

**Single Loop Controller Series**

**BARGRAPH INDICATING ALARM**

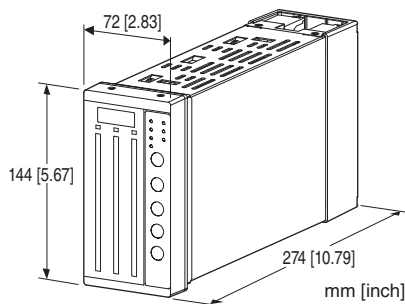
(with 4-digit digital meter, LED bar indicator)

**Functions & Features**

- Panel designed to match the SC series controllers.
- Displays a process variable in graphic bargraph of 101 LED segments
- 3 input channels
- Clear 4-digit digital meter
- Provides max. 4 alarm contact outputs
- LED brightness adjustments
- IP55 front cover
- Multi-color indicator (red, orange and green)
- Scale plate is easily replaceable

**Typical Applications**

- Panel operation for small-scale instrumentation
- Various alarm applications



**MODEL: SD10-[1][2][3][4][5][6][7][8][9]-[10]**

**ORDERING INFORMATION**

- Code number: SD10-[1][2][3][4][5][6][7][8][9]-[10]  
Specify a code from below for each of [1] through [10].  
(e.g. SD10-RYGAA0A6Y-M2)
- Use Ordering Information Sheet (No. ESU-6341) for the I/O codes, digital display range, decimal point position and alarm setpoint.
- Bargraph range (Refer to 'SCALE PLATE')

**[1] BAR LED COLOR (INPUT 1)**

- R:** Red
- Y:** Amber
- G:** Green
- B:** Blue
- 1:** Multi-color (red, orange and green), (See 'External View.')

**[2] BAR LED COLOR (INPUT 2)**

Same color availability as Input 1

**[3] BAR LED COLOR (INPUT 3)**

Same color availability as Input 1

**[4] INPUT 1**

Current

- A:** 4 - 20 mA DC (Input resistance 10 Ω)
- Z:** Specify current (See INPUT SPECIFICATIONS)

Voltage

- 6:** 1 - 5 V DC (Input resistance 1 MΩ min.)
- 0:** Specify voltage (See INPUT SPECIFICATIONS)

**[5] INPUT 2**

Same range availability as Input 1

**[6] INPUT 3**

Same range availability as Input 1

**[7] DC OUTPUT 1**

**Y:** Without

Current

- A:** 4 - 20 mA DC (Load resistance 550 Ω max.)
- D:** 0 - 20 mA DC (Load resistance 550 Ω max.)

Voltage

- 6:** 1 - 5 V DC (Load resistance 10 kΩ min.)
- 0:** Specify voltage (See OUTPUT SPECIFICATIONS)

**[8] DC OUTPUT 2**

Same range availability as DC Output 1

**[9] DC OUTPUT 3**

Same range availability as DC Output 1

**[10] POWER INPUT**

AC Power

- M2:** 100 - 240 V AC (Operational voltage range 85 - 264 V, 47 - 66 Hz)

DC Power

- R:** 24 V DC  
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)

**SPARE PARTS**

- Scale plate

## GENERAL SPECIFICATIONS

**Construction:** Panel flush mounting

**Degree of protection:** IP55; ensured for the front panel of the unit independently mounted to a panel

**Connection:** M3.5 screw terminals (torque 1.0 N·m)

**Screw terminal:** Nickel-plated steel

**Housing material:** Flame-resistant resin (gray), steel

**Setting:** (Front button)

- Scaled range
- Alarm setpoint
- LED brightness
- Moving average
- DC output fine adjustment
- Others

(Refer to the instruction manual for details)

**Isolation:** Input 1 to input 2 to input 3 to supply output to DC output 1 to DC output 2 to DC output 3 to alarm output 1 to alarm output 2 to alarm output 3 to power to FG

**Display zero adjustment (bargraph):** -19 to +19 %

**DC output zero adjustment:** -19 to +19 %

**Display span adjustment (bargraph):** 81 to 119 %

**DC output span adjustment:** 81 to 119 %

**Scale plate:** Flame resistant resin (white scale & characters on black base)

**H & L alarm output delay:** 0 sec. (factory setting; fieldselectable between 0 and 15 sec. by 1 sec. increments)

**Setpoint adjustment**

HH [H setpoint] to 100 %

H [L setpoint] to [HH setpoint]

L [LL setpoint] to [H setpoint]

LL 0 % to [L setpoint]

**Alarm deadband (hysteresis):** 1 %

■ **BARGRAPH**

3 Bar-LEDs indicate scaled Input 1, 2 and 3 from 0 to 100 %.

**LED:** 101 segments, 100 mm (3.94") height, 3.0 mm (.12") width

**Display range:** 0 to 100

**Number of digits:** Max. 4 digits (including decimal point and negative sign)

**Divisions:** 22 - 100

**Engineering unit:** max. 6 characters

**Bargraph display scale plate**

- Detachable structure
- White characters on black base

■ **DIGITAL DISPLAYS**

With the Input indication selector (IND) display Input 1, 2 and 3 scaling values.

**LED:** Red; 4 digits; 10 mm (0.39") height, 24 mm (0.94") width

**Scaled range:** -1999 to 0 to 9999 (Min. 3 significant digits)

**Minimum scale value:** 100 (3 digits, the decimal point

position disregarded)

**Overrange:** The indicator blinks when the input is out of the range from -15 to +115 %.

The indicator shows '----' when the value after scaling is out of the range.

**Decimal point position:**  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$  or none

**Zero indication:** Higher-digit zeros are suppressed

### ■ LED BRIGHTNESS ADJUSTMENTS

3 levels of brightness available for the bargraph and the digital indicator. (except alarm and mode setting status LED)

**Read rate:** 5/s

**Moving average sample number:** 4 (factory setting; field selectable among 1, 2, 4, 8 or 16)

## SUPPLY OUTPUT

### Output voltage:

24 V DC  $\pm 10$  % with no load

18 V DC min. at 20 mA

**Current rating:**  $\leq 22$  mA DC

### • Shortcircuit protection

**Current limited:** Approx. 30 mA

## INPUT SPECIFICATIONS

### ■ DC Current: 0 - 50 mA DC; input resistor incorporated

The factory selects input resistance from the following values

**Max. signal (DC current at input 100 %) range: Input resistance value**

39 mA or more, not more than 50 mA: 5.1  $\Omega$

20 mA or more, less than 39 mA: 10  $\Omega$

16 mA or more, less than 20 mA: 12  $\Omega$

10 mA or more, less than 16 mA: 20  $\Omega$

5 mA or more, less than 10 mA: 39  $\Omega$

1 mA or more, less than 5 mA: 200  $\Omega$

**Minimum span:** 1 mA

**Offset:** Max. 1.5 times span

### ■ DC Voltage: -10 - +10 V DC

**Input resistance:**  $\geq 1$  M $\Omega$

**Minimum span:** 0.1 V

**Offset:** Max. 1.5 times span

## OUTPUT SPECIFICATIONS

### ■ DC Voltage

Choose output range from below.

0 - 1 V DC (Load resistance 2000  $\Omega$  min.)

0 - 10 V DC (Load resistance 20 k $\Omega$  min.)

0 - 5 V DC (Load resistance 10 k $\Omega$  min.)

-10 - +10 V DC (Load resistance 20 k $\Omega$  min.)

-5 - +5 V DC (Load resistance 10 k $\Omega$  min.)

For details, refer to the Ordering Information Sheet.

■ **Alarm Output:** Relay contact

**Rated load:** 240 V AC @ 1 A (cos  $\phi$  = 1)

30 V DC @ 1 A (resistive load)

**Maximum switching voltage:** 250 V AC or 30 V DC

**Maximum switching power:** 250 VA or 60 W

**Minimum load:** 5 V DC @ 10 mA

**Mechanical life:**  $2 \times 10^7$  cycles

## INSTALLATION

### Power consumption

**AC:**

Approx. 14 VA at 100 V

Approx. 17 VA at 200 V

Approx. 19 VA at 264 V

• **DC:** Approx. 7.3 W

**Operating temperature:** -5 to +55°C (23 to 131°F)

**Operating humidity:** 5 to 90 %RH (non-condensing)

**Mounting:** Panel flush mounting (high-density mounting in horizontal direction)

**Weight:** 1.8 kg (4.0 lb)

## PERFORMANCE in percentage of span

**Accuracy:** Input accuracy + output accuracy

• **Input accuracy:**  $\pm 0.1\%$

• **Output accuracy:**

$\pm 0.1\%$  DC output

$\pm 1\%$   $\pm 1$  digit (bargraph)

$\pm 0.1\%$   $\pm 1$  digit (digital indicator, alarm output)

**Temp. coefficient:**  $\pm 0.015\%$ /°C ( $\pm 0.008\%$ /°F)

**Response time:**  $\leq 0.5$  sec. (0 - 90%, moving average sample number set to 4)

**Line voltage effect:**  $\pm 0.1\%$  over voltage range

**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC

**Dielectric strength:**

1500 V AC @ 1 minute (Input 1 or Input 2 or input 3 or supply output to DC output 1 or DC output 2 or DC output 3 to alarm output 1 or alarm output 2 or alarm output 3 to power to FG)

500 V AC @ 1 minute (Input 1 to Input 2 to input 3 to supply output)

500 V AC @ 1 minute (DC output 1 to DC output 2 to DC output 3)

500 V AC @ 1 minute (alarm output 1 to alarm output 2 to alarm output 3)

## SCALE PLATE

### ■ WHAT MUST BE SPECIFIED WHEN ORDERING

Following two methods can specify scale plate.

#### a) Using 'Scale Plate Designer'

Access 'Design Scale Plate' in the our web site. Scale plate can be designed in this web site.

By function below, it can be easy to create standard design or original design.

##### [Design Automatically]

Entering Minimum, Maximum, and Unit allows to create automatically a scale plate.

Maximum created scale division number is '54.9'. Use [Specify Division Number], if division number more than '54.9' is required (Maximum 100 division).

##### [Specify Division Interval]

Division Interval can be specified according to the application.

##### [Specify Division Number]

It is available to create originally with scale division number, length of line, position, character size, font and detailed position.

After designing is completed, register code is issued. Place the order with this code.

Once scale plate is designed, it is recorded. The register code can be used any number of times.

#### b) Specifying scale range and display unit when placing the order

It is available to create by specifying scale range and display unit for right and left.

Regarding design of scale plate such as division number, length of division number line, and character font, they are same as above [Design Automatically], we design them.

### ■ DESIGNING BY 'DESIGN AUTOMATICALLY'

How 'Design Automatically' creates scale design is described succinctly below.

#### ■ TYPES OF DIVISIONS

Five (5) types of divisions are used depending upon the scale span, which determined by the following equation:

Scale Span = (Max. range value – Min. range value) x 10

where n = integer (used to limit the calculated scale span to the minimum of 1.1, below 11.0.)

The number of divisions is automatically determined by the scale span.

#### • Type 1: 1.1 Scale Span < 1.3

Number of divisions: 22 to 25.9

Scale: Starts at 0, increments by 0.02 / 0.2 / 2 / 20 / 200. Min. and max. values indicated. 4 digits including negative sign and decimal point.

Division lines: Long, Short, Medium, Short, Long (4 divisions repeated)

#### • Type 2: 1.3 Scale Span < 2.0

Number of divisions: 26 to 39.9

Scale: Starts at 0, increments by 0.03 / 0.3 / 3 / 30 / 300. Min. and max. values indicated. 4 digits including negative sign and decimal point.

Division lines: Long, Short, Medium, Short, Medium, Short, Long (6 divisions repeated)

Minimum Divisions	Maximum Divisions	Bipolar Scale
11 —	1.29 —	600 —
10 —	1.2 —	400 —
8 —	1.0 —	200 —
6 —	0.8 —	0 —
4 —	0.6 —	-200 —
2 —	0.4 —	-400 —
0 —	0.2 —	-600 —

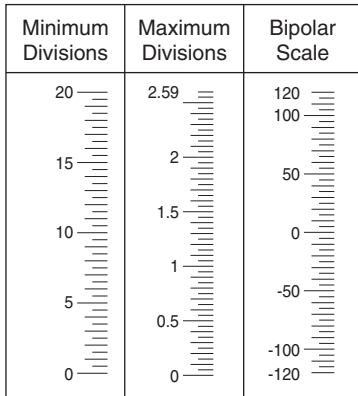
Minimum Divisions	Maximum Divisions	Bipolar Scale
130 —	1.99 —	0.8 —
120 —	1.8 —	0.6 —
90 —	1.5 —	0.3 —
60 —	1.2 —	0 —
30 —	0.9 —	-0.3 —
0 —	0.6 —	-0.6 —
	0.3 —	-0.8 —
	0 —	

• **Type 3: 2.0 Scale Span < 2.6**

Number of divisions: 40 to 51.9

Scale: Starts at 0, increments by 0.05 / 0.5 / 5 / 50 / 500. Min. and max. values indicated. 4 digits including negative sign and decimal point.

Division lines: Long, Short, Medium, Short, Medium, Short, Medium, Short, Medium, Short, Long (10 divisions repeated)

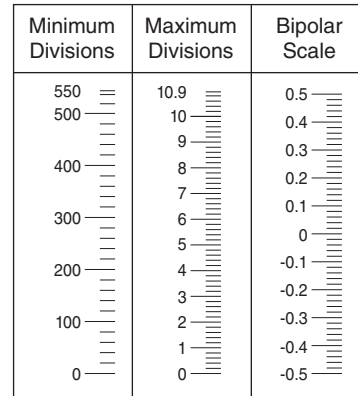


• **Type 5: 5.5 Scale Span < 11.0**

Number of divisions: 27.5 to 54.9

Scale: Starts at 0, increments by 0.01 / 0.1 / 1 / 10 / 100 / /1000. Min. and max. values indicated. 4 digits including negative sign and decimal point.

Division lines: Long, Medium, Medium, Medium, Medium, Long (5 divisions repeated)

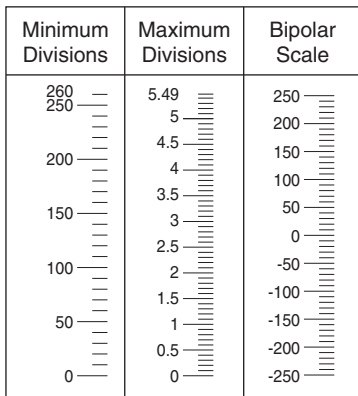


• **Type 4: 2.6 Scale Span < 5.5**

Number of divisions: 26 to 54.9

Scale: Starts at 0, increments by 0.05 / 0.5 / 5 / 50 / 500. Min. and max. values indicated. 4 digits including negative sign and decimal point.

Division lines: Long, Medium, Medium, Medium, Medium, Long (5 divisions repeated)

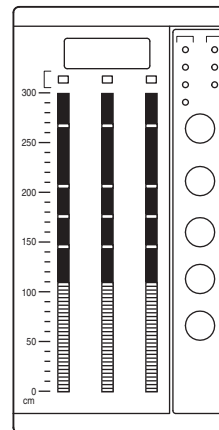


[Example] : Bargraph range 0 to 300 cm (Type 4)  
Digital indicator range 0.00 to 6.75 m<sup>3</sup> (Type 4)

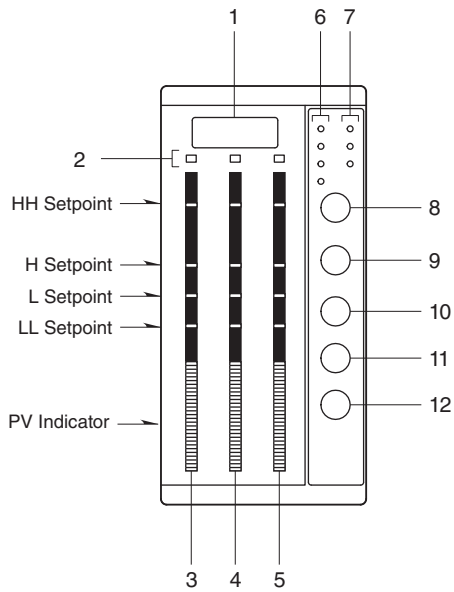
Left scale range: 0 – 300

Left scale unit (bargraph): cm

Center and right bar scale: None

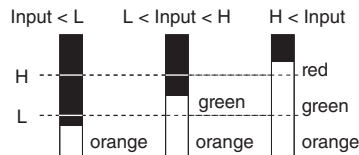


## EXTERNAL VIEW

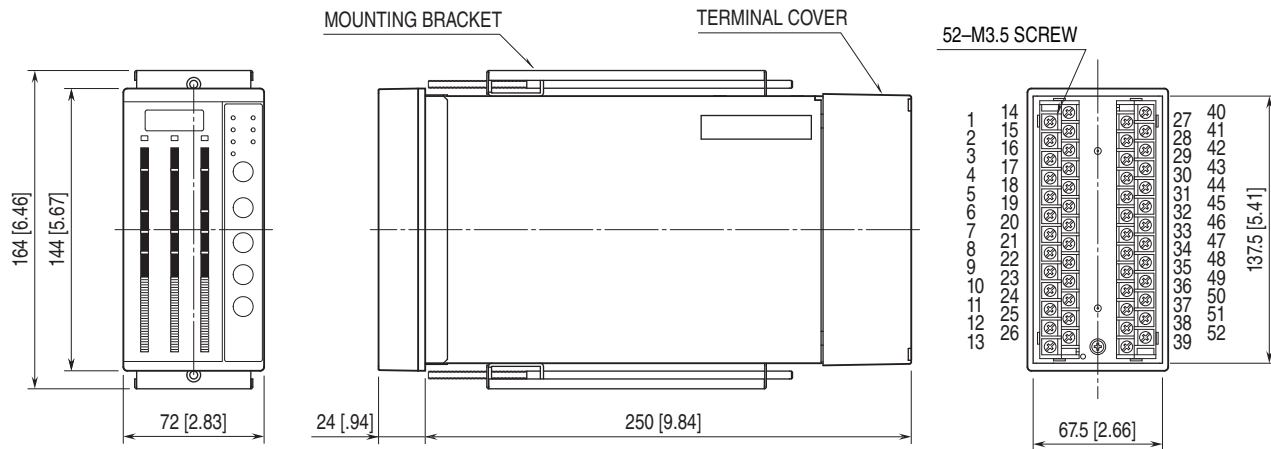


1. Digital meter
2. Digital meter Selector LED  
(Displays which of the 3 inputs value is indicating)
3. Input 1 bargraph meter
4. Input 2 bargraph meter
5. Input 3 bargraph meter
6. Alarm indicator
7. Mode setting status LED
8. Input indication selector (IND)
9. Mode selector (M)
10. Manual operation button (UP)
11. Acceleration button (FAST)  
(Accelerates the operation by pressing simultaneously with UP or DOWN button)
12. Manual operation button (DOWN)

• Bar Color Pattern



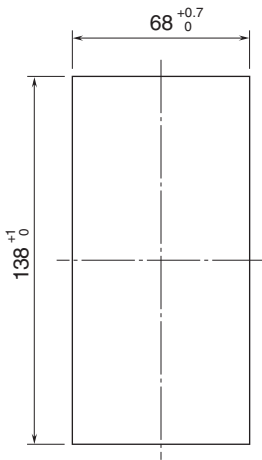
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



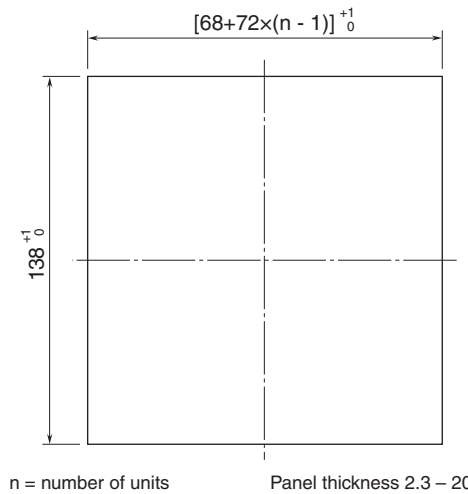
**PANEL CUTOUT unit: mm**

■ PANEL CUTOUT unit: mm

• Single mounting



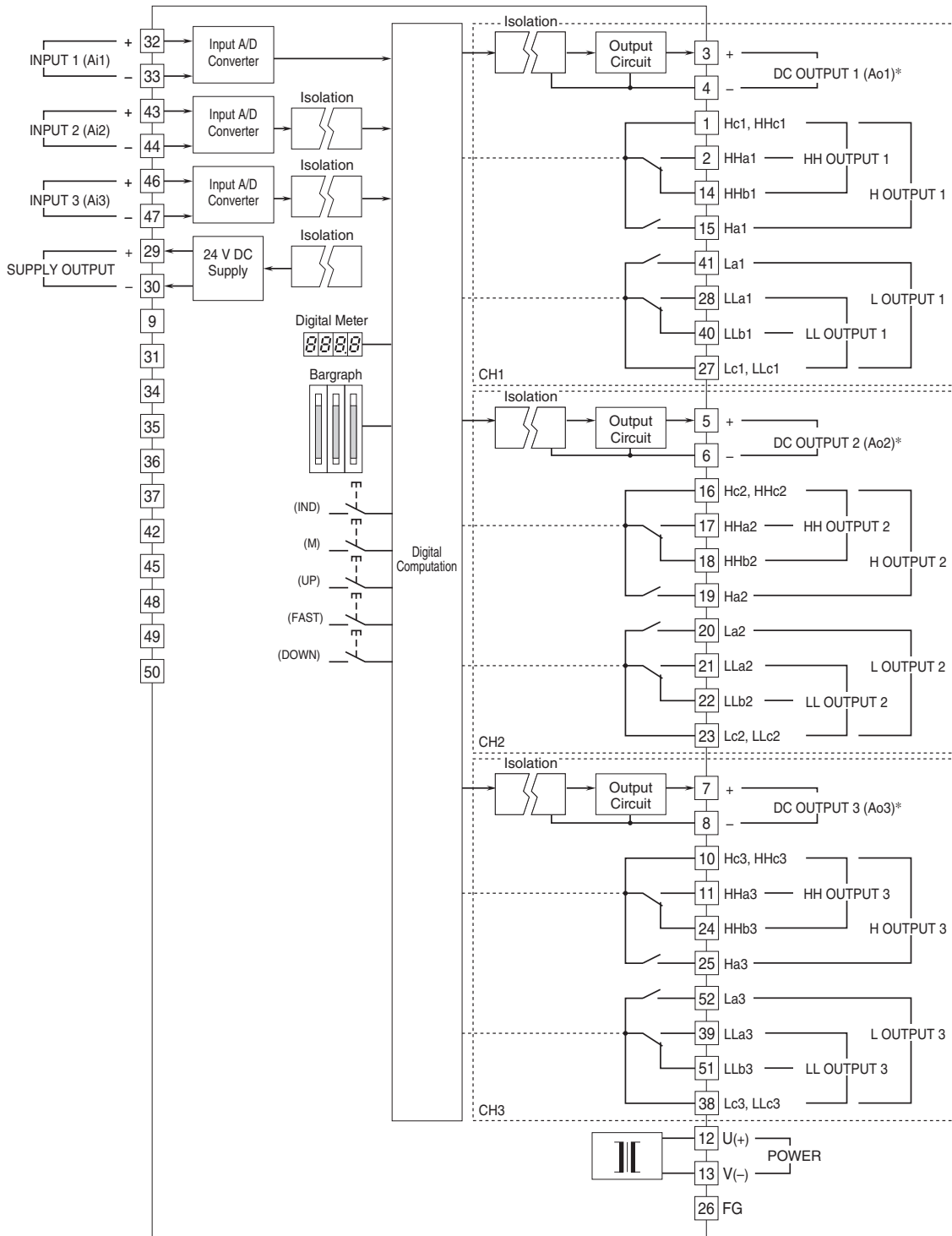
• Clustered mounting



■ CAUTION

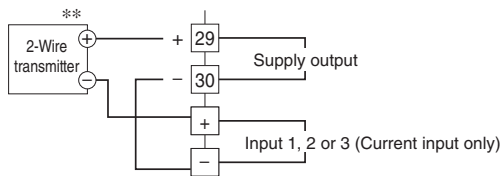
- IP55 is ensured for the front panel of the unit mounted independently according to a panel. Test the sealing at the mounting surface once the device is installed.
- Set the unit on a vertical surface with its digital meter is at the upper side. Mounting in other directions may cause heat built up inside the unit and shorten its life span or degrade its performance.
- Ensure that there is sufficient space for ventilation inside a panel. Do not install above the devices that generate high heat such as heaters, transformers or resistors. Leave at least 30 mm (1.2 inch) space above, below and behind the unit for maintenance purpose (e.g. wiring, removing or installing).

**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**



\* Not available for output code /Y

**CONNECTION (2-Wire transmitter)**



\*\* Not applicable to smart transmitters





Specifications are subject to change without notice.