TECHNILL
Industrial Automation

CONOTEC® Digital Temperature Controller

CONOTEC CO., LTD. www.conotec.co.kr

Instruction Manual FOX-DM2



- 8 step input range
- User scale functions
- Decimal position setting
- Zero and Span correction
- True RMS measured at AC

1 Safety Precautions

Please read the cautions carefully before use for proper handling.
※ Specification and dimension specified in this manual is subject to change without notice for the improvement of product performance.

⚠ Warning

1. This product was not made as safety equipment, thus when you use this product for control equipment that may cause the damage of important peripherals and big property loss, you need to use it after attaching safety equipment.
2. Do not make wiring, inspection or repair when the power is turned on.
3. When you connect the power, make sure to check terminal numbers.
4. Never disassemble, process, improve or repair the product.

⚠ Cautions

- Please be well informed of method of use and safety precautions or warning before installation, and make sure to use the product as per the related specification or within related capacity.
- Do not make any wiring or installation at the motor or solenoid that has big inductive load.
- When you extend the sensor, use shielding wire and do not extend more than necessary.
- Do not use the parts that generate the arc when opening and closing same power directly.
- Keep the power line away from high-voltage line and do not install at the place where there are lots of water, oil or dust.
- Do not install at the place exposed to the direct sunlight or rain.
- Do not install at the place where there is strong magnetism, noise, vibration or impact.
- Keep it away from strong alkaline or acidic materials and use independent pipes.
- When you install it at the kitchen, do not sprinkle the water directly for cleaning.
- Do not install at the place where rated temperature/humidity exceeds.
- Be careful not to cut sensor wire or make any scratches on it.
- Keep sensor wire away from signal wire, power or load line and use independent pipes.
- Please note that if you disassemble or modify the product, maintenance cannot be made.
- ⚠ mark at wiring diagram is the safety phrase like warning or caution.
- Do not use the product near to the equipment that generates strong high-frequency noise (high-frequency welder, high-frequency sewing machine, high-frequency radio, large capacity SCR controller).
- Keep it out of reach of children since it is not a toy.
- We are not responsible for any damage or loss caused by not observing the contents specified in above warnings or cautions or due to the mistake of the user.

⚠ Danger

■ Caution, Danger of electric shock

- Electric shock – Do not contact AC terminal when turning on electric current. You may get electric shock.
- When you inspect input power, make sure to turn off the power.

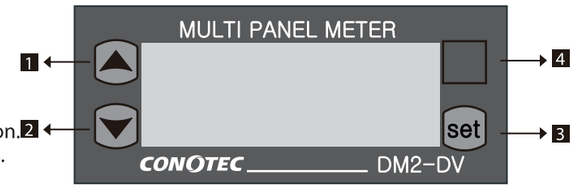
2 Model compositions

DM 2 - DV

Measure input specification	DV	DC Voltage
	DA	DC Ampere
	AV	AC Voltage(True RMS)
	AA	AC Ampere(True RMS)
External	2	DIN SIZE 76 X 35
	DM	Digital Multi Meter

3 Name of each component

■ Exterior of the product and name of each component



1 A set value increases (UP key)

2 A set value decreases (DOWN key)

3 To enter the settings mode and change their values

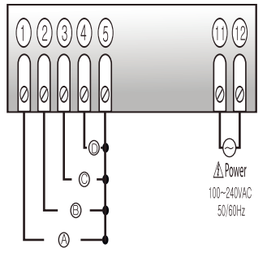
4 This is where the measurement unit sticker is attached

When the set key is pressed for more than 5 seconds or when there are no key inputs for longer than 1 minute, the input data are automatically stored and the instrument returns and gets ready for measurement.

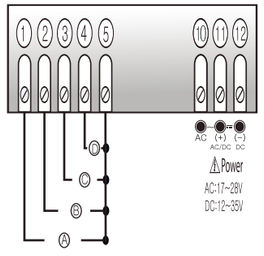
4 Terminal wiring diagram

■ Input terminals connection diagram

ex) FOX-DM2-AV

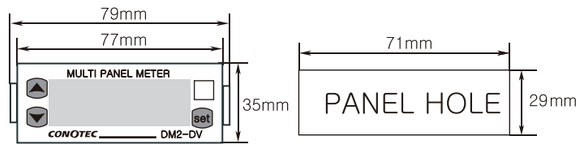


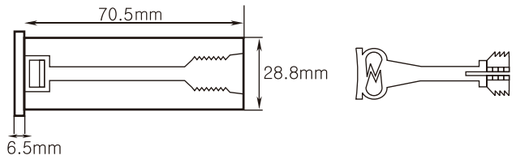
FOX-DM2-AV-D



terminal / Model	Ⓐ	Ⓑ	Ⓒ	Ⓓ
DM2-AV	600V/300V	100V/50V	20V/10V	2V/1V
DM2-AA	5A/2.5A	1A	500mA/250mA	100mA/50mA
DM2-DV	800V/160V	50V/10V	5V/1V	250mV/50mV
DM2-DA	5A/2A	500mA/200mA	50mA/20mA	5mA/2mA

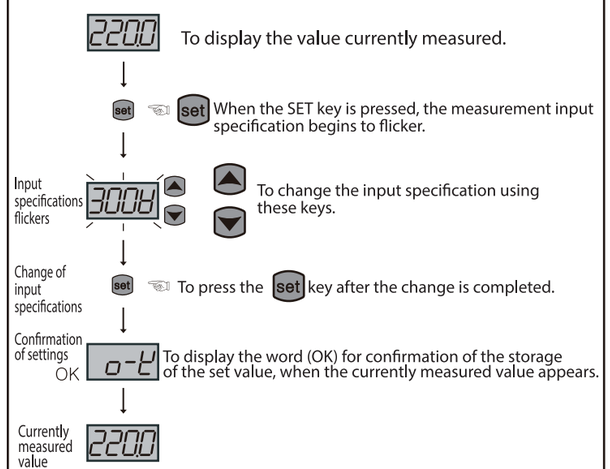
5 Exterior and panel processing dimensions





6 Sequence of changing settings

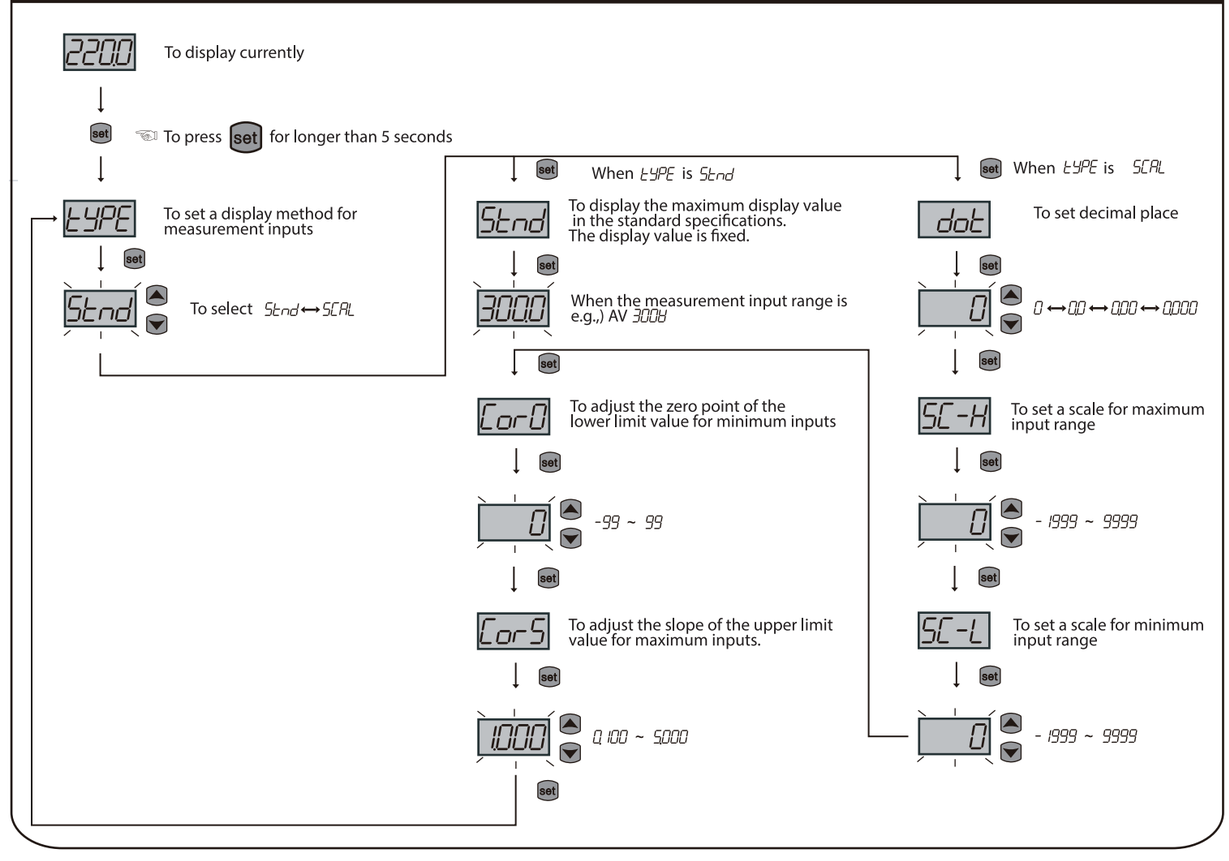
Setting of measurement input specifications



<Measurement input specifications table for each model>

Model	Measurement input range
DM2-AV	600V ⇄ 300V ⇄ 100V ⇄ 50V ⇄ 20V ⇄ 10V ⇄ 2V ⇄ 1V
DM2-AA	5A ⇄ 2.5A ⇄ 1A ⇄ 0.5A ⇄ 0.25A ⇄ 0. 1A ⇄ 50mA
DM2-DV	800V ⇄ 160V ⇄ 50V ⇄ 10V ⇄ 5V ⇄ 1V ⇄ 0.25V ⇄ 50mV
DM2-DA	5A ⇄ 2A ⇄ 0.5A ⇄ 0.2A ⇄ 50mA ⇄ 4-20 ⇄ 5mA ⇄ 2mA

How to set program



7 Detailed description of functions

Measurement input and range table

	Measurement input range		Display range [Stnd]	Scale's range [SCAL]
DC voltage	0 ~ 800V	[800V]	0.0 ~ 800.0(Fixed)	
	0 ~ 160V	[160V]	0.0 ~ 160.0(Fixed)	
	0 ~ 50V	[50V]	0.00 ~ 50.00(Fixed)	
	0 ~ 10V	[10V]	0.00 ~ 10.00(Fixed)	
	0 ~ 5V	[5V]	0.000 ~ 5.000(Fixed)	
	0 ~ 1V	[1V]	0.000 ~ 1.000(Fixed)	
	0 ~ 250mV	[0.25V]	0.00 ~ 250.0(Fixed)	
	0 ~ 50mV	[50mV]	0.00 ~ 50.00(Fixed)	
DC current	0 ~ 5A	[5A]	0.000 ~ 5.000(Fixed)	
	0 ~ 2A	[2A]	0.000 ~ 2.000(Fixed)	
	0 ~ 500mA	[0.5A]	0.0 ~ 500.0(Fixed)	
	0 ~ 200mA	[0.2A]	0.0 ~ 200.0(Fixed)	
	0 ~ 50mA	[50mA]	0.00 ~ 50.00(Fixed)	
	4 ~ 20mA	[4-20]	4.00 ~ 20.00(Fixed)	
	0 ~ 5mA	[5mA]	0.000 ~ 5.000(Fixed)	
	0 ~ 2mA	[2mA]	0.000 ~ 2.000(Fixed)	
AC voltage	0 ~ 600V	[600V]	0.0 ~ 600.0(Fixed)	
	0 ~ 300V	[300V]	0.0 ~ 300.0(Fixed)	
	0 ~ 100V	[100V]	0.0 ~ 100.0(Fixed)	
	0 ~ 50V	[50V]	0.00 ~ 50.00(Fixed)	
	0 ~ 20V	[20V]	0.00 ~ 20.00(Fixed)	
	0 ~ 10V	[10V]	0.00 ~ 10.00(Fixed)	
	0 ~ 2V	[2V]	0.000 ~ 2.000(Fixed)	
	0 ~ 1V	[1V]	0.000 ~ 1.000(Fixed)	
AC current	0 ~ 5A	[5A]	0.000 ~ 5.000(Fixed)	
	0 ~ 2.5A	[2.5A]	0.000 ~ 2.500(Fixed)	
	0 ~ 1A	[1A]	0.000 ~ 1.000(Fixed)	
	0 ~ 500mA	[0.5A]	0.0 ~ 500.0(Fixed)	
	0 ~ 250mA	[0.25A]	0.0 ~ 250.0(Fixed)	
	0 ~ 100mA	[0.1A]	0.0 ~ 100.0(Fixed)	
	0 ~ 50mA	[50mA]	0.00 ~ 50.00(Fixed)	

dot	Display range
0	- 1999 ~ 9999
0.0	- 1999 ~ 9999
0.00	- 1999 ~ 9999
0.000	- 1999 ~ 9999

* The display range varies depending on the placement of decimal points.

* Choose and make connection to an input terminal whose maximum measurement input falls within its 30~100% range. If an input is larger than the allowable value of the input terminal, it may subject to damage to the terminal or will exceed the display range. If the connection is made to an input terminal whose maximum measurement input falls below its 30%, the precision gets deteriorated.

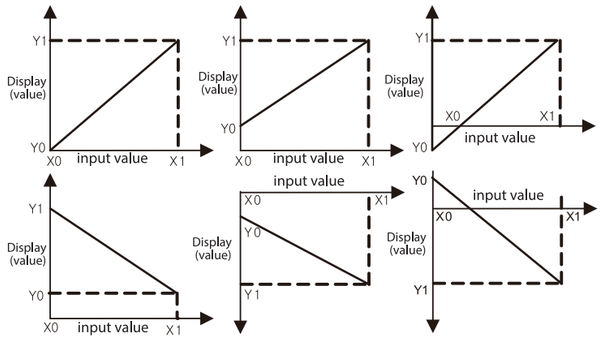
Error messages

Sign	Description
ñ-HH	When a measurement input value exceeds 110% of its maximum permissible input value
ñ-LL	When a measurement input value exceeds -10% of its minimum permissible input value
I -HH	When a measurement input display value exceeds its maximum display range of 9999 or the preset SC-H value
I -LL	When a measurement input display value exceeds its minimum display range of -1999 or the preset SC-L value

* If the Error is within the measurement range or display range is automatically cancelled.
* ñ-LL is displayed only 4 ~ 20mA if the measuring input specification and DC input polarity is reversed.

PreScale function [SC-H / SC-L]

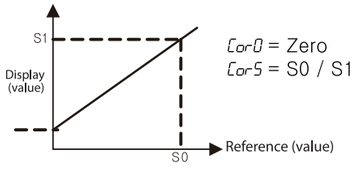
This function shows an arbitrary upper/ lower limit (-1999~9999) for measurement inputs to be displayed.
Assuming measurement inputs are X0 and X1 and any values to be displayed are Y0 and y1, inputs X0, X1 can be linearly displayed as Y0=X0, Y1=X1, as shown in the diagram.



Error compensation function [Cor0 / Cor5]

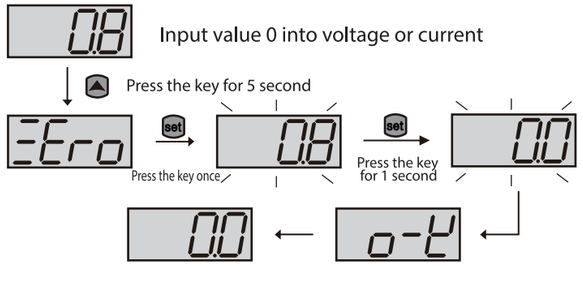
When there are errors among instruments due to differences between input sources and meters, their errors can be reduced through Zero and Span compensations.

1. The Cor0 function uses the difference between maximum input value and maximum display value to compensate for the zero point. For example, when the scale is set to be 0.0 ~ 600.0 and 1.2V is displayed at an input source of 0V, the value for Cor0 is set at 12.
2. The Cor5 function serves to compensate for the maximum value. [Compensation of the slope (%) of the High value] For example, when the scale is 0.0 ~600.0 and a measurement input is 600V which is actually displayed to be 498.0V, the Cor5 is to be re-set at the rate of 1.205 (= 600/498), in which case the slope of the displayed High value is adjusted to show a display value of 600.0

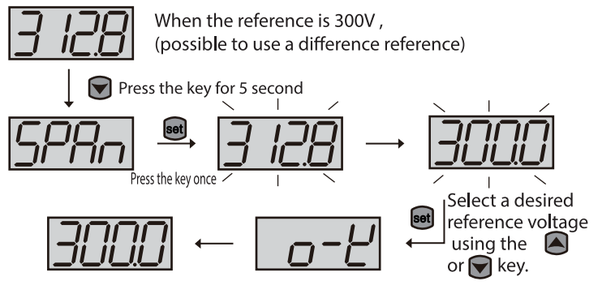


Automatic error compensation

Zero point calibration



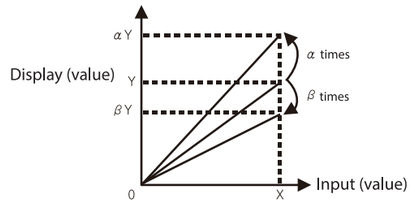
Slope adjustment function



* The auto-adjusted zero point is stored in the Cor0 , and the auto-adjusted slope value is stored in the Cor5 .

Slope adjustment function [Cor5]

1) This function serves to adjust the slope of a basic display value(Stnd) or a scale value (SCAL). The Y value that is the display value of an input value X can be displayed on the graph adjusted by α times or β times using the slope adjustment (Cor5) function, as shown in Graph Ga).

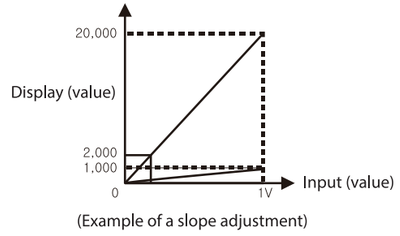


(Graph Ga)

2) This function also serves to compensate for the maximum display value(SC-H). The adjustment range is 0.100 ~ 5.000 and adjustment can be done by multiplying the current slope value.

Ex) When DM2-AV reads AC100mV which has a slope of 2.000

① Use [1V] to set the measurement input specification.
② When in the standard mode [Stnd], the maximum measurement for [1V]is 1.000. In order to display 2.000 at AC100mV, the maximum [SCAL] display value [SC-H] must be 20.000. However, the maximum settable value is up to 9.999 which is unable to accommodate the value.
③ In this case, a setting should be made to produce
SC-H X Cor5 =20,000
(SC-H = 5,000 , SC-L = 0.000 , Cor5 = 4.000)



(Example of a slope adjustment)

8 Setting ranges and default settings at the time of shipment

Display	Function	Range	At default	Note
tYPE	To set display type	Stnd / SCAL	Stnd	Stnd : Basic display range SCAL : Change of display range
Stnd	Basic display range			When in Stnd , max. value is displayed
dot	To set decimal points	0 / 0.0 / 0.00 / 0.000	0	Displayed only in SCAL mode
SC-H	To set maximum value	- 1999 ~ 9999	0	
SC-L	To set minimum value	- 1999 ~ 9999	0	
Cor0	To compensate for lower limit	-99 ~ 99	0	Zero
Cor5	To compensate for upper limit	0.100 ~ 5.000	1.000	Span

9 Specifications/ performance

Power supply	100 ~ 240VAC 50/60Hz
Power consumption	5VA
Operating temp.	0 ~ 50℃
Operating humidity	35 ~ 85%RH
Storage Temperature	-10 ~ 70℃
Input signal	Input from instrument signals in current or voltage
A/D conversion method	Successive approximation method (SAR)
Sampling cycle	16.6ms(AC 60Hz),50ms(DC)
Max. display range	-1999 ~ 9999(4 digits)
Display part	7 segment LED, letter height 14mm
AC measurement method	Root mean square (True RMS)
Polarity display	When DC input signals are reversed, "-" sign is automatically given

10 How to diagnose a breakdown

- Indicating ERROR on using items

▪ This ER1 is the damage of memory data for various of inner-DATA due to b got nosied strongly from outside while using this items. Please test us A/S by return in case of Er-2 . Because the storage device damaged in the initial calibration DATAAlthough our controller is designed as the complimentary measures regarding these noise from outside, it is not endurable against these noise with endlessly.

※ The specifications of the product are subject to change without a prior notice to improve the performance of the product.
Please comprehend the contents specified in the above precautions, and observe them without fail.

※ Regarding the English-language manual, please download it at our homepage.

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※ This device works proper operation with;
surrounding Temp. : 0℃ ~ 60℃
surrounding Humi. : below 80%Rh
Regular : 100~240VAC 50/60Hz