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;

⚠ **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

1. **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 and damage of property.
2. **It must be mounted on Panel.**
   It may give an electric shock.
3. **Do not connect, inspect and repair terminals when it is power on.**
   It may give an electric shock.
4. **Do not disassemble or modify this unit, please contact us when it is required.**
   It may cause a fire and give an electric shock.
5. **Please check the number of terminal when connecting power or input.**
   It may cause a fire.

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock.
2. **When connecting wire, No.20AWG(0.50mm²) should be used and tighten screw bolt on terminal block with 0.74N • m~0.90N • m strength.**
   It may cause a malfunction or fire due to contact failure.
3. **Please observe the rated specification.**
   It might shorten the life cycle of the product and cause a fire.
4. **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.
5. **In cleaning the unit, do not use water or an oil-based detergent.**
   It may cause a fire and give an electric shock.
6. **Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration and impact etc.**
   It may cause a fire or explosion.
7. **Do not inflow dust or wire dregs into the unit.**
   It may cause a fire or mechanical malfunction.
8. **Please connect properly after checking the polarity of measuring terminals.**
   It may cause a fire or explosion.

■ Ordering information

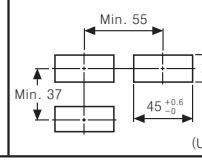
MT 4 N − □ − □ □

Output	N	Without output function
	0	Relay ouput(2 Contacts)
	1	NPN Open collector output(OUT1, GO, OUT2)
	2	PNP Open collector output(OUT1, GO, OUT2)
	3	Relay(OUT1)+PV transmission(DC4−20mA) output
	4	Relay(OUT1)+RS485 output
Power supply	E	12−24VDC/AC
Input	DV	DC Volt
	DA	DC Ampere
	AV	AC Volt
	AA	AC Ampere
Size	N	DIN W48×H24mm
Digit	4	4Digit(−1999~9999)
Item	MT	Multi Meter

■ Front panel identification

1. OUT1:Preset output of OUT1
2. GO:Preset Go output of OUT1/OUT2
3. OUT2:Preset output of OUT2
4. MD Key:Mode Key
5. ◀:Shift key
6. ▼:Down key
7. ▲:Up key
8. mV, V Unit
9. mA, A Unit
10. Hz Unit

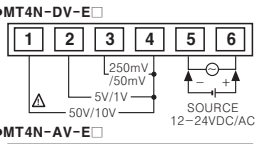
■ Panel cut-out



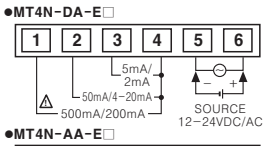
(Unit:mm)

■ Terminal connection

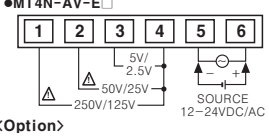
●MT4N-DV-E□



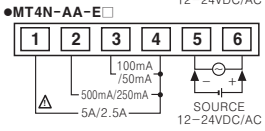
●MT4N-DA-E□



●MT4N-AV-E□

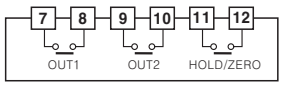


●MT4N-AA-E□

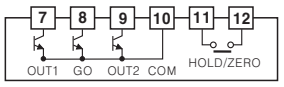


<Option>

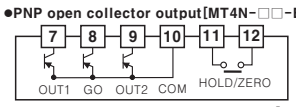
●Relay output[MT4N-□□-E0]



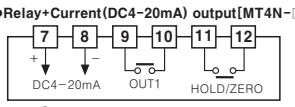
●NPN open collector output[MT4N-□□-E1]



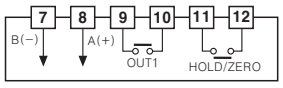
●PNP open collector output[MT4N-□□-E2]



●Relay+Current(DC4-20mA) output[MT4N-□□-E3]

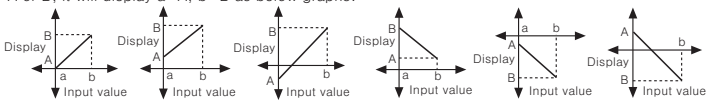


●Relay+RS485 communication output[MT4N-□□-E4]



■ Prescale function[PA1 : H-SC/L-SC mode]

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



■ Error display function

Display	Description
HHHH	When measuring input exceeds max.allowable input (110%)
LLLL	When measuring input exceeds min.allowable input (−10%)
d−HH	When measuring input display value exceeds max.display (9999)
d−LL	When measuring input display value exceeds min.display (−1999)
F−HH	When measuring frequency display value exceeds max.measuring value (9999)
ovEr	When exceed zero adjustment range (±99)

※Zero adjusting error is returning to measuring mode after "ovEr" is flickering 2 times.
※Refer to "■ Measuring AC frequency function" for frequency measuring range.

■ Display cycle delay function [PA 2 : dISt mode]

It is able to make stable display value by display cycle when measuring input value is fluctuated frequently. Change the delay time in **dISt** mode of Parameter 2.
If select 4.0s, the display value is displayed every 4sec. averaging input value for 4sec.

■ Initialization function

It initializes parameter setting state. Press ◀▼▲ keys for over 5sec in RUN status, it returns to the default value.

예)
Run —(Press at the same time for 5sec.)→ ◀▼▲ **Init** → ◀▼▲ **no** → ▼▲ **YES** → MODE → **Run**

※The above specifications are changeable at anytime without notice.

■ Specifications

Series		MT4N
Power supply		12−24VDC/AC(90 to 110% of rated voltage)
Power consumption		DC:3W, AC:5VA
Display method		7Segment LCD Display, Character height:9mm
Display accuracy		• 23℃ ±5℃, 35~85%RH ☞ DC Type : ±0.1% F.S ±2Digit AC Type : ±0.3% F.S ±3Digit • −10℃~50℃ ☞ DC/AC Type : ±0.5% F.S ±3Digit
Input		DC Voltage/Current, AC/Voltage/Current, AC Frequency
Max. allowable input		110% for input spec.
A/D conversion method		Over sampling type using SAT type of ADC
Sampling cycle		50ms(DC), 16.6ms(AC) (1/12,000)
Max. display range		−1999~9999(4Digit)
Preset output		• Relay output ☞ Contact capacity:15VAC 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 • 4−20mADC output ☞ Resolution: 12,000 division(Load resistance max. 600Ω)
AC measuring function		Selectable RMS or AVG
Frequency measuring function		Measurement range:0.100~9999Hz(Fixed decimal point type)
Hold function		Includes(Outer hold function)
Insulation resistance		Min. 200MΩ(500VDC)
Dielectric strength		1000VAC 50/60Hz 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 10−55Hz in each of X, Y, Z directions for 2hour
	Malfunction	0.5mm amplitude at frequency of 10~55Hz in each of X, Y, Z directions for 10minutes
Shock	Mechanical	100m/s² (10G) in X, Y, Z directions for 3 times
	Malfunction	300m/s² (30G) in X, Y, Z directions for 3 times
Ambient temperature		−10 ~ 50℃(at non−dew status)
Storage temperature		−20 ~ 60℃(at non−dew status)
Ambient humidity		35 ~ 85%RH

■ Specification of measuring input and range

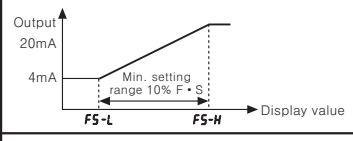
	Measuring input and range	Input impedance	Standard [Stnd] Display range [Fixed]	Prescale [SCAL] Display range [Variable]
DC Volt	0−50V [50V]	434.35kΩ	0.00~50.00(Fixed)	−1999~9999(Variable) −199.9~999.9(Variable) −19.99~99.99(Variable) −1.999~9.999(Variable) (Display position will be changed depending on decimal point position.)
	0−10V [10V]	434.35kΩ	0.00~10.00(Fixed)	
	0−5V [5V]	43.35kΩ	0.000~5.000(Fixed)	
	0−1V [1V]	43.35kΩ	0.000~1.000(Fixed)	
	0−250mV [250mV]	2.15kΩ	0.0~250.0(Fixed)	
	0−50mV [50mV]	2.15kΩ	0.00~50.00(Fixed)	
DC Ampere	0−500mA [500mA]	0.1Ω	0.0~500.0(Fixed)	
	0−200mA [200mA]	0.1Ω	0.0~200.0(Fixed)	
	0−50mA [50mA]	1.1Ω	0.00~50.00(Fixed)	
	4−20mA [4−20mA]	1.1Ω	4.00~20.00(Fixed)	
	0−5mA [5mA]	101.1Ω	0.000~5.000(Fixed)	
	0−2mA [2mA]	101.1Ω	0.000~2.000(Fixed)	
AC Volt	0−250V [250V]	1.109MΩ	0.0~250.0(Fixed)	※Please connect proper terminal its max. input voltage is within 30~100% of input terminal. When it is higher than input voltage, it may cause a breakdown of terminal and over display range and the accuracy is decreased when it is connected to the terminal under 30%.
	0−125V [125V]	1.109MΩ	0.0~125.0(Fixed)	
	0−50V [50V]	200kΩ	0.00~50.00(Fixed)	
	0−25V [25V]	222kΩ	0.00~25.00(Fixed)	
	0−5V [5V]	22kΩ	0.000~5.000(Fixed)	
	0−2.5V [2.5V]	22kΩ	0.000~2.500(Fixed)	
AC Ampere	0−5A [5A]	0.01Ω	0.000~5.000(Fixed)	
	0−2.5A [2.5A]	0.01Ω	0.000~2.500(Fixed)	
	0−500mA [500mA]	0.1Ω	0.0~500.0(Fixed)	
	0−250mA [250mA]	0.1Ω	0.0~250.0(Fixed)	
	0−100mA [100mA]	0.5Ω	0.0~100.0(Fixed)	
	0−50mA [50mA]	0.5Ω	0.00~50.00(Fixed)	

■ Monitoring function for Peak display value
[PA 0 : H.PEU/L.PEU mode, PA 2 : PEU.t mode]

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

■ Current output (4-20mADC) scale adjustment function
[PA2 : FS-H / FS-L mode]

It sets current output for present display value at the output current 4−20mADC.
It sets display value for 4mA and 20mA and set range between FS−H(**FS-H**) and FS−L(**FS-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 **FS-L** and 20mA at over **FS-H**,



■ Measuring AC frequency function
[PA1 : dISP mode]

It measures input signal frequency when it is an AC input using fixed decimal point[PA1:**dot** mode] and measuring range can be changed by setting and measuring range of decimal point position is as below. It is available to adjust upper gradient with [PA1:**I nbH** mode] and [PA1:**I nbE** mode]. In order to measure frequency normally, input signal, over 10% F • S of measuring range should be supplied. Please select the proper point of measuring terminal.

①Measuring range

Decimal point position	0.000	0.00	0.0	0
Measurement range	0.100~ 9.999Hz	0.10~ 99.99Hz	0.1~ 999.9Hz	1~ 9999Hz

②**I nbH** : 0.100~9.999[Gradient adjustment of high value]
③**I nbE** : 10−2, 10−1, 10−1[Index adjustment of **I nbH**]

■ Error correction function
[PA1 : I nbH / I nbL mode]

It corrects display value error of measuring input.
I nbL:±99[Adjust deviation of low value],
I nbH:5.000~0.100[Correct gradient(%) of High value]
Display value=(Measuring value×**I nbH**) + **I nbL**
Ex)When it is desired to measure input specification as 0~500V and display value as 0~500.0, it is able to remove the offset of Low display value to set −12(Offset correcting value) in **I nbL**.
(When Low display value is "□□1.2" in 0V input.)
Display value for measuring input(500V) is decided depending on offset adjustment of Low value.
When set adjustment value of 0.998 in **I nbH** calculating as 500.0/501.0(Target display value/ Current display value), in case, display value is "501.0", the gradient of High display value is adjusted and display value will be 500.0.
(Target display value/Current display value)
※The offset correction range of **I nbL** is within −99~ +99 for D⁻⁰, D⁻¹ digit regardless of decimal point.

■ Zero adjustment function

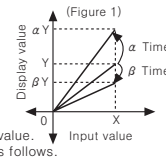
It sets preset display value as zero when min. input is entered into the measuring terminal, zero error can be adjusted with 3 ways as below.
When zero adjustment is finished normally by front key and hold terminal, zero will be displayed and the adjusted value is saved in automatically.

Operation	Input correction value	Front panel key	External input signal
Description	**PA 1** :Direct input correction value method at **I nbL** mode.	◀ ▲ keys are pressed for 3sec. at measuring mode.	Short−circuit External hold terminal no.11, 12 over min.50m. ※It is enable to use in option mode.

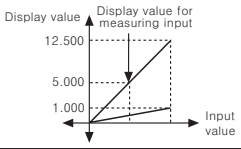
※Refer to [■ Error correction function], [■ Error display function] and [■ Parameter 2] for function and error.

■ Gradient correction function [PA1 : 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-SC**). Adjustment range is 0.100~5.000 and multiply current gradient by the value.



Ex)When 4.00VDC, display 5.000 for measuring input 0~10.00V
①Set the decimal position as '0000' for prescale value.
②In order to display 5.000 when measuring input is 4.00VDC, 12.500 will be displayed when max. input value is 10.00V, but it cannot set the max. setting value.
③Set gradient correction setting value[**I nbH**]×High scale value[**H-SC**]=12.500 as follows.
④It displays 5.000 when measuring input is 4.00V after set is finished.



Setting method	H-SC	L-SC	I nbH	Remark
①	12.500	0000	1.000	The max. set value of H−SC can be up to 9.999.
②	7.500	0.000	2.000	It can be changed to set by user and displays same value.
③	5.000	0.000	3.000	
④	3.750	0.000	4.000	
⑤	3.000	0.000	5.000	

■ Preset output mode[PA 2 : oU1t / oU2t mode]

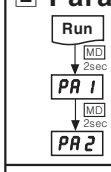
Mode	Output operation	Operation
oFF	OUT1 output / No output	No output
HI	OUT1.H / Hysterisis / OUT1 output	Period ON : Display value ≥ OUT1.H Period OFF : Display value ≤ OUT1.H −Hys
Lo	OUT1.L / OUT1 output	Period ON : Display value ≤ OUT1.H Period OFF : Display value ≥ OUT1.H +Hys
HL	OUT1.H / OUT1.L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

※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 by output operation mode selection.
※GO is outputted within the period both OUT1/OUT2 are off. (NPN/PNP Open collector output type.)

■ Parameter

Parameter	Display	Function	Note
PA 1 (Parameter 1)	In-t Input type	Selectable RMS/AVG in AC type	Available AC type only.
	In-r Input range	Input range selection	
	dISP Display	Display type selection	Selectable **Stnd** / **SCAL** / **FrE9**
	Stnd Standard	Standard scale range	Display max. display value of **Stnd**
	FrE9 Frequency	Frequency display	Available AC type only.
	SCAL Scale	Scale range	These are displayed in **SCAL** only and set max/min. display value(−1999~9999).
	H-SC High scale	Set max. value of display range	
	L-SC Low scale	Set min. value of display range	
	dot Dot	Set Dot position	It is displayed in **SCAL**/**FrE9** only and set the position.
	I nbH Input bias high	Correct High−limit gradient of display value	**Stnd**/**SCAL**:Correction range 0.100~5.000 **FrE9**:Correction range 0.100~9.999
	I nbL Input bias low	Correct Low−limit gradient of display value	Set range:Correction range is −99~+99
	I nbE Input bias exponent	Set display index of frequency mode	Set range:10^{-2}/ 10^{-1}/ 10^{0} / 10^{1}
PA 2 (Parameter 2)	oU1t Out1 type	Select output mode of OUT1	OFF / HI / LO / HL / HL−G
	oU2t Out2 type	Select output mode of OUT2	OFF / HI / LO / HL / HL−G
	HYS.1 Out1 hysteresis	Select hysteresis of OUT1	Within 1~F • S 10%(Variable depending on set of input range and prescale.)
	HYS.2 Out2 hysteresis	Select hysteresis of OUT2	
	PEU.t Peak time	Set monitoring delay time for peak value(sec)	Setting range:00 ~ 30sec
	dISt Display time	Set sampling time(sec.)	Variable by 0.1sec unit of 0.1~5.0sec
	Color Color	Select color	Red / Green / Yellow / r−G / G−r
	ZEro Zero Key	Disable zero adjustment key	No:Enable/disable zero adjustment key Yes:Enable zero adjustment key
	EuIn 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.
	FS-H Full scale High	Set High−limit value output position of PV output	Min. set range:Min. 10% F • S
	FS-L Full scale Low	Set Low−limit value output position of PV output	Max. set range:Max. FS−H 10%
	AdrS Address	Set communication address	Set range:01 to 99
	bPS Bit per second	Set baud rate(bps)	Selectable 1200/2400/4800/9600
	LoC Lock	Enable lock status	Selectable oFF/Loc1/Loc2/Loc3
PA 0 (Parameter 0)	oU1H OUT1 high preset	Set value of OUT1 High−limit output	Set the range within display range of **Stnd**/**SCAL**.
	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.PEU High peak	Max. value by data monitoring	◀ key is pressed, it will be returned to initial status.
	L.PEU Low peak	Min. value by data monitoring	

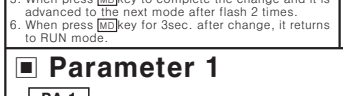
■ Parameter setting



※MD key is pressed for 2sec in RUN mode, PA 1 is displayed.
※MD key is pressed for 5sec in RUN mode, PA 2 is displayed after PA 1.
If MD key is pressed continually, it stops displaying at PA 2.
※It is advanced to current display parameter releasing MD key at PA 1 or PA2.
※MD key is pressed for 3sec, it is returned to RUN at any position.
※If any key is untouched for 60sec. in each parameter, it will return to RUN mode.
※After return to RUN, press MD key within 2 sec., it will return to previous parameter.
(Refer to the below descriptions for set parameter.)

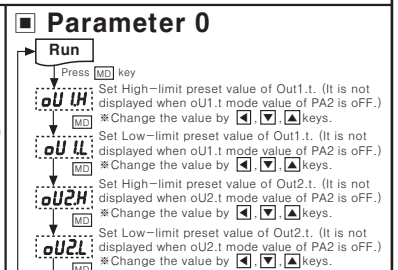
■ Change the parameter setting value

1. Advance to the parameter to be changed when press MD key continuously in RUN mode and release MD key at the parameter. (Refer to "■ Parameter setting".)
2. When press MD key in each parameter, the initial mode of the parameter is displayed. (Refer to the description of each parameter.)
3. When press one of ◀▼▲ keys in display mode, saved setting value is displayed.
   Ex)

4. Change the set value by ▲ or ▼ key when set value is flashed.
   Ex) Change AC type measuring input from 250V to 125V.
   

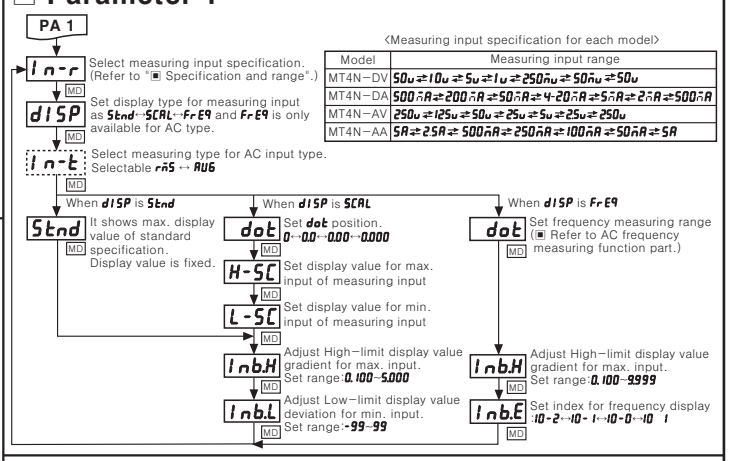
5. When press MD key to complete the change and it is advanced to the next mode after flash 2 times.
6. When press MD key for 3sec. after change, it returns to RUN mode.

■ Parameter 0



※If Pek.t monitoring delay time in PA2 is '00', H.Pek and L.Pek are not displayed.

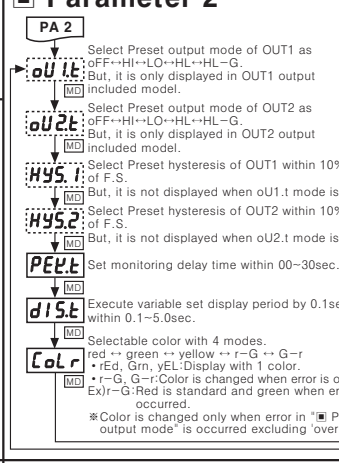
■ Parameter 1



<Measuring input specification for each model>

Model	Measuring input range
MT4N−DV	50u↔10u↔5u↔1u↔250mu↔50mu↔50u
MT4N−DA	500mA↔200mA↔50mA↔4-20mA↔5mA↔2mA↔500uA
MT4N−AV	250u↔125u↔50u↔25u↔5u↔25u↔250u
MT4N−AA	5A↔2.5A↔500mA↔250mA↔100mA↔50mA↔5A

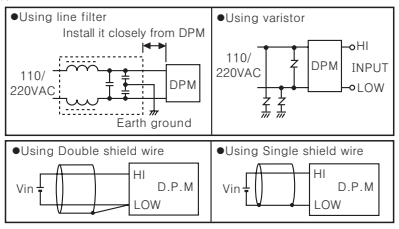
■ Parameter 2



oFF	Disable Lock function	Loc1	Lock parameter 1
Loc2	Lock parameter 1, 2	Loc3	Lock parameter 0, 1, 2

■ Caution for using

1. Allowable installation environment
   ①If shall be used indoor ③Pollution Degree 2
   ②Altitude Max. 2000m ④Installation CategoryⅡ.
2. Use compression terminal(M3, Max. 6.0mm) to connect AC power.
3. Separate from high−tension line, power line to avoid inductive noise.
4. Install power switch or circuit breaker to on/off the power.
5. The switch or circuit breaker should be installed near by users for safety.
6. Avoid to use the unit near by machinery with high frequency noise, such as high frequency welder/sewing machine and high capacity SCR controller etc.
7. "HHHH" or "LLLL" is displayed, off the power to check lines.
8. Noise inflowing from power line can cause serious problem for DPM 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.
9. Input line : Use shield wire when measuring input line is extended or in a place with noise and open the non−used terminals.



※It may cause malfunction if above instructions are not followed.

■ Major products

■ PROXIMITY SENSOR ■ PHOTOELECTRIC SENSOR
■ AREA SENSOR ■ FIBER OPTIC SENSOR
■ DOOR/DOOR SIDE SENSOR ■ PRESSURE SENSOR
■ ROTARY ENCODER ■ COUNTER
■ TIMER ■ TEMPERATURE CONTROLLER
■ TEMPERATURE/HUMIDITY TRANSDUCER
■ POWER CONTROLLER ■ PANEL METER
■ TACHO/LINE SPEED/PULSE METER
■ DISPLAY UNIT ■ SENSOR CONTROLLER
■ SWITCHING POWER SUPPLY ■ GRAPHIC PANEL
■ STEPPING MOTOR & DRIVER & CONTROLLER
■ LASER MARKING SYSTEM(CO2, Nd:YAG)

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