

Autonics PANEL METER MT4N SERIES

M A N U A L



Upgrade feature



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

- *Please keep these instructions and review them before using this unit.
- *Please observe the cautions that follow:
 - Warning** Serious injury may result if instructions are not followed.
 - Caution** Product may be damaged, or injury may result if instructions are not followed.
- *The following is an explanation of the symbols used in the operation manual.
 - Caution:** Injury or danger may occur under special conditions.

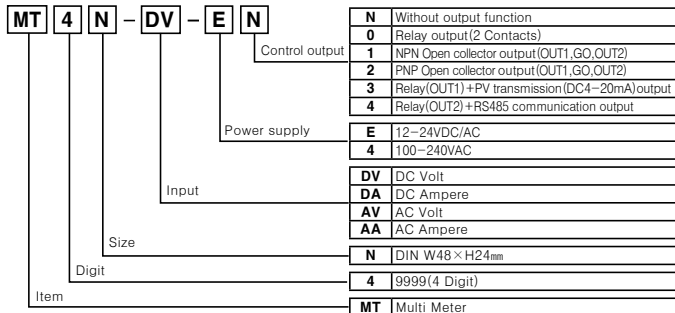
Warning

- In case of using this unit with machinery(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device. It may cause a fire, human injury or property loss.
- It must be mounted on panel. It may give an electric shock.
- Do not connect, inspect or repair terminals when it is power on. It may give an electric shock.
- Do not disassemble or modify this unit. If needs, please contact us. It may cause a fire and give an electric shock.
- Please check the number of terminal when connecting power or measured input. It may cause a fire.

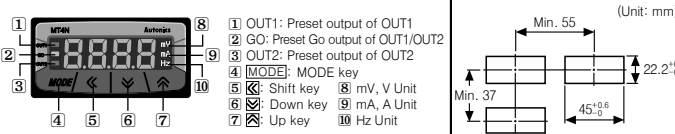
Caution

- This unit shall not be used outdoors. It might shorten the life cycle of the product or give an electric shock. Use this product indoors only. Do not use the product outdoors or at locations subject to the temperatures or humidity outside. (Example: rain, dirty, frost, sunlight, condensation, etc.)
- When connecting wire, use AWG 20(0.50mm) be used and tighten screw bolt on terminal block with 0.74 to 0.90N·m strength. It may cause a malfunction or fire due to contact failure.
- Please observe the rated specification. It might shorten the life cycle of the product and cause a fire.
- Do not use beyond of the rated switching capacity of relay contact. It may cause insulation failure, contact melt, contact failure, relay broken and fire etc.
- In cleaning the unit, do not use water or an oil-based detergent. It may cause a fire and give an electric shock.
- Do not use this unit in place where flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration or impact, etc. exists. It may cause a fire or explosion.
- Do not inflow dust or wire dregs into the unit. It may cause a fire or mechanical malfunction.
- Please wire properly after checking the polarity of measuring terminals. It may cause a fire or explosion.

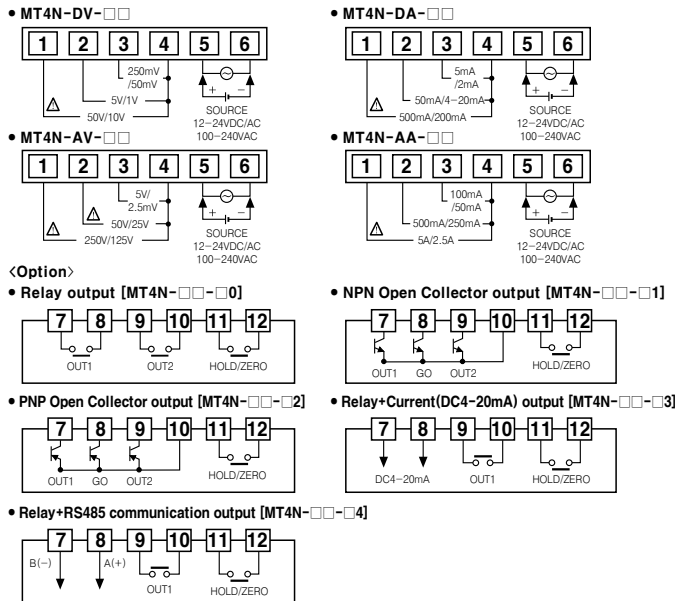
Ordering information



Front panel identification



Terminal connection



Prescale function[PA1: H-5C/L-5C mode]

This function is to display setting(1999 to 9999) of particular High/Low-limit value in order to display High/Low-limit value of measured input. If measured inputs are 'a' and 'b' and particular values are 'A' and 'B', it will display a=A, b=B as below graphs.

Display Input value

Display Input value

Display Input value

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Error display function

Display	Description
HHHH	Flashes when measured input is exceeded the max. allowable input (110%).
LLLL	Flashes when measured input is exceeded the min. allowable input (10%).
d-HH	Flashes when display input is exceeded H-5C setting value
d-LH	Flashes when display input is exceeded L-5C setting value
F-HH	Flashes when input frequency is exceeded the max. display value of measuring range
oUEr	Flashes when it exceeds zero range (±99)
* Zero adjusting error is returning to measuring mode after [oUEr] flashes twice.	
* Refer to "Measuring AC frequency function" for frequency measuring range.	

Initialization function

It initializes parameter setting state. Press [Shift]+[Up] keys simultaneously for over 5 sec. in RUN status, it returns to factory default value.

Ex) RUN [Shift]+[Up] Press for over 5 sec.

Display cycle delay function [PA2: d1 5L mode]

In some applications the measured input may fluctuate which in turn causes the display to fluctuate. By adjusting the display cycle delay function time in the d1 5L mode in parameter 2, the operator can adjust the display time within a range of 0.1 sec to 5 sec. For example, if the operator sets the display cycle time to 4.0 sec., the display value displayed will be the average input value over 4 sec. and also will show any changes if any every 4 sec.

Startup compensation timer function [PA2: 5cRL mode]

This time function limits the operation of an output until the measured input (overvoltage or inrush current) is stable at moment of power on. All outputs are off during startup compensation time setting after power is applied.
Setting range: 00.0 to 99.9 (Unit: sec.) Factory default: 00.0
* The above specifications are subject to change without notice.

Specifications

Model	MT4N
Power supply	12~24 VDC/AC
Power consumption	DC: 3W, AC: 5VA
Display method	7 Segment LCD Display, Character height: 9mm
Display accuracy	23°C ± 5°C ⇒ DC Type: F.S. ± 0.1% rdg ± 2digit / AC Type: F.S. ± 0.3% rdg ± 3digit DC/AC Type: Within F.S. ± 0.3% rdg ± 3digit only for Current 5A terminal -10°C to 50°C ⇒ DC/AC Type: F.S. ± 0.5% rdg ± 3digit
Input	DC Voltage/Current, AC Voltage/Current, AC Frequency
Max. allowable input	110% F.S. for input spec.
A/D conversion method	Practical oversampling using successive approximation ADC
Sampling cycle	50ms (DC), 16.6ms (AC) (1/12,000)
Max. display range	1999 to 9999 (4 Digit)
Preset output	• Relay output ⇒ Contact capacity: 125VAC 0.3A, 30VDC 1A/Contact composition: N/O(1a) • NPN/PNP Open Collector output ⇒ 12~24VDC ± 2V 50mA Max. (Load resistance)
Sub output (Transmission output)	• RS485 communication output ⇒ Baud rate: 1200/2400/4800/9600, Transmission method: 2 wires half duplex, Tuning method: Sub-synchronization, Protocol: Modbus type • DC4~20mA output ⇒ Resolution: 12,000 division (Load resistance max. 600Ω)
AC measuring function	Selectable RMS or AVG
Frequency measuring function	Measurement range: 0.100 to 9999Hz (Differ according to decimal point position)
Hold function ¹⁾	Includes (Outer hold function)
Insulation resistance	Min. 20MΩ (at 500VDC megger)
Dielectric strength	1000VAC for 1 minute (Between external terminal and case) 2000VAC for 1 minute (Between external terminal and case)
Noise strength	± 2kV the square wave noise (pulse width: 1μs) by the noise simulator
Vibration	Mechanical 0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 2 hours Malfunction 0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 10 minutes
Shock	Mechanical 100m/s ² (Approx. 10G) in X, Y, Z directions for 3 times Malfunction 300m/s ² (Approx. 30G) in X, Y, Z directions for 3 times
Environment	Ambient temperature -10 to 50°C, Storage: -20 to 60°C Storage humidity 35 to 85%RH, Storage: 35 to 85%RH
Insulation type ²⁾	□
Approval	CE
Unit weight	Approx. 64g

- * 1: "H" Mark indicated that equipment protected throughout by double insulation or reinforced insulation.
- * 2: The indicator has no Hold function.
- * Environment resistance is rated at no freezing or condensation.

Specification of measured input and range

Type	Measured input and range	Input impedance	Standard [Std]	Praescale [ScrL]
			Display rang [Fixed]	Display range [Variable]
DC Volt	0~50V [50V]	434.35kΩ	0.00 to 50.00 (Fixed)	
	0~10V [10V]	434.35kΩ	0.00 to 10.00 (Fixed)	
	0~5V [5V]	43.35kΩ	0.000 to 5.000 (Fixed)	
	0~1V [1V]	43.35kΩ	0.000 to 1.000 (Fixed)	
	0~250mV [250mV]	2.15kΩ	0.0 to 250.0 (Fixed)	-1999 to 9999 (Variable)
	0~50mV [50mV]	2.15kΩ	0.00 to 50.00 (Fixed)	-199.9 to 999.9 (Variable)
DC Ampere	0~500mA [500mA]	0.1Ω	0.0 to 500.0 (Fixed)	-1999 to 9.999 (Variable)
	0~200mA [200mA]	0.1Ω	0.0 to 200.0 (Fixed)	
	0~50mA [50mA]	1.1Ω	0.00 to 50.00 (Fixed)	
	4~20mA [4~20mA]	1.1Ω	4.00 to 20.00 (Fixed)	
	0~5mA [5mA]	11.1Ω	0.000 to 5.000 (Fixed)	
	0~2mA [2mA]	11.1Ω	0.000 to 2.000 (Fixed)	
AC Volt	0~250V [250V]	1.109MΩ	0.0 to 250.0 (Fixed)	
	0~125V [125V]	1.109MΩ	0.0 to 125.0 (Fixed)	
	0~50V [50V]	222kΩ	0.00 to 50.00 (Fixed)	
	0~25V [25V]	222kΩ	0.00 to 25.00 (Fixed)	
	0~5V [5V]	22kΩ	0.000 to 5.000 (Fixed)	
	0~2.5V [2.5V]	22kΩ	0.000 to 2.500 (Fixed)	
AC Ampere	0~5A [5A]	0.01Ω	0.000 to 5.000 (Fixed)	
	0~2.5A [2.5A]	0.01Ω	0.000 to 2.500 (Fixed)	
	0~500mA [500mA]	0.1Ω	0.0 to 500.0 (Fixed)	
	0~250mA [250mA]	0.1Ω	0.0 to 250.0 (Fixed)	
	0~100mA [100mA]	0.5Ω	0.0 to 100.0 (Fixed)	
	0~50mA [50mA]	0.5Ω	0.00 to 50.00 (Fixed)	

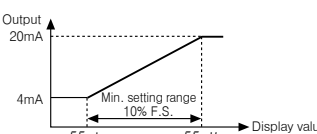
Monitoring peak display value function

[PA 0: H.PE/L.PE mode, PA 2: PE mode]

It monitors Max./Min. value of display value based on current display value and then display the data in H.PE mode and L.PE mode of parameter 0. Set delay time (0 to 30 sec.) in PE mode of parameter 2 in order to avoid caused by initial overcurrent or overvoltage, when monitoring the peak value. Delay time is 0 to 30 sec. and it starts to monitor the peak value after set time.
When [H.PE/L.PE] keys are pressed at H.PE/L.PE mode of parameter 0, it will be initialized.
* Monitoring function is not indicated when setting the PE mode of parameter 2 as "0".

Current output (DC4~20mA) Scale adjustment function [PA 2: F5-H/F5-L mode]

It sets current output for preset display value at the output current 4~20mA DC.
It sets display value for 4mA in F5-L and 20mA in F5-H and set range between F5-H and F5-L should be 10% F.S. (When it set as under 10% F.S., it changed as over 10% F.S. automatically.) Preset display value is fixed to output as 4mA at under F5-L and 20mA at over F5-H.



Measuring AC frequency function [PA 1: d1 5P mode]

It measures input signal frequency when it is an AC input using fixed decimal point [PA1: do mode]. Measuring range can be changed by setting and measuring range of decimal point position is as below chart. It is available to adjust upper gradient in [PA 1: i nbH mode] and [PA 1: i nbE mode]. In order to measure frequency normally, input signal, over 10% F.S. of measuring range, should be supplied. Please wire the proper measuring terminal.

Decimal point position	0.000	0.00	0.0	0
Measurement	0.100 to 0.10 to 0.1 to 1 to 9.999Hz	9.999Hz	99.99Hz	999.9Hz
• 0.100 to 5000Hz: Display accuracy error within ± 0.3% F.S. ± 2digit				
• 5000 to 9999Hz: Display accuracy error within ± 1% F.S. ± 3digit				
① i nbH: 0.100 to 9.999 (Gradient adjustment of high value)				
② i nbE: ID-2, ID-1, ID-1, ID-1 (Index adjustment of i nbH)				

Zero adjustment function

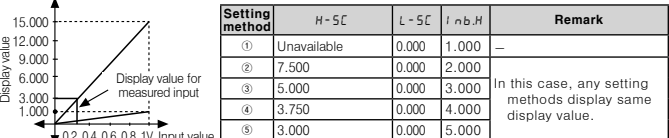
It adjusts the display value of the optional configured input value as zero by force, zero point error can be adjusted with 3 ways as below.
When zero point adjustment with front key and Hold terminal is finished normally, zero point of measuring terminal is displayed and the adjusted value is saved in i nbH automatically.

Operation	Input correction value	Front key	Input external signal
PA 1: Direct input correction value method at i nbL mode	Press both [Shift] and [Up] keys for 3 sec. at the measuring mode.	Short-circuit external Hold terminal No. 11, 12 over min. 50m. It is enable to use in option mode.	
Des-cription			

* Refer to description [Error correction function], [Error indication function] and [Parameter 2] for function and error.

Gradient correction function [PA 1: i nbH mode]

It corrects a gradient of prescale value and display value.
(Figure 1) Display value Y can be adjusted as α, β times against X input value by correction function [i nbH] and used as correction function of max. display value [H-5C]. Adjustment range is 0.100 to 5.000 and multiply current gradient by the value.
Ex) To display "3,000" in DC 200mV input for measured input specification as 0 to 1V, ① Select 0~1VDC for measured input in Parameter 1
② Standard specification in input: 0~1VDC and 1,000 therefore it has to be 15,000 (H-5C) for 1VDC (input) in order to display 3,000 for 200mVDC (input).
But it is unable due to setting range is 9.999.
③ In this case, please check below chart. Please set as i nbH × H-5C = 15,000.



Preset output mode [PA 2: oU1L/oU2L mode]

Mode	Output operation	Operation
oFF	OUT1 output	No output
HI	OUT1.H OUT1 output	Period ON: Display value ≥ OUT1.H Period OFF: Display value ≥ OUT1.H-Hys
Lo	OUT1.L OUT1 output	Period ON: Display value ≤ OUT1.L Period OFF: Display value ≥ OUT1.L+Hys
HL	OUT1.H OUT1 output	Period ON: Display value ≤ OUT1.L or Display value ≥ OUT1.H Period OFF: Display value ≥ OUT1.H+Hys
HL-G	OUT1.H OUT1.L OUT1 output	Period ON: OUT1.L ≤ Display value ≤ OUT1.H+Hys Period OFF: Display value ≤ OUT1.L+Hys or Display value ≥ OUT1.H+Hys

- * Set output mode separately for each OUT1/OUT2.
- * OUT1/OUT2 are operated individually depending on output operation mode.
- * Setting value mode of parameter group 0 is displayed depending on output operation mode.
- * GO outputs when the period both OUT1/OUT2 are off. (NPN/PNP open collector output type)

Parameter

Parameter	Display	Function	Note
PA 1 (Parameter 1)	i n-r	Selectable RMS/AVG in AC type	Available AC type only.
	i n-r	Input range selection	Input range selection
	d1 5P	Display type selection	Selectable: Std/ScrL/PreE9
	5cnd	Standard scale range	Display max. display value of 5cnd
	F-5H	Frequency display	Available AC type only.
	5cRL	Scale range	These are displayed in 5cRL only and set max/min. display value (-1999 to 9999).
	H-5C	High scale	Set max. value of display range
	L-5C	Low scale	Set min. value of display range
	doE	Dot	Set decimal point position
	d1 5c	Display unit	Set display unit
	i nbH	Input bias high	Correct High-limit gradient of display value
	i nbL	Input bias low	Correct Low-limit gradient of display value
PA 2 (Parameter 2)	i nbE	Input bias exponent	Set display index of frequency mode
	oU1L	OUT1 type	Set output mode of OUT1
	oU2L	OUT2 type	Set output mode of OUT2
	H5C	OUT1 hysteresis	Select hysteresis of OUT1
	H5L	OUT2 hysteresis	Select hysteresis of OUT2
	5cRL	Startup compensation time	Set startup compensation time
	PEE	Peak time	Set monitoring delay time for peak value (sec)
	d1 5L	Display time	Set sampling time (sec)
	Col-r	Color	Select color
	ZEro	Zero key	Enable zero adjustment key
	Ev n	Event input	Set external terminal (11, 12) function
	F5-H	Full scale high	Set High-limit value output position of PV output
PA 0 (Parameter 0)	F5-L	Full scale low	Set Low-limit value output position of PV output
	Rd-5	Address	Set communication address
	b5 B	Bit per second	Set baud rate (bps)
	P24	Parity bit	Set parity bit
	5cRL	Standard	Selectable: None/Even/Odd
	5cRL	Standard	Selectable: 1/2
	5cRL	Standard	Selectable: 5 to 99
	L-5C	Lock	Enable lock status
	oU1H	OUT1 high preset	Set value of OUT1 High-limit output
	oU1L	OUT1 low preset	Set value of OUT1 Low-limit output
	oU2H	OUT2 high preset	Set value of OUT2 High-limit output
	oU2L	OUT2 low preset	Set value of OUT2 Low-limit output
	H.PE	High peak	Max. value by data monitoring
	L.PE	Low peak	Min. value by data monitoring

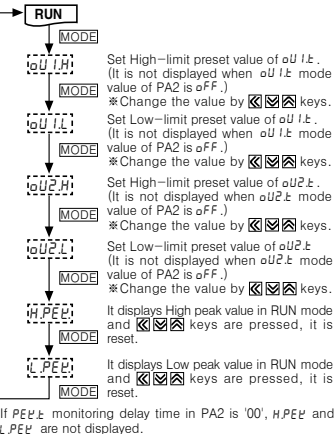
Parameter setting

- * Press [MODE] key for 2 sec. in RUN mode, [PA 1] (Parameter 1) is displayed.
- * Press [MODE] key for 4 sec. in RUN mode, [PA 2] is displayed after [PA 1]. When press [MODE] key is pressed continually, it stops displaying at [PA 2].
- * It is advanced to current display parameter releasing [MODE] key at [PA 1] or [PA 2].
- * Press [MODE] key for 3 sec., it is returned to RUN at any position.
- * If any key is not touched for 60 sec. in each parameter, it will return to RUN mode.
- * After return to RUN mode, press [MODE] key within 2 sec., it will return to previous parameter. (Refer to the below descriptions for set parameter.)

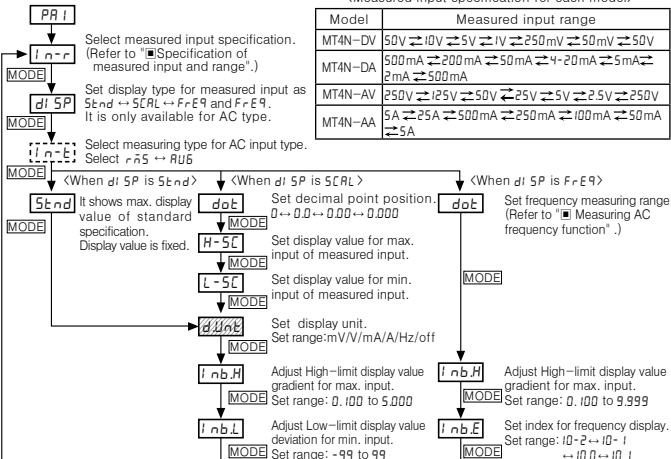
Change the parameter setting value

- Advance to the parameter to be changed when press [MODE] key continuously in RUN mode and release [MODE] key at the parameter. (Refer to "Parameter setting")
- When press [MODE] key in each parameter, the initial mode of the parameter is displayed. (Refer to the description of each parameter.)
- When press one of [H.PE], [L.PE] keys in display mode.
Ex) Mode [H.PE] Setting value [250u] Saved setting value flashes every 0.5 sec.
Press one
- Change the set value by [H.PE] or [L.PE] key when setting value is flashed.
Ex) Change AC type measured input from 250V to 125V.
Mode [H.PE] Setting value [250u] [L.PE] Setting value [125u] Press one
- When press [MODE] key to complete the change and it is advanced to the next mode after flashes 2 times.
- When press [MODE] key for 3 sec. after change, it returns to RUN mode.

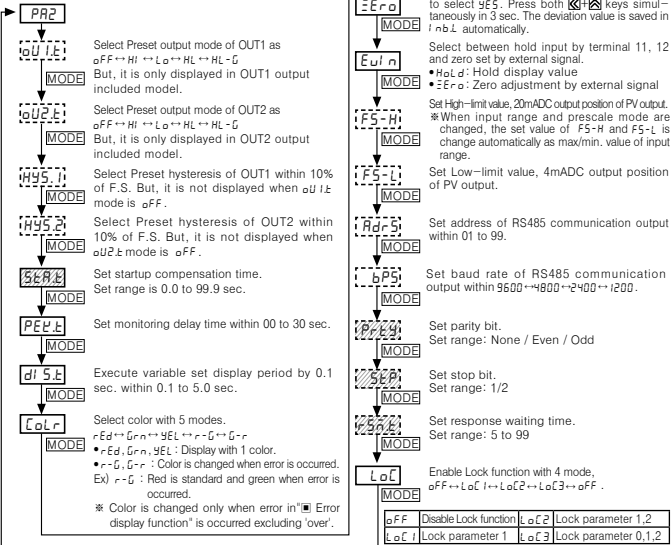
Parameter 0



Parameter 1



Parameter 2



Caution for using

- Allowable installation environment
 - ① Shall be used indoor
 - ② Altitude Max. 2,000m
 - ③ Pollution Degree 3
 - ④ Installation Category II
- Use compression terminal (M3, Max. 6.0mm) to connect AC power.
- Separate from high-tension line, power line to avoid inductive noise.
- Install