

# Autonics PANEL METER MT4N SERIES

M A N U A L



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

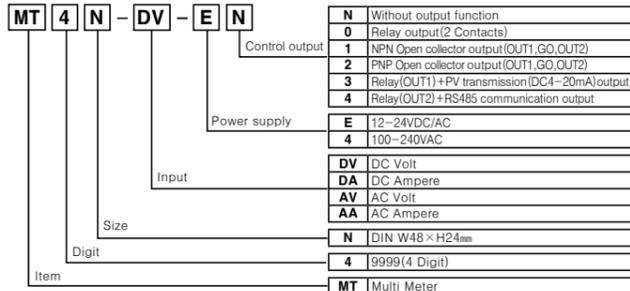
## Caution for your safety

- Please keep these instructions and review them before using this unit.
  - Please observe the cautions that follow. Serious injury may result if instructions are not followed.
  - 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.

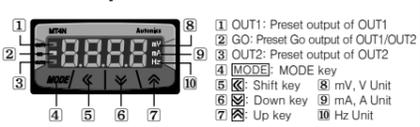
## Caution

- 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, dirt, 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.

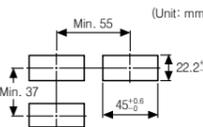
## Ordering information



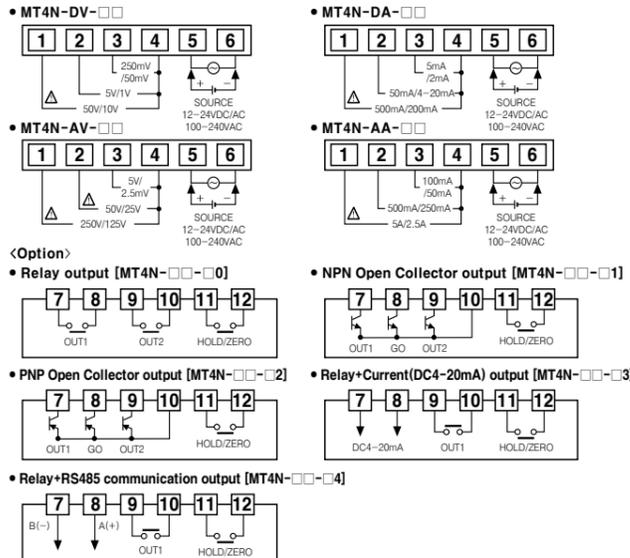
## Front panel identification



## Panel cut-out



## Terminal connection



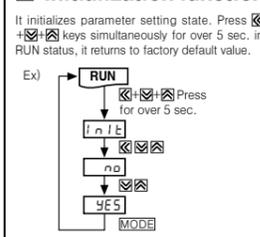
## Prescale function [PA1: H-5C/L-5C mode]

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.

## 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.
oEr	Flashes when it exceeds zero range (±99).

## Initialization function



## 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 4.0 sec. and also will show any changes if any every 4 sec.

## Startup compensation timer function [PA2: 5cRt 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: 0.0 to 99.9 (Unit: sec.) Factory default: 0.0

## Specifications

Model	MT4N	
Power supply	12-24 VDC/AC	100-240 VAC
Power consumption	DC: 3W, AC: 5VA	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 10°C to 50°C ⇒ DC/AC Type: Within F.S. ± 0.3% rdg ± 3digit only for Current 5A terminal ± 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	<ul style="list-style-type: none"> <li>Relay output ⇒ Contact capacity: 125VAC 0.3A, 30VDC 1A/Contact composition: N/O(1a)</li> <li>NPN/PNP Open Collector output ⇒ 12-24VDC ± 2V 50mA Max. (Load resistance)</li> </ul>	
Sub output (Transmission output)	<ul style="list-style-type: none"> <li>RS485 communication output ⇒ Baud rate: 1200/2400/4800/9600, Transmission method: 2 wires half duplex, Tuning method: Sub-synchronization, Protocol: Modbus type</li> <li>DC4-20mA output ⇒ Resolution: 12,000 division (Load resistance max. 600Ω)</li> </ul>	
AC measuring function	Selectable RMS or AVG	
Frequency measuring function	Measurement range: 0.100 to 9999Hz (Differ according to decimal point position)	
Hold function <sup>1)</sup>	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: 100ms/s (Approx. 10G) in X, Y, Z directions for 3 times	
Shock	Malfunction: 300m/s <sup>2</sup> (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 <sup>2)</sup>	□	
Approval	CE	
Unit weight	Approx. 64g	

<sup>1)</sup> Mark indicated that equipment protected throughout by double insulation or reinforced insulation.  
<sup>2)</sup> The indicator has no Hold function.  
Environment resistance is rated at no freezing or condensation.

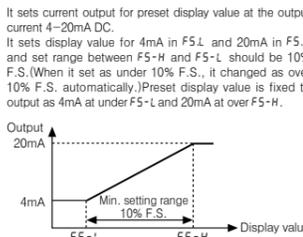
## Specification of measured input and range

Type	Measured input and range	Input impedance	Standard [Std.] Display rang [Fixed]	Prescale [ScrL] 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)	-1999 to 9999 (Variable)
	0-250mV [250mV]	2.15kΩ	0.0 to 250.0 (Fixed)	-199.9 to 999.9 (Variable)
	0-50mV [50mV]	2.15kΩ	0.00 to 50.00 (Fixed)	-19.99 to 99.99 (Variable)
DC Ampere	0-500mA [500mA]	0.1Ω	0.0 to 500.0 (Fixed)	-1.999 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 [PA0: HPEL/LPEL mode, PA2: PEL mode]

It monitors Max./Min. value of display value based on current display value and then display the data in HPEL mode and LPEL mode of parameter 0. Set delay time (0 to 30 sec.) in PEL 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 [HPEL] and [LPEL] keys are pressed at HPEL and LPEL mode of parameter 0, it will be initialized.  
\* Monitoring function is not indicated when setting the PEL of parameter 2 as "0".

## Current output (DC4-20mA) Scale adjustment function [PA2: F5-H/F5-L mode]



## Measuring AC frequency function [PA1: d1.5P mode]

It measures input signal frequency when it is an AC input using fixed decimal point (PA1: doB 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 [PA1: 1.nb.H mode] and [PA1: 1.nb.E 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.  
① Measuring range  
Decimal point position: 0.000, 0.00, 0.0, 0  
Measurement: 0.100 to 0.10 to 0.1 to 1 to 9.999Hz, 99.99Hz, 999.9Hz, 9999Hz  
\* 0.100 to 5000Hz: Display accuracy error within ± 0.3% F.S. ± 2digit  
\* 5000 to 9999Hz: Display accuracy error within ± 1% F.S. ± 3digit  
② 1.nb.H: 0.100 to 9.999 (Gradient adjustment of high value)  
③ 1.nb.E: 10<sup>-2</sup>, 10<sup>-1</sup>, 10<sup>0</sup>, 10<sup>1</sup> (Index adjustment of 1.nb.H)

## Error correction function [PA1: 1.nb.H/1.nb.L mode]

It corrects display value of measured input. 1.nb.L ± 99 (Adjust deviation of low value)  
1.nb.H: 5.000 to 0.100 (Correct gradient (%) of high value)  
Display value = (Measured value × 1.nb.H) + 1.nb.L  
Ex) Low value correction  
When there is an application where there is a residual voltage of 1.2V, but a 0V display is desired, then it is possible by adjusting the 1.nb.L parameter setting to 12 (offset correcting value or equal to 1.2V without decimal) that the desired display value of 0 can be achieved.  
Ex) High value correction  
When there is an application where the high actual value of display is 501 and exceeds the 500V display range, then it is possible by adjusting the 1.nb.H parameter setting to 0.998 (calculated by desired value of 500/actual value of 501), that the desired value can be achieved.  
\* The offset correction range of 1.nb.L is within -99 to 99 for D<sup>0</sup>, D<sup>1</sup> digit regardless of decimal point.

## 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 1.nb.L automatically.  
Operation: PA1: Direct input correction value input method at 1.nb.L mode  
Front key: Press both [HOLD] and [MODE] keys for 3 sec. at the measuring mode.  
Input external signal: Short-circuit external Hold terminal no. 11, 12 over min. 50ms. \*It is enable to use in option mode.  
\* Refer to description [Error correction function], [Error indication function] and [Parameter 2] for function and error.

## Gradient correction function [PA1: 1.nb.H 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 [1.nb.H] and used as correction function [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, (Select 0-1VDC for measured input in Parameter 1)  
① 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.  
② In this case, please check below chart. Please set as 1.nb.H × H-5C = 15.000

Setting method	H-5C	L-5C	1.nb.H	Remark
①	Unavailable	0.000	1.000	
②	7.500	0.000	2.000	
③	5.000	0.000	3.000	In this case, any setting methods display same display value.
④	3.750	0.000	4.000	
⑤	3.000	0.000	5.000	

## Preset output mode [PA2: oU1L/oU2L mode]

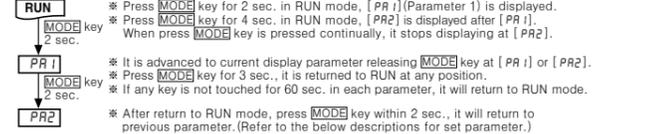
Mode	Output operation	Operation
oFF	OUT1 output	No output
Hi	OUT1.H OUT1 output	Period ON: Display value ≥ OUT1.H Period OFF: Display value ≤ OUT1.H - Hys
Lo	OUT1.L OUT1 output	Period ON: Display value ≤ OUT1.L Period OFF: Display value ≥ OUT1.L + Hys
HL	OUT1.H OUT1.L OUT1 output	Period ON: Display value ≤ OUT1.L or Display value ≥ OUT1.H Period OFF: Display value ≥ OUT1.H + Hys or Display value ≤ OUT1.L - 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	
PR1 (Parameter 1)	1.n.E	Input type	Selectable RMS/AVG in AC type Available AC type only.	
	1.n.R	Input range	Input range selection	
	di.SP	Display	Display type selection	Selectable: Std/ScrL/FrE9
	5.n.d	Standard scale range	Frequency display range	Display max. display value of 5.n.d
	F-5.H	High scale	Scale range	Available AC type only.
	5.C.R	Low scale	Scale range	Available AC type only.
	H-5.L	High scale	Set max. value of display range	These are displayed in 5.C.R. only and set max/min. display value (-1999 to 9999).
	L-5.L	Low scale	Set min. value of display range	
	doE	Dot	Set decimal point position	It is displayed in 5.C.R. F-5.H only and set the position.
	4-5c	Display unit	Set display unit	Set ranges: mV/V/mA/A/Hz/ohm
	1.nb.H	Input bias high	Correct High-limit gradient of display value	5.n.d/5.C.R. Correction range: 0.100 to 5.000 F-5.H Correction range: 0.100 to 9.999
	1.nb.L	Input bias low	Correct Low-limit gradient of display value	Correction range: -99 to 99
PR2 (Parameter 2)	1.nb.E	Input bias exponent	Set display index of frequency mode	Set range: 10 <sup>-1</sup> to 10 <sup>1</sup>
	oU1L	OUT1 type	Select output mode of OUT1	aFF/Hi/La/Lo/HL-G
	oU2L	OUT2 type	Select output mode of OUT2	aFF/Hi/La/Lo/HL-G
	H55	OUT1 hysteresis	Select hysteresis of OUT1	Within 1 to F.S. 10% (Variable depending on set of input range and prescale.)
	H52	OUT2 hysteresis	Select hysteresis of OUT2	
	5cRt	Startup compensation time	Set startup compensation time	Set range: 0.0 to 99.9 sec.
	PEL	Peak time	Set monitoring delay time for peak value(sec)	Set range: 0.0 to 30 sec.
	d1.5L	Display time	Set sampling time(sec)	0.1 to 5.0 sec. (Variable by 0.1 sec.)
	CoLr	Color	Select color	r-Ed/g-rn/y-EL/l-r-g/l-g-r
	Ero	Zero key	Enable zero adjustment key	No: Enable/disable zero adjustment key Yes: Enable zero adjustment key
	Ev n	Event input	Set external terminal(11, 12) function	Hold: Use external terminal as Hold terminal Zero: Use external terminal as zero adjustment terminal It is enable to use in option mode.
	PR0 (Parameter 0)	F5-H	Full scale high	Set High-limit value output position of PV output
F5-L		Full scale low	Set Low-limit value output position of PV output	Max. set range: Max. F5-H 10%
Rd5		Address	Set communication address	Set range: 01 to 99
bP5		Bit per second	Set baud rate(bps)	Selectable: 1200/2400/4800/9600
P24		Parity bit	Set parity bit	Selectable: None/Even/Odd
5cRt		Startup delay time	Set startup delay time	Set range: 0.0 to 99.9 sec.
5cRt		Startup delay time	Set startup delay time	Set range: 0.0 to 99.9 sec.
L-LoC		Lock	Enable lock status	Selectable: aFF/La/Lc/Lc3/aC3
oU1H		OUT1 high preset	Set value of OUT1 High-limit output	Set the range within display range of 5.n.d/5.C.R.
oU1L		OUT1 low preset	Set value of OUT1 Low-limit output	
oU2H		OUT2 high preset	Set value of OUT2 High-limit output	For MT4N-DV/DA Type, set range of oU1H/oU2H and oU1L/oU2L is within -5 to 110%.
oU2L		OUT2 low preset	Set value of OUT2 Low-limit output	
HPEL	High peak	Max. value by data monitoring	It is pressed, it will be returned to initial status.	
LPEL	Low peak	Min. value by data monitoring		

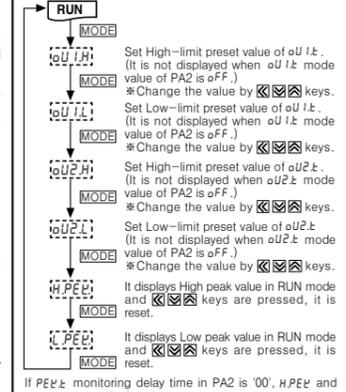
## Parameter setting



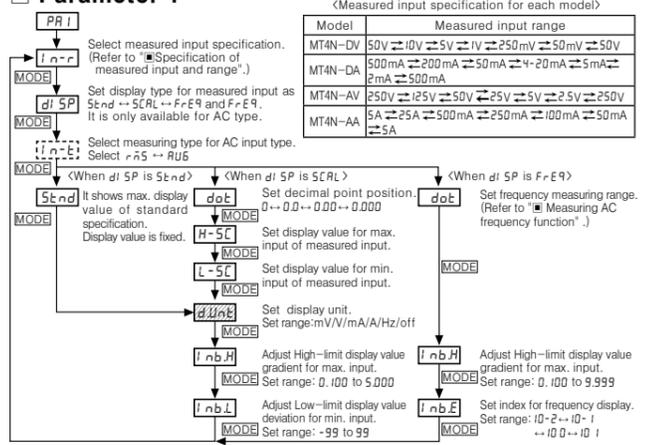
## Change the parameter setting value

- 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-5C], [L-5C], [F5-H], [F5-L], [H55], [H52], [5cRt], [PEL], [d1.5L], [CoLr], [Ero], [Ev n], [oU1L], [oU2L], [oU1H], [oU2H], [oU1H], [oU2H], [HPEL], [LPEL] keys in display mode.
- Change the set value by [H-5C] or [L-5C] key when setting value is flashed.
- 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.

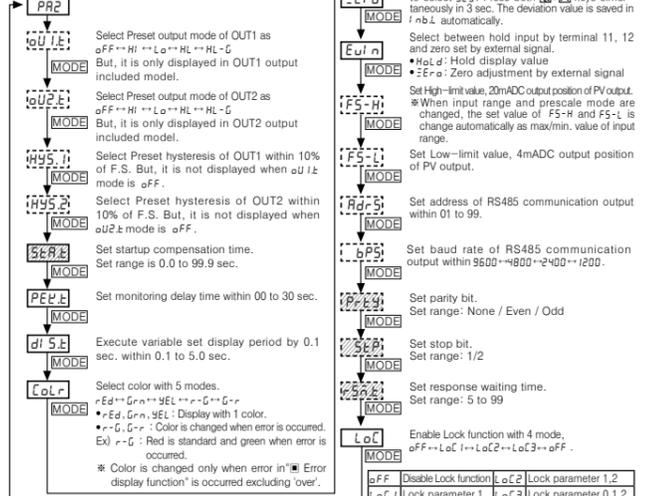
## Parameter 0



## Parameter 1



## Parameter 2



## Caution for using

- Allowable installation environment
- 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 power switch or circuit breaker to on/off the power at once.
- The switch or circuit breaker should be installed nearby users for safety.
- Avoid to use the unit nearby machinery with high frequency noise, such as high frequency welder / sewing machine and high capacity SCR controller.
- "HiH" or "LcL" is displayed, off the power and check lines.
- Noise inflowing from power line can cause serious problem for D.P.M. (Digital Panel Meter) of AC power. It is hard to install protection circuit in the small unit even there is condenser to avoid noise between lines at primary of power transformer. Use noise absorber circuit such as line filter, varistor at external lines when abnormal voltage is occurred by power relay, magnet switch, high frequency equipment are operated in same lines.
- Input line : Use shield wire when measured input line is extended or in a place with noise and open the non-used terminals.

## Main products

- Proximity sensors
- Area sensors
- Photoelectric sensors
- Fiber optic sensors
- Door/Door side sensors
- Rotary encoders
- Sensor controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Sleeping motor/drive motion controllers
- Field network devices
- Laser marking system (CO<sub>2</sub>, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Display units
- Panel meters
- Pressure sensors
- Power controllers
- Graphic Logic panels
- Temperature controllers

**Autonics Corporation**