INSTRUCTION MANUAL

DC INPUT DIGITAL PANEL METER
(4 digits, process meter)

MODEL **40DV**

BEFORE USE ....

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact our sales office or representatives.

■ PACKAGE INCLUDES:

Digital panel meter (body + mounting bracket × 2).....(1)
Engineering unit sticker label sheet.....(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.
For detailed explanations to operate this product, please refer to Operating Manual (EM-9532-B), downloadable at our web site.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- This equipment is suitable for Pollution Degree 2, Measurement Category I (input, transient voltage 1500V) and Installation Category II (transient voltage 2500V). Reinforced insulation (input to power: 300V) is maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.
- In order to enable the operator to turn off the power input immediately, install a switch or a circuit breaker according to the relevant requirements in IEC 60947-2 and properly indicate it.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
  100 – 120V AC rating: 85 – 132V, 47 – 66 Hz, approx. 1.6VA
  200 – 240V AC rating: 170 – 264V, 47 – 66 Hz, approx. 1.0VA
  24V DC rating: 24V ±20%, approx. 0.5W

■ GENERAL PRECAUTIONS

- Before you remove the unit or mount it, turn off the power supply and input signal for safety.
- Be sure to put the terminal cover on while the power is supplied.

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.
- Be sure that the ventilation slits are not covered with cables, etc.

■ WIRING

- Make sure for safety that only qualified personnel perform the wiring.
- Do not install cables close to noise sources (high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ EX-FACTORY SETTING (/SET)

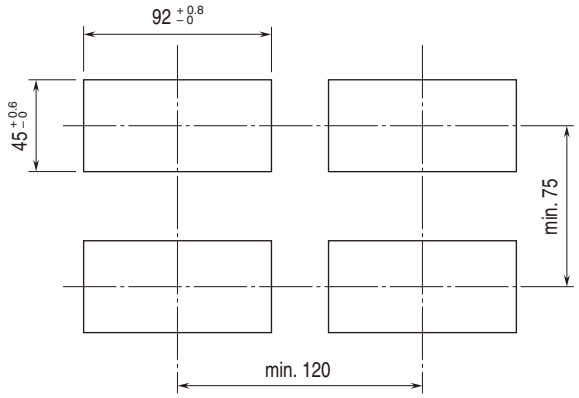
- Activating “initialization” of Display Setting Mode, Ex-factory settings or user’s specified parameters will be deleted and overwritten with the factory default values. Notice that after this, Ex-factory settings will be irrecoverable.

■ AND ....

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

INSTALLATION

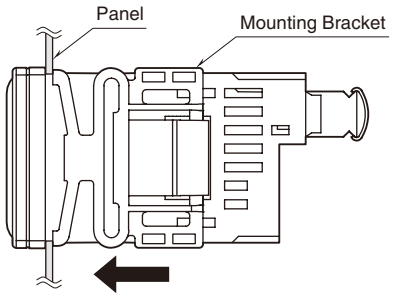
■ PANEL CUTOUT unit: mm



Panel thickness: 1.6 to 8.0 mm

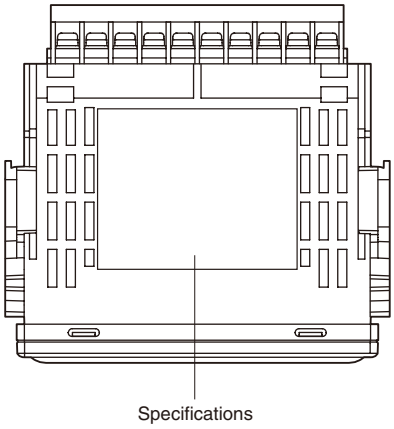
■ HOW TO MOUNT THE UNIT ON A PANEL

1) Insert the unit into the panel cutout.
2) Push the mounting brackets into the grooves on both sides of the rear module, until they hit the panel's rear side.

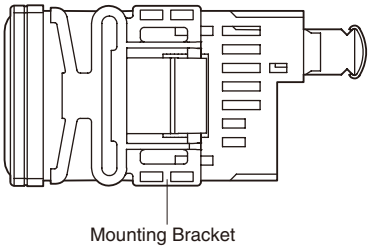


COMPONENT IDENTIFICATION

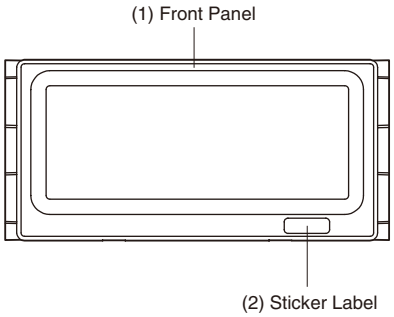
■ **TOP VIEW**



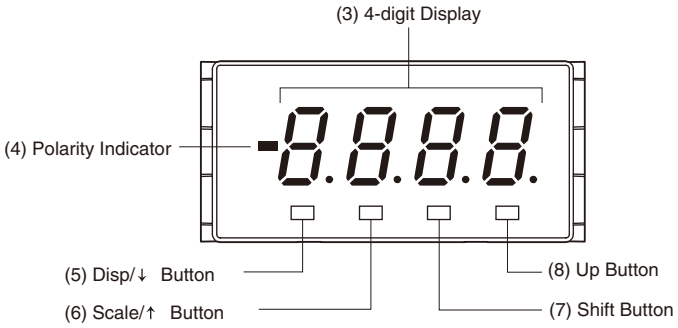
■ **SIDE VIEW**



■ **FRONT VIEW**



• **Front View without the Front Panel**

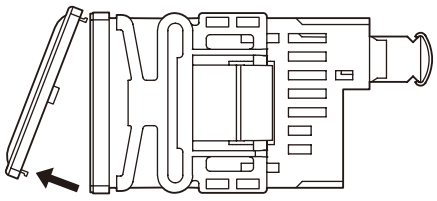


■ **COMPONENT IDENTIFICATION**

No.	COMPONENT	FUNCTION
(1)	Front Panel	Removed at configuration.
(2)	Sticker Label	Engineering unit label position
(3)	4-digit Display	4-digit LED display. Range: 0 to 9999 (not including decimal point)
(4)	Polarity Indicator	Turns on when negative value is displayed
(5)	Disp/↓ Button	Used to move on to the display setting modes; or to shift through setting items in each setting mode.
(6)	Scale/↑ Button	Used to move on to the scaling setting modes; or to shift through setting items in each setting mode.
(7)	Shift Button	Used to move on to the setting standby status and shift through display digits in each setting item.
(8)	Up Button	Used to select setting value.

■ **HOW TO REMOVE THE FRONT PANEL AT CONFIGURATION**

Hold up the front panel and remove it from downside.



■ **HOW TO MOUNT THE FRONT PANEL**

1) Insert the front panel hook into the case upside slots of the unit.

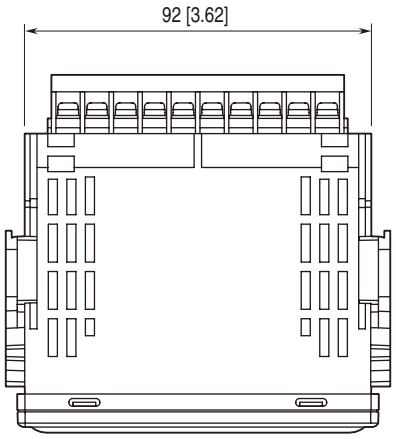
2) Push the front panel hook into the case downside slots of the unit.

TERMINAL CONNECTIONS

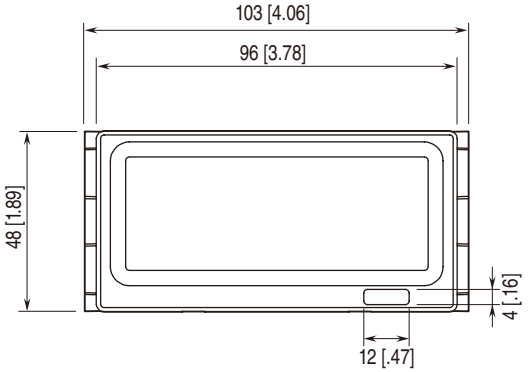
Connect the unit as in the diagram below or refer to the connection diagram on the top of the unit.

■ EXTERNAL DIMENSIONS unit: mm [inch]

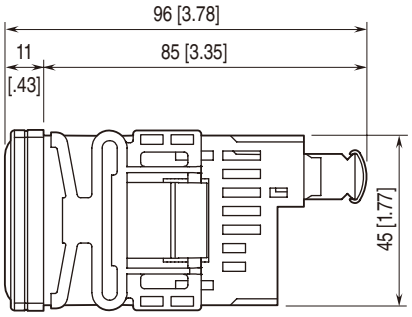
■ TOP VIEW



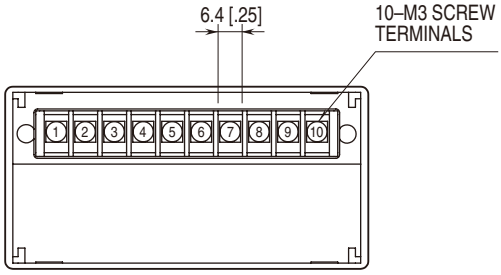
■ FRONT VIEW



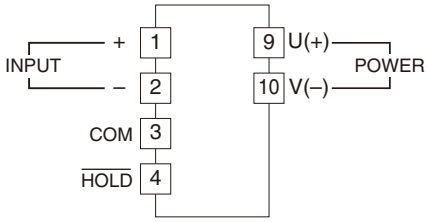
■ SIDE VIEW



■ REAR VIEW



■ CONNECTION DIAGRAM



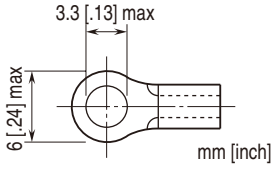
WIRING INSTRUCTIONS

■ SCREW TERMINAL

Torque: 0.6 N·m

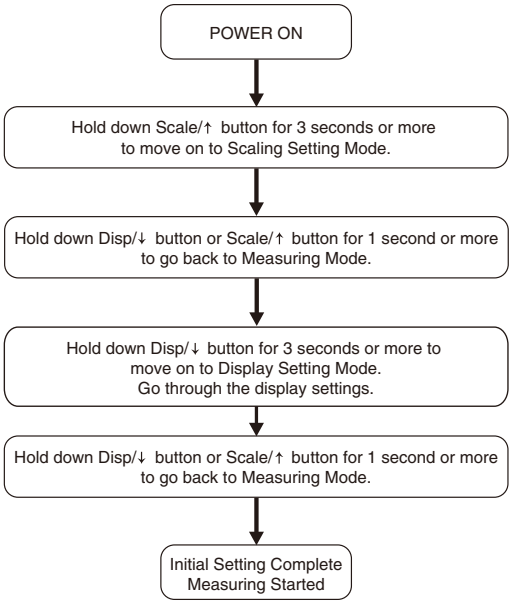
■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.
Applicable wire size: 0.25 to 1.65 mm² (AWG 22 to 16)
Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd

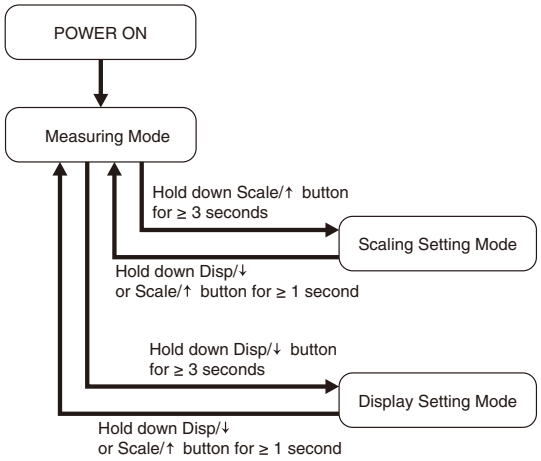


SETTING PROCEDURE

■ INITIAL SETTING FLOWCHART



■ GENERAL SETTING FLOWCHART



Note: For DC Voltmeter, or Current meter the initial setting is not necessary.

■ OPERATIONS IN SETTING MODES

• Display

4 digits numeric display including polarity display (referred hereafter as 'display') shows the current settings while the panel meter is in the setting mode.

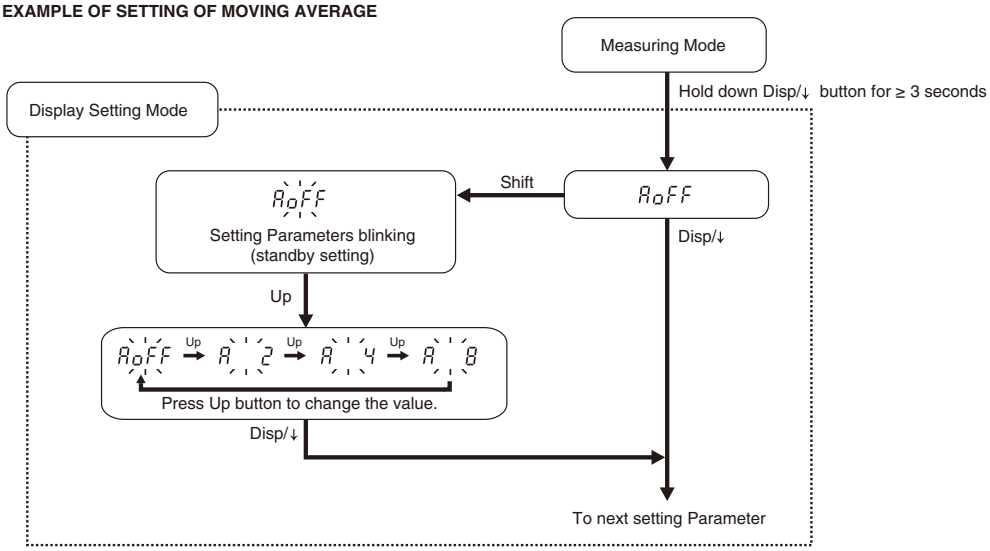
• Shifting through setting parameters

In any setting mode, pressing Disp/↓ button shifts one parameter to the next. Pressing Scale/↑ button shifts one to the previous.

• Changing parameters

Pressing Shift button while one of the parameter settings is indicated on the display shifts the panel meter into the setting standby mode. The digit to which you can apply changes starts blinking.
Press Up button to change the blinking value.
Press Shift button to go to the next digit.
Press Disp/↓ or Scale/↑ button to apply the new value and go to the next parameter setting.
If no operation continues more than one minute, while the parameter is blinking, it returns to the parameter before setting. Otherwise it returns to measuring mode.

■ EXAMPLE OF SETTING OF MOVING AVERAGE

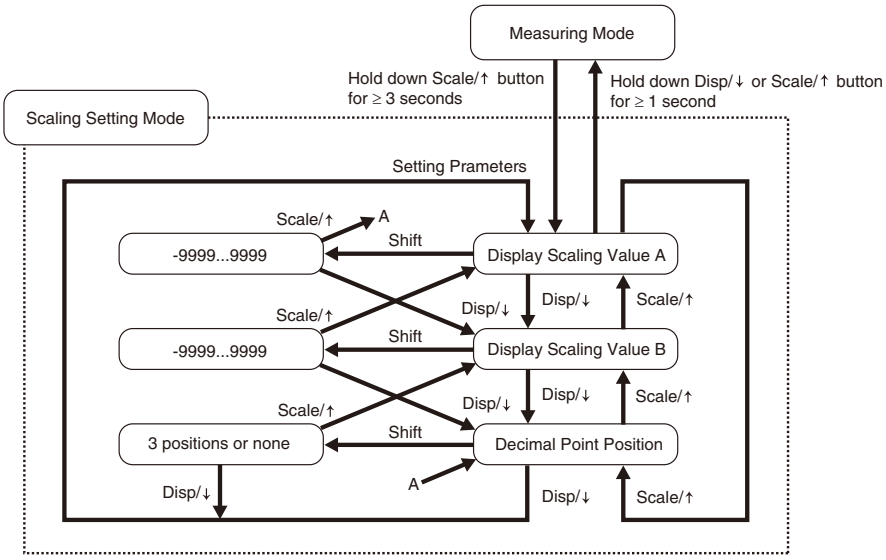


Note: For Scaling setting mode the method for using the Shift and Up button is the same as for canging the Setting Parameters.

• If you get lost...

Hold down Shift button for 3 seconds or more to return to the measuring mode without applying the last changes.
(Those which have been already applied by pressing Disp/↓ or Scale/↑ button are not canceled.)

■ SCALING SETTING MODE



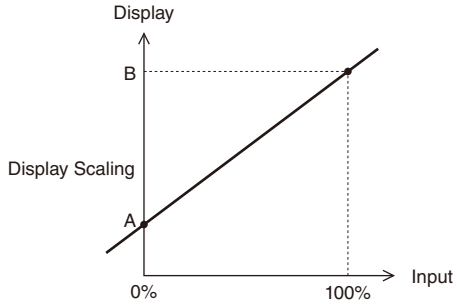
• PARAMETER LIST

PARAMETER	DISPLAY	FUNCTION	INPUT CODE	DEFAULT VALUE
Display Scaling Value A	-9999 ... 9999	Display value for measurement range 0%*1 To distinguish from B, the first decimal point is blinking.	A1	-199.9
			A2	-1.999
			A3	-19.99
			A4	-199.9
			A5	-1.999
			A	04.00
			V1	-199.9
			V2	-1.999
			V3	-19.99
			V4	-199.9
			V5	-0600
			6	0 1.00
Display Scaling Value B	-9999 ... 9999	Display value for measurement range 100% *1	A1	199.9
			A2	1.999
			A3	19.99
			A4	199.9
			A5	1.999
			A	20.00
			V1	199.9
			V2	1.999
			V3	19.99
			V4	199.9
			V5	0600
			6	05.00
Decimal Point Position	10^{-1}, 10^{-2}, 10^{-3} or none	Decimal point position	A1	8888
			A2	8.888
			A3	88.88
			A4	888.8
			A5	8.888
			A	88.88
			V1	888.8
			V2	8.888
			V3	88.88
			V4	888.8
			V5	8888
			6	88.88

*1. Measurement range 0 %, 100 % refers min. and max. value per each input signal code.
E.g. for A3: ±19.99 mA, measurement range 0 % = -19.99 mA, measurement range 100 % = 19.99 mA.

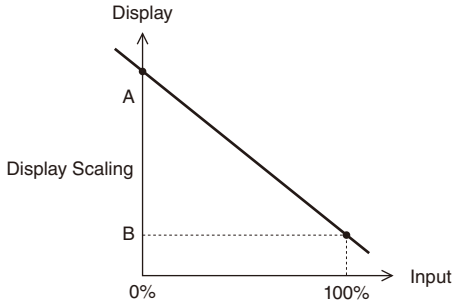
• Normal Scaling

The display value increases when the input signal increases.



• Inverted Scaling

The display value decreases when the input signal increases.



The decimal point position can be set to any digit. Set it according to the 100% value.

• Scaling settings

Set scaling the range between -9999 to +9999 for measurement range (conformance range). Display scaling value has two types, A and B. Decimal point can be set at any place.

· Display scaling A is the display value for measurement range 0% (min. value).
· Display scaling B is the display value for measurement range 100% (max. value).
· Set display scaling decimal point commonly for the display scaling value A and B.

Example) Input signal code A3: For display value ±19.99 mA, 0.0 to 100.0%

Measurement range 0%:	-19.99 mA DC
Measurement range 100%:	+19.99 mA DC
Display scaling value A:	0.0%
Display scaling value B:	100.0%
Display scaling decimal point:	888.8 (one place of decimal)

When input signal is other than measurement range (e.g. input signal code A3: ±19.99 mA DC is used for 0 to 10 mA DC), obtain the value parallel shifted from intended display value for the input signal to measurement range 0% and 100%. Set the obtained value as the display scaling value A and B. In next paragraph, how to calculate the display scaling value A and B when input signal is other than measurement range.

■ SCALING EXAMPLES

• Example 1: 40DV-A3-x

Input: 0 – 20 mA
Desired display value: 0.0 – 100.0
Measurement range: ±19.99 mA

1) Calculate “Display Scaling Value A” with following formula.

SA = (Rz × Dspan + Dz × Is – Ds × Iz) / Ispan

= [-19.99 × (1000 – 0) + 0 × 2000 –1000 × 0]
/ (20 – 0)

= -999.5 ≈ -1000 (round off)

SA: Display Scaling Value A
Iz: 0% value of input
Is: 100% value of input
Dz: Display value for 0% input
Ds: Display value for 100% input
Rz: 0% value of conformance range
Dspan: Display span (Ds - Dz)
Ispan: Input span (Is - Iz)

In the above formula, decimal points for desired display value are omitted as following.
0.0 – 100.0 → 0 – 1000

From the above calculation, the Display Scaling Value A is “-1000”

2) Calculate “Display Scaling Value B” with following formula.

SB = (Rs × Dspan + Dz × Is – Ds × Iz) / Ispan

= [19.99 × (1000 – 0) + 0 × 2000 – 1000 × 0]
/ (20 – 0)

= 999.5 ≈ 1000 (round off)

SB: Display Scaling Value B
Rs: 100% value of conformance range

From the above calculation, the Display Scaling Value B is “1000”

3) Set scaling with the above parameters.

According to the display value, 0.0 – 100.0, set decimal point at the second position from LSD.

• Example 2: 40DV-V3-x

Input: 0 – 5 V
Desired display value: -5.00 – +5.00
Measurement range: ±19.99 V

1) Calculate “Display Scaling Value A” with following formula.

SA = (Rz × Dspan + Dz × Is – Ds × Iz) / Ispan

= [-19.99 × (500 + 500) – 500 × 5 – 500 × 0]
/ (5 – 0)

= -4498

In the above formula, decimal points for desired display value are omitted as following.
-5.00 – +5.00 → -500 – +500

From the above calculation, the Display Scaling Value A is “-4498”

2) Calculate “Display Scaling Value B” with following formula.

SB = (Rs × Dspan + Dz × Is – Ds × Iz) / Ispan

= [19.99 × (500 + 500) – 500 × 5 – 500 × 0]
/ (5 – 0)

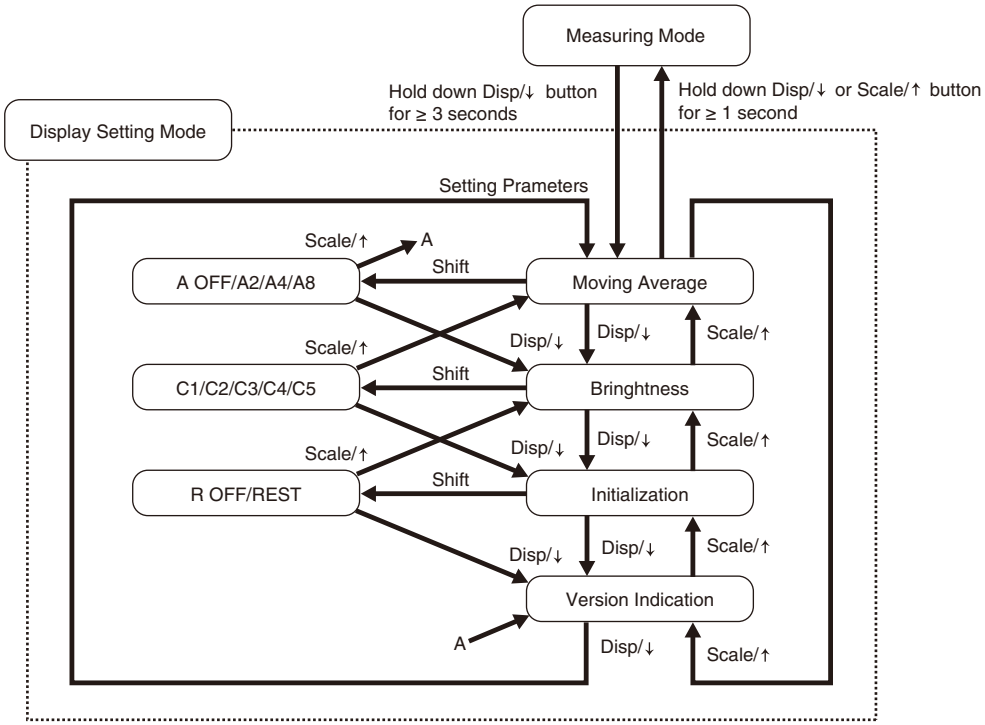
= 3498

From the above calculation, the Display Scaling Value B is “3498”

3) Set scaling with the above parameters.

According to the display value, -5.00 – +5.00, set decimal point at the third position from LSD.

■ DISPLAY SETTING MODE



• PARAMETER LIST

PARAMETER	DISPLAY	FUNCTION	DEFAULT VALUE
Moving Average	AoFF	No moving averaging	AoFF
	A 2	Moving average with 2 samples	
	A 4	Moving average with 4 samples	
	A 8	Moving average with 8 samples	
Brightness	C 1	Brightness level 1 (dark)	C 5
	C 2	Brightness level 2	
	C 3	Brightness level 3	
	C 4	Brightness level 4	
	C 5	Brightness level 5 (bright)	
Initialization	roFF	Non-initialization	roFF
	rESt	Initialize settings (change to factory settings) *1	
Version Indication	–	Version number, indication only	–

*1. While "rESt" is shown, pressing Disp/↓ button or Scale/ ↑ button initializes settings.

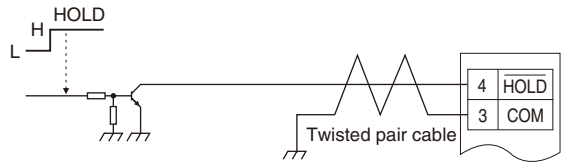
Activating "initialization" , user's specified parameters will be deleted and overwritten with the factory default values. Notice that after this, Ex-factory settings will be irrecoverable.

DISPLAY HOLD COMMAND

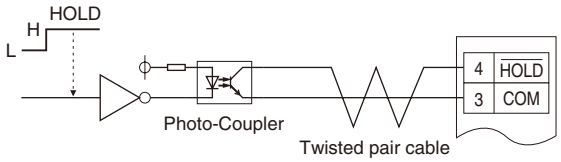
Displayed value is held with an external HOLD command input. Connect the contacts across $\overline{\text{HOLD}}$ to COM.

• WIRING EXAMPLES

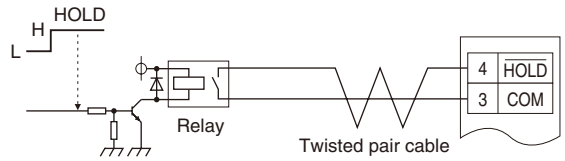
(a) Transistor



(b) Photo-Coupler



(c) Relay



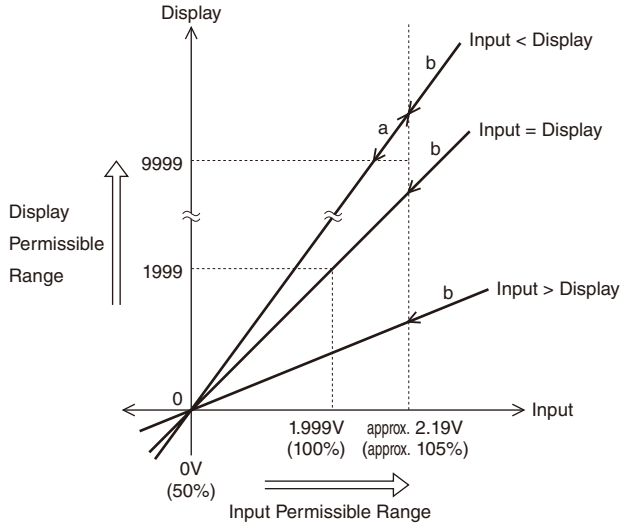
Terminals 3 and 4 are NOT isolated from the internal circuit.

ERROR MESSAGES

DISPLAY	ERROR MESSAGE	WHAT TO DO
S.Err blinking	The input signal is out of the permissible range.	Set the input signal within the permissible range.
-9999 or 9999 blinking	The value after scaling is out of the permissible display range.	Set the input signal within the permissible range.

Note: While an external HOLD command is input, the display keeps the value at the HOLD command turning on, even though the input is out of range.

■ INPUT AND ERROR CORRELATION (e.g. 1.999V input)



a: 9999 blinking
If the value to display after scaling is out of the permissible range, the maximum (9999) or minimum (-9999) value.
b: S.ERR blinking
If the input signal is out of the permissible range, the indicator will blink “S.ERR”.

CHARACTER SET

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F	G	H	ı	J	K	L	n̄	n	o	P	q	r	S	t	U	u	y̆	ū	y	Z

LIGHTNING SURGE PROTECTION

We offer a series of lightning surge protectors for protection against induced lightning surges. Please contact us to choose appropriate models.