

BD 7-Segment Display

Easy display with BCD codes.

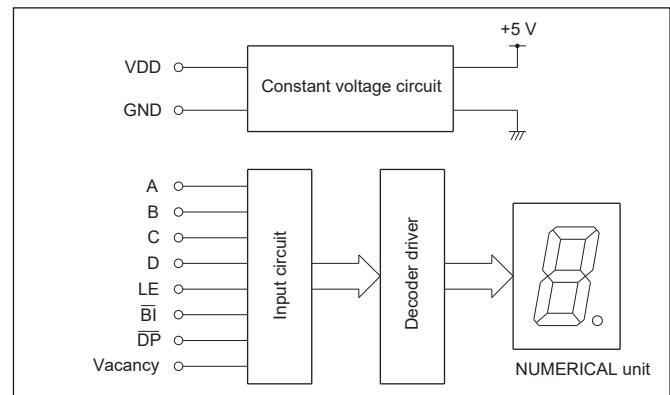
- Digit display : 14.6-mm-high characters, displayed by BCD codes.
- Illumination color : Red, Green
- Mounting : One-touch easy mounting with side plates.
- Unit type : NUMERICAL unit, CHARACTER unit
- Terminal : Connector (Selling separately)
- Accessories : Blank unit, Motherboard



CHARACTERISTICS

Character Height	14.6 mm
Illumination Color	Red, Green
Outer Dimension	H28 mm×W15 mm×D45 mm (1 unit)
Max. Digits	8 digits
Supply Voltage	DC5 V ±5% DC12 V, 24 V ±10%
Consumption Current	65 mA max. (1 unit)
Display Method	Decimal system
Control Method	BCD codes (Positive Logic, Negative Logic)
Data Input Method	TTL input
High Level Input Voltage	3.5 to 5 V
Low Level Input Voltage	0 to 1.5 V
Terminal Shape	MIL connector (10 pins)
Ambient Operating Temperature	-15°C to 50°C (No Freeze, No Condensation)
Ambient Operating Humidity	80%RH max. (No Condensation)
Ambient Storage Temperature	-25°C to 65°C (No Freeze, No Condensation)
Ambient Storage Humidity	80%RH max. (No Condensation)
RoHS (10 Substances)	Conform to standards

BLOCK DIAGRAM



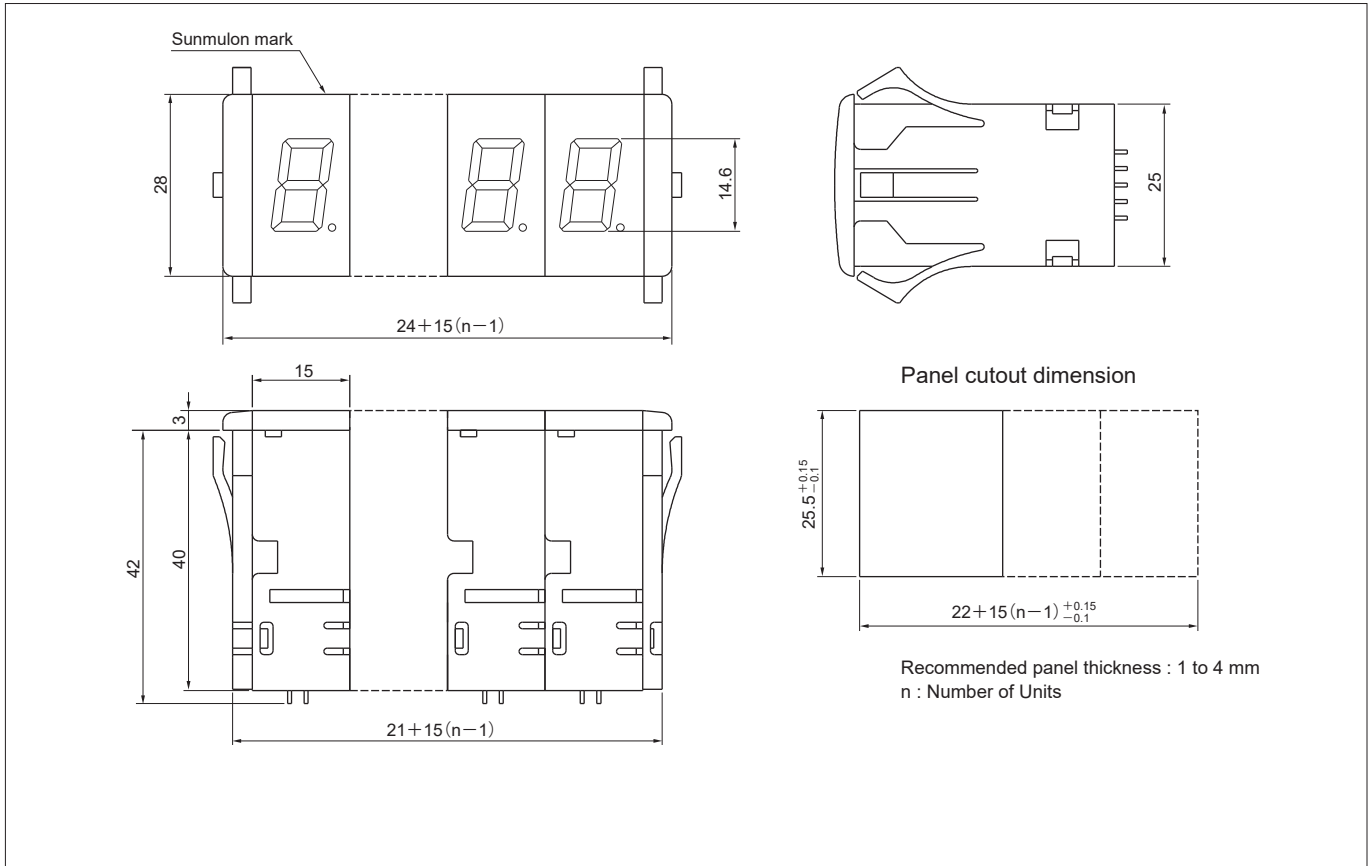
※ DC 5 V input type does not have a built-in constant voltage circuit.
Please refer to page BD-4 for internal connection arrangements of NUMERICAL unit (Without circuit) and CHARACTER unit.

https://www.sunmulon.co.jp/english/products/display_e/bd.html



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|--|--|---|
| ◇Dimensions / Panel cutout : page BD-2 | ◇NUMERICAL unit (With circuit) : page BD-3 | ◇NUMERICAL unit (Without circuit) : page BD-4 |
| ◇CHARACTER unit : page BD-4 | ◇Ordering code : page BD-5 | ◇Terminals : page BD-6 |
| ◇Accessories' dimensions : page BD-6~7 | ◇Reference wiring diagram : page BD-8 | |

DIMENSIONS / PANEL CUTOUT

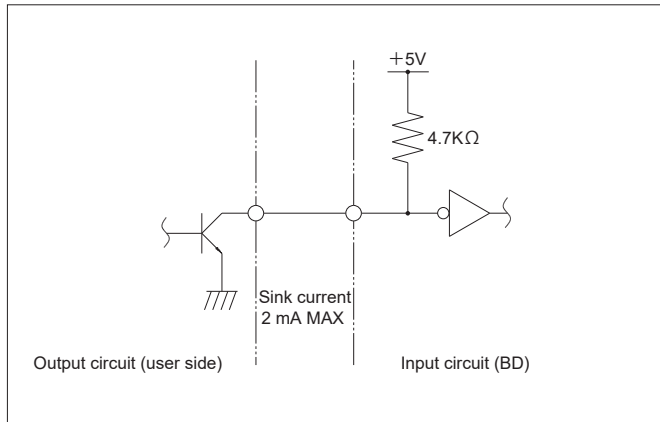


- ※ Up to 8 units can be connected in series.
- ※ Blank unit also has the same dimensions.
- ※ If the panel is to be finished (e.g. coated), make sure that the panel meets the specified dimensions after the coating.
In case the panel cut dimension is too small, it may cause malfunction.
- ※ After the panel-cutting process, make sure to remove burrs on the surface.

Tolerance : ± 0.4 mm

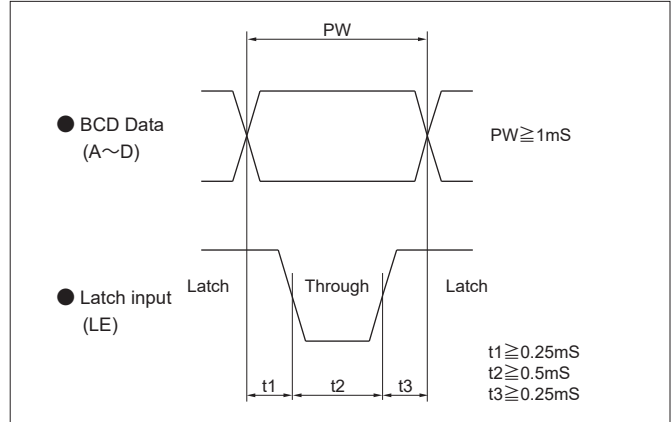
SPECIFICATIONS [NUMERICAL UNIT] With circuit

● Input Circuit and Connection



- ※ Since internal circuit is operated with +5 V, user side output should be Open Collector Circuit, or less than +5 V impression circuit.
- ※ While power is not supplied in the unit, even low voltage not to be impressed on the input circuit.

● Input Timing



● BCD Signals Truth Table

Input							Output
DP	B̄I	LE	D	C	B	A	BCD
X	H	L	L(H)	L(H)	L(H)	L(H)	0
X	H	L	L(H)	L(H)	L(H)	H(L)	1
X	H	L	L(H)	L(H)	H(L)	L(H)	2
X	H	L	L(H)	L(H)	H(L)	H(L)	3
X	H	L	L(H)	H(L)	L(H)	L(H)	4
X	H	L	L(H)	H(L)	L(H)	H(L)	5
X	H	L	L(H)	H(L)	H(L)	H(L)	6
X	H	L	L(H)	H(L)	H(L)	H(L)	7
X	H	L	H(L)	L(H)	L(H)	L(H)	8
X	H	L	H(L)	L(H)	L(H)	H(L)	9
X	H	L	H(L)	L(H)	H(L)	L(H)	Blank
X	H	L	H(L)	L(H)	H(L)	H(L)	Blank
X	H	L	H(L)	H(L)	L(H)	L(H)	Blank
X	H	L	H(L)	H(L)	L(H)	H(L)	Blank
X	H	L	H(L)	H(L)	H(L)	H(L)	Blank
L	X	X	X	X	X	X	.
X	L	X	X	X	X	X	Blank
X	X	H	X	X	X	X	A through D data before H is retained.

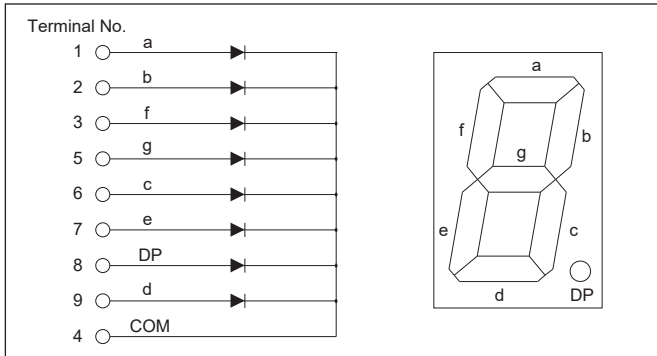
- ※ Either H or L is acceptable for X.
- ※ () = Negative Logic
- ※ All inputs are pulled up internally, so opened H is acceptable.

● Terminals Function Table

Pin No.	Mark	Description	Functions
1	VDD	⊕ Power supply	⊕ Power input
2	A	Data input	Indicate figures and symbols according to data signal input of the BCD code. Please see the truth table.
3	B		
4	C		
5	D		
6	LE	Latch input	If controlled using a latch, "H : Data Retention" and "L : Data Read". When controlling without using a latch, connect to GND. Note : Always use either control method. No display and no change will be made if there is no connection.
7	B̄I	Blanking input	"L" makes display 'OFF' except Decimal point.
8	DP	Decimal input	"L" makes Decimal point 'ON'.
9	—	—	—
10	GND	Ground	⊖ Power input. Electrical potential norm of all signals.

SPECIFICATIONS [NUMERICAL UNIT] Without circuit

● Internal Connection Arrangements



● LED Specifications

Absolute Maximum Rating

LED Color	Red	Green
DC Forward Current I_F /seg (mA)	20	20
Pulse Lighting	Pulse Width PW (μ s)	
	Duty Ratio DR	
	1/10	
Forward Current I_{FP} /seg (mA)	110	110
DC Reverse Voltage V_R (V)	6	6

Electrical / Optical Performance

LED Color	Red	Green
Forward Voltage V_F [$I_F=10$ mA] (V)	2.0	2.1
Reverse Current I_R (μ A)	100 max.	100 max.
Luminous Intensity / Segment I_v (mcd)	14	22
Peak Radiation Wavelength λ_P (nm)	650	563
Spectral Half-width $\Delta \lambda$ (nm)	40	40

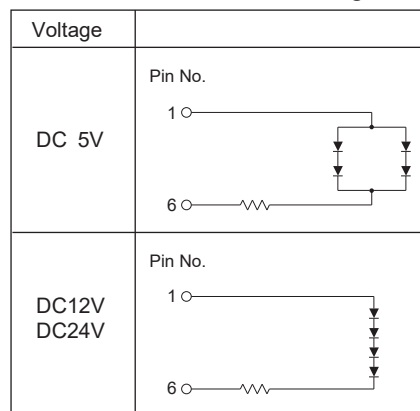
※ The above are characteristics of the LED element, so differ slightly from the actual product.

SPECIFICATIONS [CHARACTER UNIT]

● Terminals Function Table

Pin No.	Mono Color
1	Anode (+)
2	—
3	—
4	—
5	—
6	Cathode (-)
7	—
8	—
9	—
10	—

● Internal Connection Arrangements



● LED Specifications

Voltage	Rated Current (mA)	
	Red	Green
DC 5V $\pm 5\%$	40	40
DC12V $\pm 5\%$	20	20
DC24V $\pm 5\%$	20	20

ORDERING CODE

NUMERICAL unit
(With circuit)



※ Side plates to be ordered separately.

BD - BN

● DISPLAY

BN	NUMERICAL unit (With circuit)
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● BCD CODE LOGIC

1	Positive
2	Negative

● SUPPLY VOLTAGE

1	DC 5V
2	DC12V
3	DC24V

● LED COLOR

R	Red
G	Green

NUMERICAL unit
(Without circuit)



※ Side plates to be ordered separately.

BD - E 1

● DISPLAY

E	NUMERICAL unit (Without circuit)
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● LED COLOR

R	Red
G	Green

● POLARITY

1	Cathode common
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CHARACTER unit

This unit displays any engraved characters.



※ Side plates to be ordered separately.

※ Custom legend plate can be made. Engraving is available separately.

BD - D 0

● DISPLAY

D	CHARACTER unit
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● DISPLAY TYPE

0	Full-Face
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● LED COLOR

R	Red
G	Green

● LEGEND PLATE

A	With legend plate
B	Without legend plate

● SUPPLY VOLTAGE

1	DC 5V
2	DC12V
3	DC24V

◇Dimensions / Panel cutout : page BD-2

◇NUMERICAL unit (With circuit) : page BD-3

◇NUMERICAL unit (Without circuit) : page BD-4

◇CHARACTER unit : page BD-4

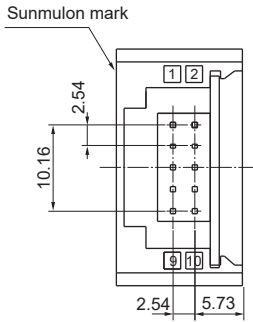
◇Terminals : page BD-6

◇Accessories' dimensions : page BD-6~7

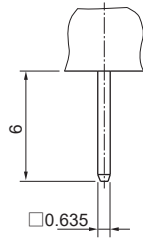
◇Reference wiring diagram : page BD-8

TERMINALS

● TERMINALS DIMENSIONS



● TERMINAL SHAPE



【Applicable connectors】

OMRON made XG4M-1030 (Socket)
 XG4T-1004 (Strain Relief)

HRS made HIF3B-10D-2.54R

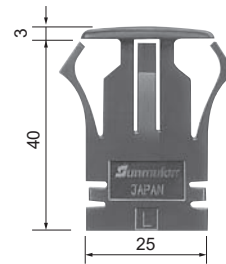
※ We do not sell the above products.
 For more information, please refer to these
 manufacturers' catalogs.

ACCESSORIES / REPLACEMENT PARTS

● SIDE PLATE

Part no.	BD-0206-K
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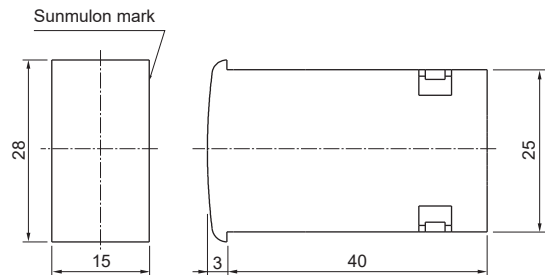
- ※ A pair of side plate (right and left) is necessary for mounting on panel.
 (This part no. is a set of right and left.)
- ※ Available in Black only.



● BLANK UNIT

Part no.	BD-0207-SR	Semitransparent Red
	BD-0207-SG	Semitransparent Green

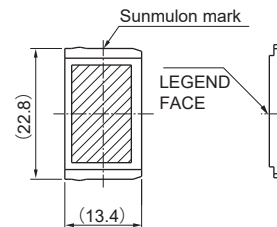
- ※ This unit is used when blanks are needed between digits.



● LEGEND PLATE

Part no.	BD-0205
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- ※ Used for CHARACTER unit.



Tolerance : ± 0.4 mm

ACCESSORIES [MOTHERBOARD]

● MOTHERBOARD

Part no. BD-0286

Up to 4-digits can be wiring-saved.

【Specifications】

Available type : NUMERICAL unit, CHARACTER unit
 Available max. digits : Up to 4-digits (Motherboards can be used in multiples.)

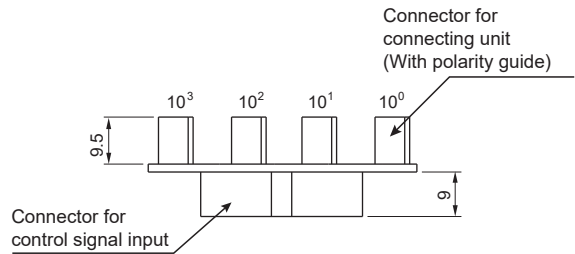
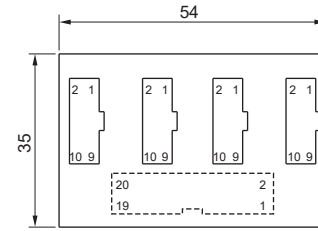
【Applicable connectors】

OMRON made XG4M-2030 (Socket)
 XG4T-2004 (Strain Relief)

HRS made HIF3BA-20D-2.54R

※ We do not sell connectors.

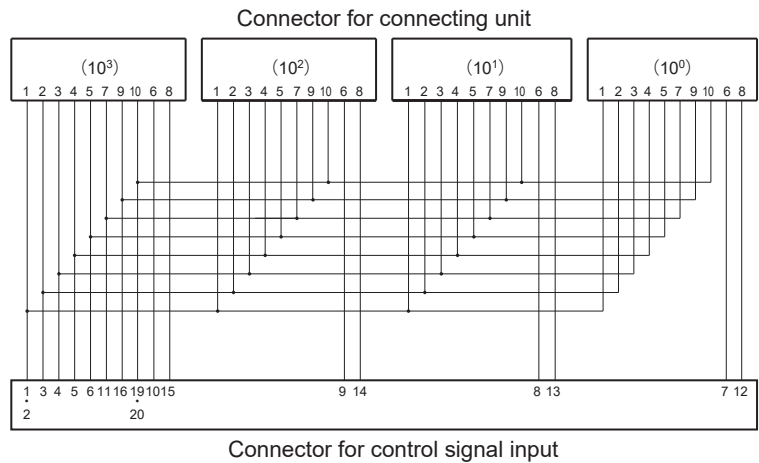
Dimensions



Input / output Terminal Table

Pin No.	Unit type	NUMERICAL unit (With circuit) PN : BD-BN□□□□	CHARACTER unit PN : BD-D0□□□□
	1	VDD	Anode
2	VDD	Anode	
3	A	—	
4	B	—	
5	C	—	
6	D	—	
7	LE10 ⁰	Cathode 10 ⁰	
8	LE10 ¹	Cathode 10 ¹	
9	LE10 ²	Cathode 10 ²	
10	LE10 ³	Cathode 10 ³	
11	\overline{BI}	—	
12	$\overline{DP}10^0$	—	
13	$\overline{DP}10^1$	—	
14	$\overline{DP}10^2$	—	
15	$\overline{DP}10^3$	—	
16	—	—	
17	—	—	
18	—	—	
19	GND	—	
20	GND	—	

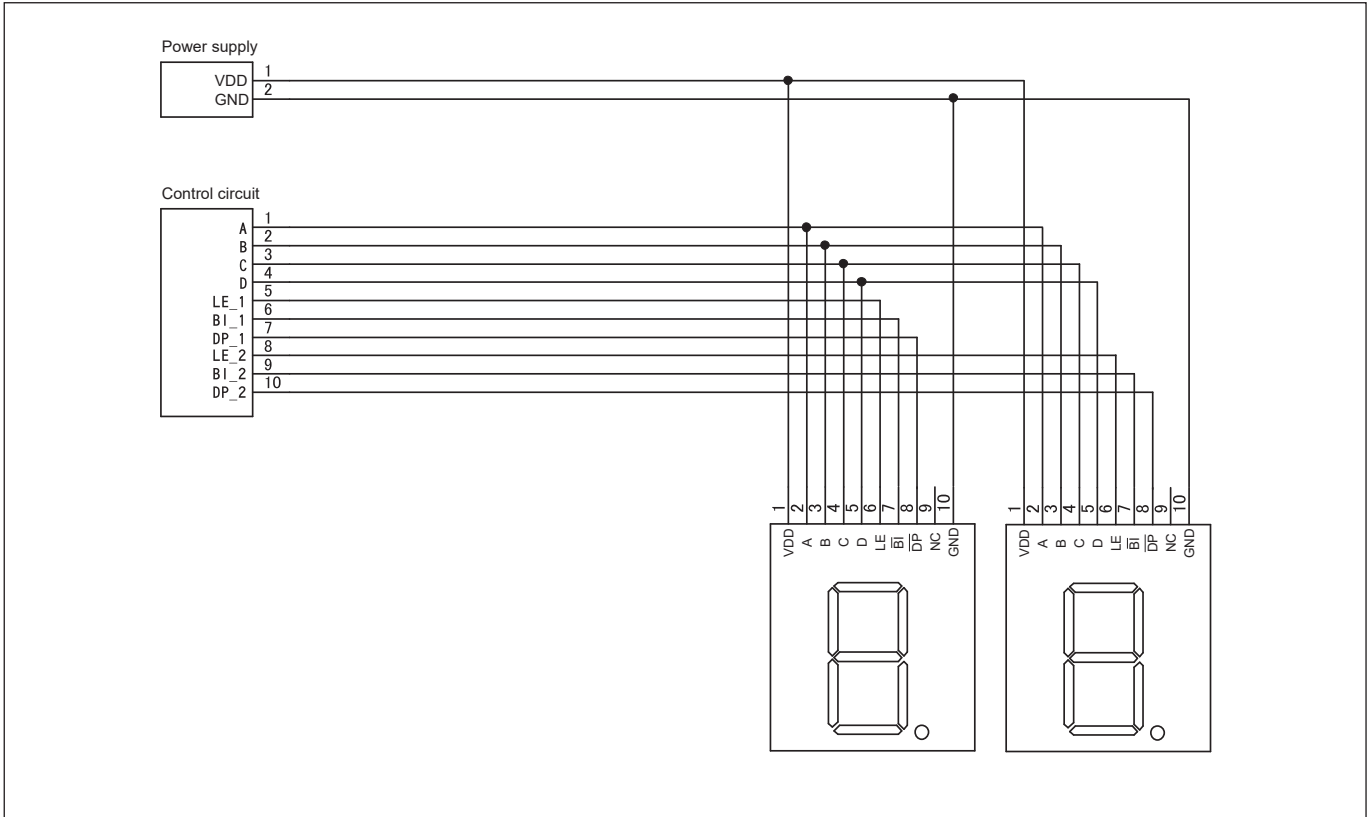
Circuit Diagram



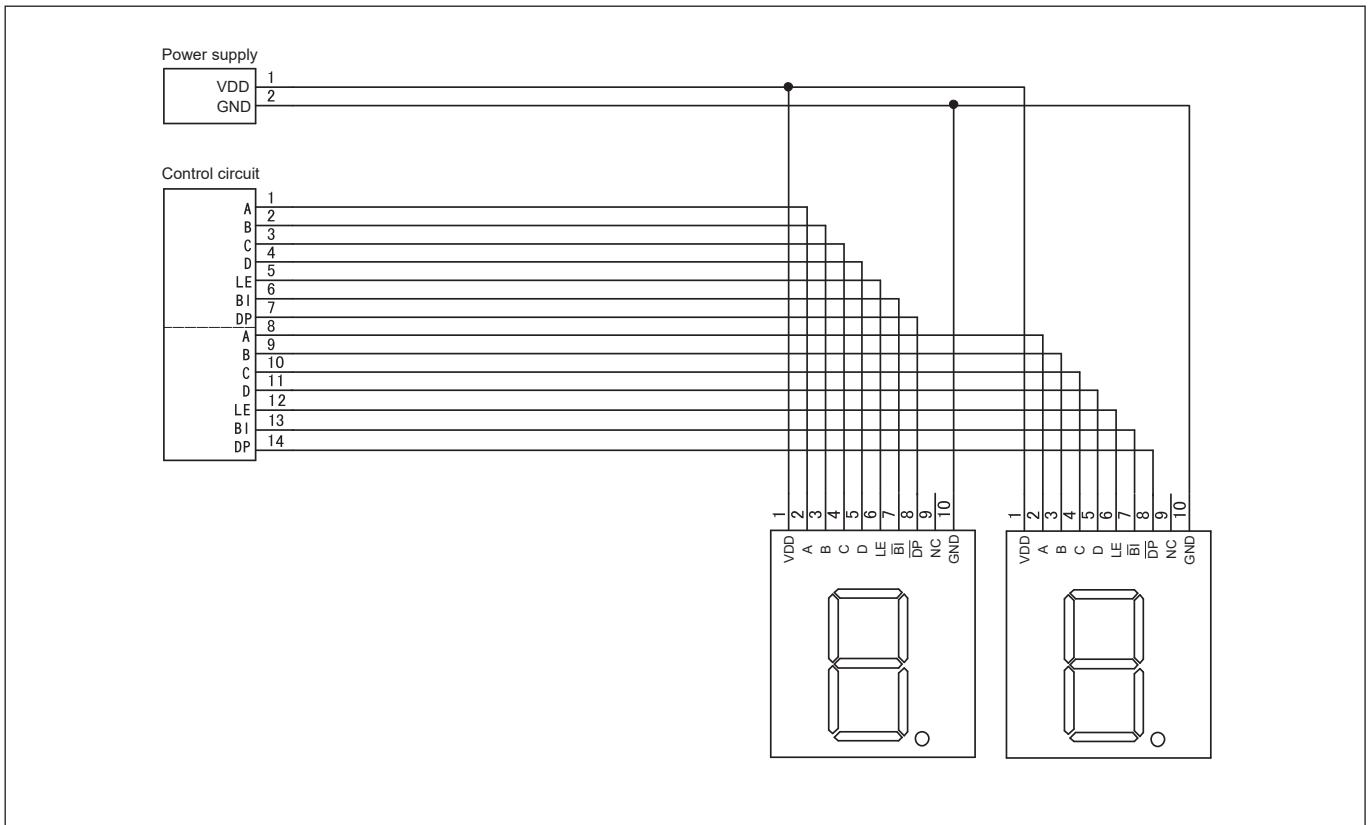
Tolerance : ± 0.4 mm

REFERENCE WIRING DIAGRAM

● BD-BN□□□ NUMERICAL unit (With circuit) Example of data common wiring



● BD-BN□□□ NUMERICAL unit (With circuit) Example of single wiring

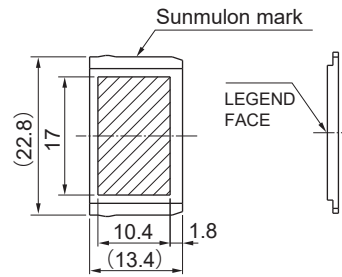


MOUNTING

1. Engraving on CHARACTER unit

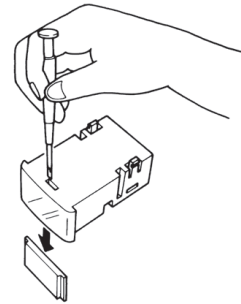
How to engrave by yourself.

- 1) Engrave on the black silk printing side.
The engraved area will allow light to pass through.
- 2) The possible engraving range is shown on the right.



2. Removing Legend plate

Insert a flat-head screwdriver or similar into the square hole and push the legend plate out.



PRECAUTIONS FOR CORRECT USE

When assembling the unit, insert the unit slowly and in parallel to avoid excess force on the case's pins and connector's pins.

※ For handling instructions and precautions other than the above, please refer to "Safety Precautions for All 7-Segment displays".

Tolerance : ± 0.4 mm

As of November 2023

Safety Precautions for All 7-Segment Displays

1. Notes on contents of Catalogs

- (1) Rated values, performance values, and specification values of Sunmulon products listed in this catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.
- (2) The ambient operating temperature(humidity) is guaranteed by evaluation based on characteristics, and does not guarantee continuous use for a long period of time near the upper or lower limit of the ambient operating temperature(humidity) or permanent use at that temperature(humidity).
- (3) Reference data and reference values listed in catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.
- (4) The specifications / appearance and accessories of Sunmulon products listed in catalogs are subject to change or termination of sales without notice, for improvement or other reasons.
- (5) The content of catalogs is subject to change without notice.

2. Note on applications

- (1) If using Sunmulon products in combination with other products, confirm the following suitability by yourself. Sunmulon shall provide no guarantees regarding the combination suitability.
 - (a) Regulations, standards, or laws to which your machinery, equipment, etc. must conform
 - (b) Functionality and safety of your machinery and equipment
- (2) Wiring and installation that ensures the Sunmulon product used in your system, machine, device, or the like can perform and function according to its specifications.
- (3) When using Sunmulon products, be cautious when implementing the following.
 - (a) Use of Sunmulon products with sufficient allowance for rating and performance.
 - (b) Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that Sunmulon product fails.
- (4) Sunmulon products are designed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use Sunmulon product for these applications, unless otherwise agreed upon between you and Sunmulon, Sunmulon shall provide no guarantees whatsoever regarding Sunmulon products.
 - (a) Safety devices intended for human body protection
 - (b) Direct control of transport equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.)
 - (c) Space equipment, submarine equipment
 - (d) Nuclear power control equipment, radiation related equipment
 - (e) Combustion equipment, electric heat equipment
 - (f) Disaster prevention and security equipment
 - (g) Elevating equipment
 - (h) Amusement facilities
 - (i) Facilities subject to government or industry regulations
 - (j) Use in applications that require a high degree of safety, any other equipment, instruments, or the like that could endanger life or human health

3. Warranty

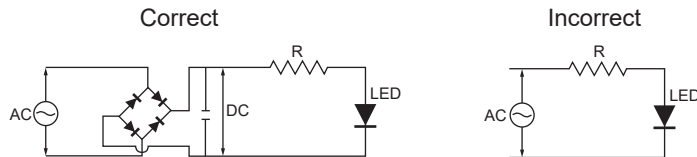
- (1) The warranty period for Sunmulon products shall be 1 year after purchase or delivery to the specified location.
- (2) Warranty scope should a failure occur in Sunmulon product during the above warranty period for reasons attributable to Sunmulon, then Sunmulon shall provide that product, free of charge, the same quantity. Further, in no event shall liability of Sunmulon exceed the individual price of the product on which liability is asserted.
- (3) Failures cause by the following reasons shall be deemed outside the scope of this warranty.
 - (a) The product was handled or used deviating from conditions / environment listed in the catalogs
 - (b) The failure was caused by reasons other than Sunmulon product
 - (c) Modification or repair was performed by a party other than Sunmulon
 - (d) Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and catalogs
 - (e) The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from Sunmulon
 - (f) The failure was due to other causes not attributable to Sunmulon (including cases of force majeure such as natural disasters and other disasters)
- (4) The warranty listed in this Safety Precautions is the full and complete warranty for Sunmulon products, and Sunmulon shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to Sunmulon product.

4. Handling precautions for 7-Segment display

- (1) Note that if the storage temperature range is exceeded, the product may not operate properly even if it is returned to within the specified operating temperature range.
- (2) Note that the LSI used internally may be destroyed by the floating or latch-up if each signal is input before the VDD is stabilized.
- (3) The power input and control signal sections are not equipped with protection circuits, so do not apply electrical stress such as power supply fluctuations (ripple currents and voltages), lightning surges, and noise reverse voltages.
If the element is damaged, it may cause smoke, fire, or burnout. Be sure to use with a protection circuit.
- (4) Wire the terminals with correct polarity. Connecting connectors backwards may cause a power short, resulting in burnout.
- (5) Turn off the power to the product before starting installation, removal, wiring, maintenance, or inspection. Failure to turn power off may cause electrical shock or fire.
- (6) Be careful of electrostatic breakdown when handling.

Safety Precautions for All 7-Segment Displays

- (7) Do not drop or otherwise apply strong force to the 7-Segment display.
- (8) Do not place heavy objects on the switch.
- (9) The product should be mounted on a solid surface.
- (10) Do not use the switch under loads that exceed the rated switching capacity or other contact ratings. Doing so may result in welding of the contact, or burnout accidents.
- (11) Assemble correctly according to the handling instructions. Do not assemble or disassemble the product other than as described in the catalog, as this may cause defects or accidents.
- (12) Illumination
 - (a) Do not apply a voltage between the LED terminal that is greater than the rated voltage. Doing so may damage the LED, cause lighting failure.
 - (b) LEDs cannot be lit directly by AC circuit should be provided rectifier smoothing circuit for products other than AC input type.



- (13) Wiring
 - (a) Avoid wiring input lines in parallel with high-voltage lines and power lines, and use ceded wires and metal tubes for noise suppression.
 - (b) When tightening terminals or connecting connectors, do not apply more force than necessary from the back side. Support the 7-Segment display with one hand as it may slip out of the front of the panel.
 - (c) Use the applicable connectors listed in the catalog for each model.
- (14) Terminology explained
 - (a) With or without Photocoupler The interface with the user side is isolated by specifying with photocoupler to prevent malfunction from noise. It is especially effective for long-distance transmission, which is vulnerable to noise. (AD series)
 - (b) Positive logic, Negative logic Applies to BCD code entry only. The input circuit is pulled up. When the user side indicates 0 on input with an open collector output circuit, a positive logic turns on all transistors for inputs A to D. Negative logic turns off all transistors for inputs A to D.
 - (c) Decoder driver This circuit converts the input of BCD code into a signal to drive 7-Segment LED.
 - (d) Data latch The 4 bits of data from A to D must be in the holding state. If LE is set to H (or open), the display will not change even if data comes in later.
 - (e) Data through The 4 bits of data from A to D must be in the read state. When LE is set to L (GND), the display changes as the data input changes.
- (15) Usage environment
 - (a) Do not use in the presence of flammable or explosive gases such as gasoline, thinner, LPG, etc.
 - (b) Avoid using the product in places where corrosive or silicon gas is generated, high temperature, high humidity, sea breeze or direct sunlight.
 - (c) Provide appropriate protection when using the product in places where it is exposed to water, oil, metal powder, or dust.
 - (d) Do not use the product in a place subject to vibration or shock. It may cause malfunction or damage.
 - (e) When installed in a close grouping or continuously lit, the ambient temperature may exceed the specified value due to heat generation. Take measures such as ventilation and lowering the operating voltage.
 - (f) When checking the actual equipment, load conditions and operating environment should be the same as the actual operating conditions.
 - (g) The ambient temperature for storage is -25°C to 65°C (No freeze, no condensation).
- (16) When wiping off dirt on the exterior of the 7-Segment display and accessories such as side plates, wipe lightly with a soft, dry cloth. Organic solvents such as thinner, benzene, alcohol, or other acidic chemicals may cause deformation, discoloration, or malfunction.
- (17) Store the product away from malignant gases, dust, high temperature and high humidity, and keep it in our packing condition.
- (18) Periodic inspection and replacement
 - (a) Although mechanical and electrical durability are listed in the specifications column, deterioration of various parts (deterioration of resins and corrosion of metal parts) is possible due to the operating environment and method of use. We ask that you implement inspections for Sunmulon products to prevent accidents from occurring by conducting periodic inspections and replacements.
- (19) Service scope
 - The price of Sunmulon products do not include the cost of services, such as dispatching technicians.