged, but the operating value and reset value will not be accurate. These values will be about 10% less than the set values if DC is input for an AC setting and about 10% off to the positive side if AC is input for a DC setting.

**Q:** Can the negative pole of a DC voltage be input to the SDV?

**A:** Yes. An absolute rectifier circuit is used in the SDV-F to enable negative pole input. The SDV-FL has a polarity setting, which can be set to (+)(-) to disable operation with negative voltages. Positive/Negative settings cannot be used for the dual-function SDV-D even if the intermediate voltage of dead band is set to 0. Negative inputs cannot be used for the SDV-D.

**Q:** Is instantaneous detection faster than 0.5 s possible?

**A:** Use the S87A Power Interruption Detector for instantaneous detection (10 ms or 20 ms).

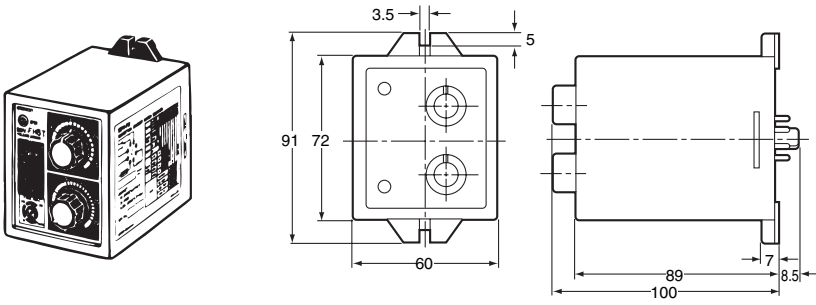


# Dimensions

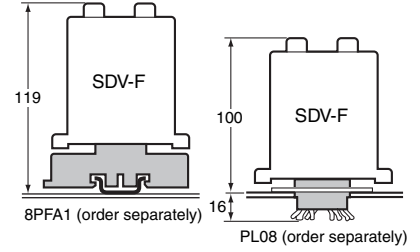
Note: All units are in millimeters unless otherwise indicated.

## Main Body

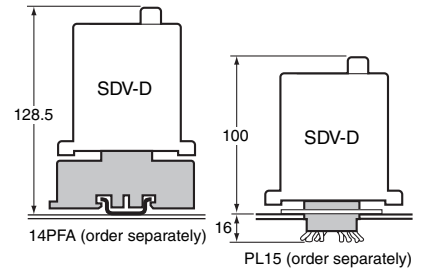
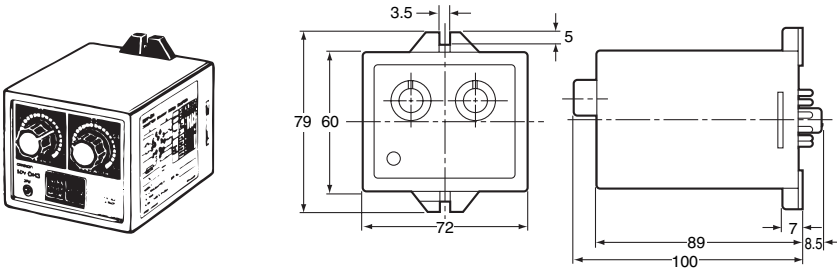
SDV-F□□/SDV-FH□T



### Connecting Socket

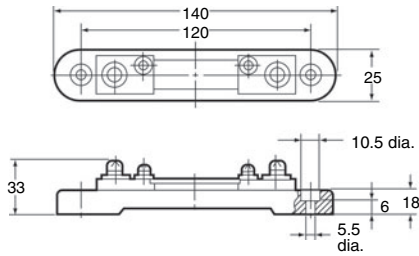


SDV-D□□



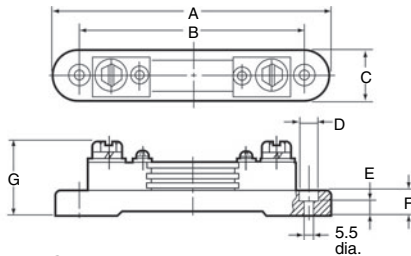
## Shunts

SDV-SH5 to SDV-SH50 (60-mV Rating)



Current terminal: M6 screw  
Voltage terminal: M4 screw

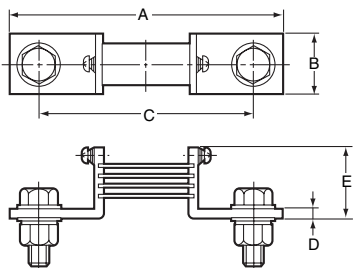
SDV-SH75 to SDV-SH200 (60-mV Rating)



Current terminal: M8 screw  
Voltage terminal: M4 screw

| Model     | A   | B   | C  | D    | E | F  | G  |
|-----------|-----|-----|----|------|---|----|----|
| SDV-SH75  | 140 | 120 | 25 | 10.5 | 6 | 18 | 36 |
| SDV-SH100 | 140 | 120 | 25 | 10.5 | 6 | 18 | 36 |
| SDV-SH150 | 140 | 120 | 25 | 10.5 | 6 | 18 | 43 |
| SDV-SH200 | 140 | 120 | 25 | 10.5 | 6 | 18 | 43 |

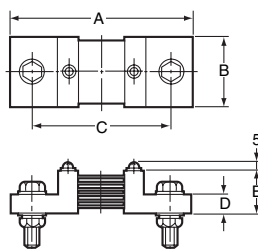
**SDV-SH300/-SH500 (60-mV Rating)**



Current terminal: M10 screw (SDV-SH300),  
M12 screw (SDV-SH500)  
Voltage terminal: M4 screw

| Model     | A   | B  | C   | D | E  | Resistor |
|-----------|-----|----|-----|---|----|----------|
| SDV-SH300 | 130 | 30 | 110 | 4 | 36 | 4        |
| SDV-SH500 | 160 | 40 | 120 | 6 | 41 | 5        |

**SDV-SH750/-SH1000 (60-mV Rating)**



Current terminal: M12 screw  
Voltage terminal: M5 screw

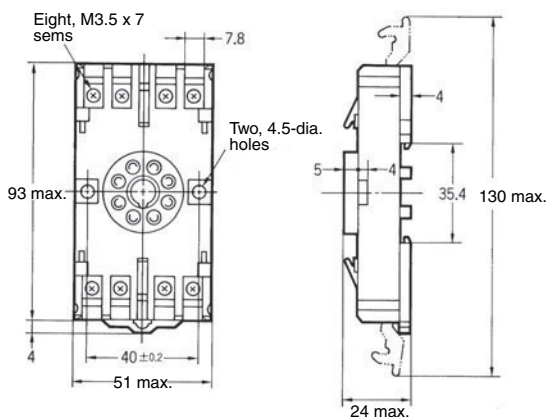
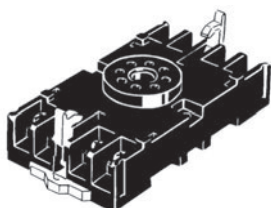
| Model      | A   | B  | C   | D  | E  |
|------------|-----|----|-----|----|----|
| SDV-SH750  | 175 | 45 | 130 | 15 | 30 |
| SDV-SH1000 | 175 | 60 | 135 | 18 | 30 |

**Note:** Inquire about models with a rated current of 1,500 A or larger.

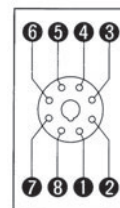
**Accessories (Order Separately)**

**Front Connecting Socket**

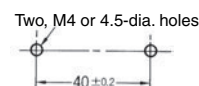
**8PFA1**



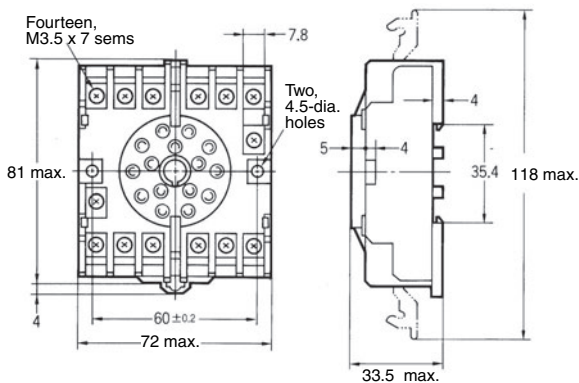
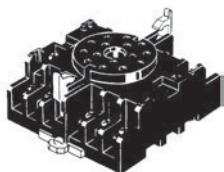
**Terminal Arrangement (Top View)**



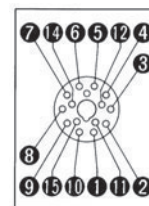
**Mounting Holes**



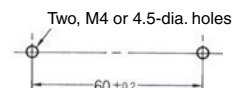
**14PFA**



**Terminal Arrangement (Top View)**

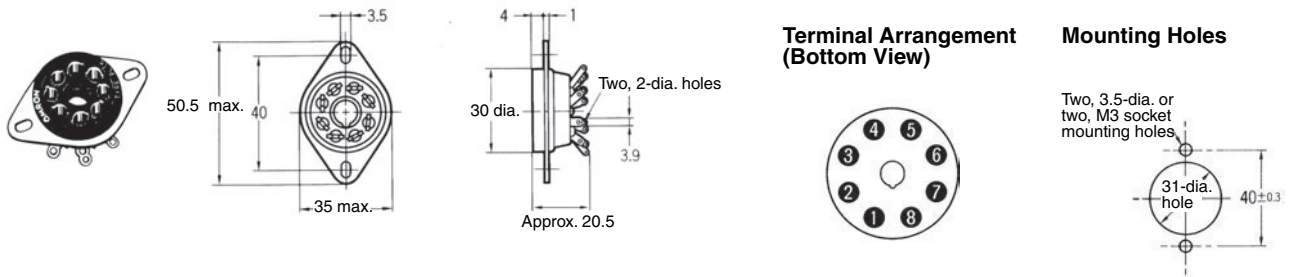


**Mounting Holes**

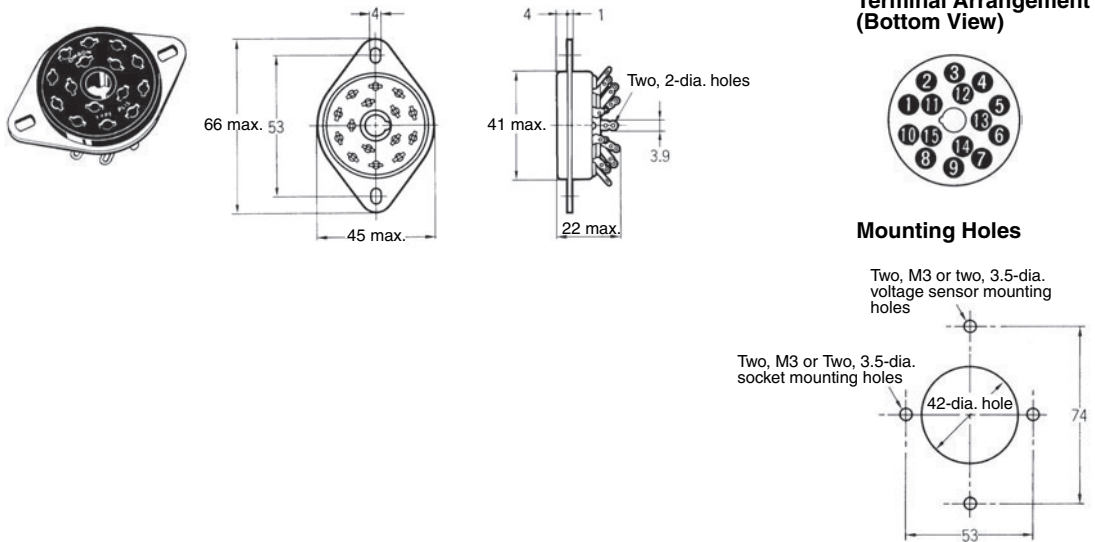


## Back Connecting Socket (Solder Terminal)

### PL08

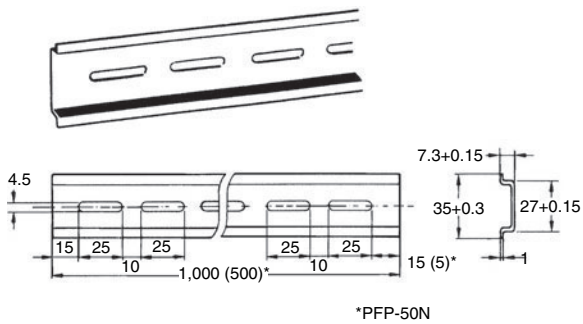


### PL15

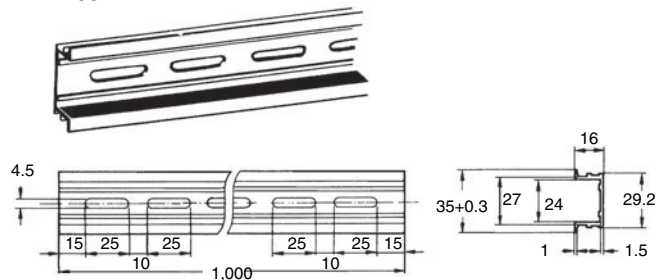


## Mounting Track

PFP-100N  
PFP-50N

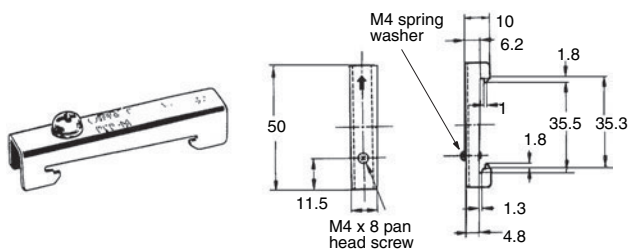


PFP-100N2



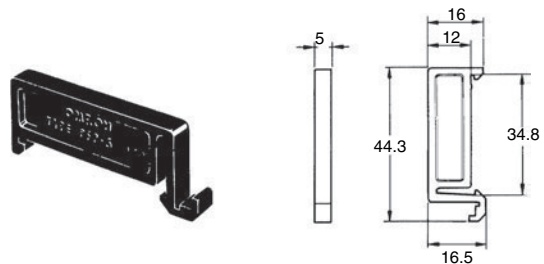
## End Plates

PFP-M



## Spacers

PFP-S

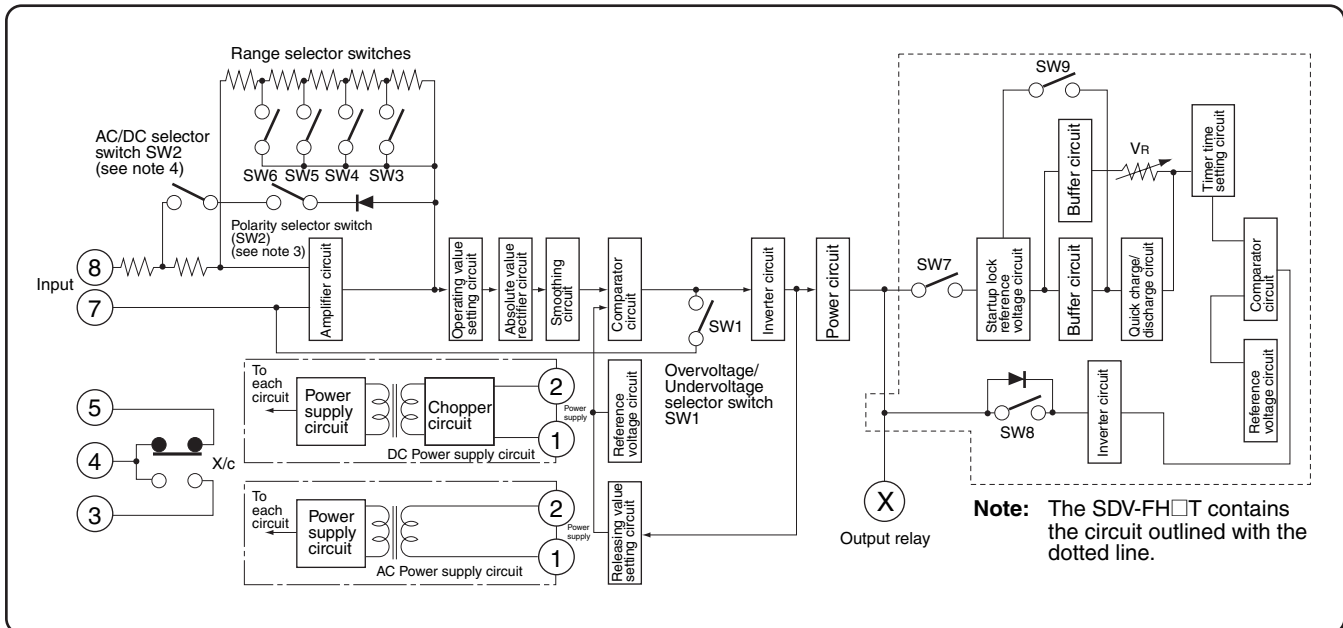


# Installation

## Internal Circuit

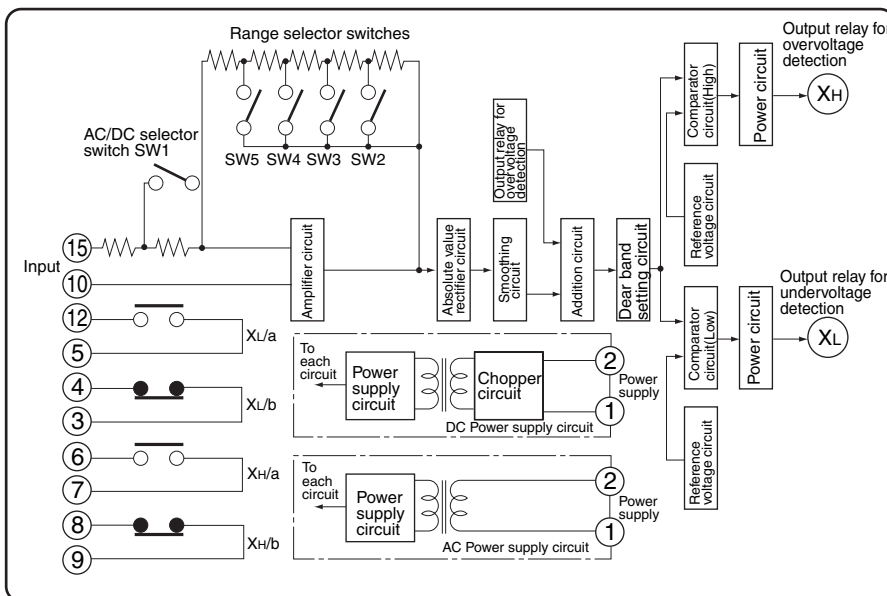
Input and power supply circuits are electrically isolated as protection against mutual interference.

### SDV-F□□/SDV-FH□T



- Note:**
1. There is no polarity setting for the SDV-FM or SDV-FH/-FH□T.
  2. There is no power supply polarity setting when using a DC control power supply for the SDV.
  3. The polarity selection switch (SW2) is on the SDV-FL.
  4. The AC/DC switch (SW2) is on the SDV-FM and SDV-FH/-FH□T.

### SDV-D



- Note:**
1. There is no power supply polarity setting when using a DC control power supply for the SDV.
  2. There is no polarity setting for DC inputs.

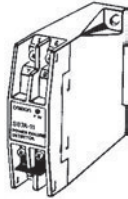
## Safety Precautions

Approximately 0.5 s is required for operation. When confirming the operating value, gradually change the input voltage while checking the value.

Power supply voltage fluctuations and the ambient operating temperature must be maintained within the allowable ranges. Be particularly careful not to apply an overvoltage beyond the specified range for the voltage detection.

Do not use the SDV in locations subject to corrosive or explosive gases.

The SDV cannot be used to detect momentary power interruptions because of its response time. Use the S87A to detect momentary power interruptions.



S87A Power Interruption Detector

An SDV cannot be used with a circuit containing thyristors, or VVVF inverters, because these elements can change the output waveform to the point that the SDV will malfunction.

### Mounting

When mounting with the PL08 or PL15 Back Connection Socket, insert the Socket into a 1- to 4-mm panel from the back and secure it with screws. Do not mount the SDV until the Socket has been mounted firmly. Be sure that the key groove on the Socket is mounted on the bottom, and also secure the SDV to the panel with screws.

When mounting with the 8PFA or 14PFA Back Connection Socket, insert the SDV into the Socket and secure it with the hooks. Leave approximately 30 mm or more between Sockets to allow enough space for the hooks.

When mounting more than one SDV, allow at least 30 mm or more between them.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

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