Autonics

PANEL METER
MT4Y 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.

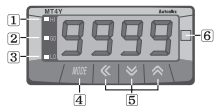
⚠ Warning

1. **In case of using this unit with machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
   It may cause a fire, human injury or damage to property.
2. **It must be mounted on the Panel.**
   It may cause electric shock.
3. **Do not connect, inspect and repair terminals when it is power on.**
   It may cause electric shock.
4. **Do not disassemble and modify this unit. Please contact us if it is required.**
   It may cause electric shock and a fire.
5. **Please check the number of terminal when connecting power line or measured 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 cause 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.)
2. **When connecting wire, AWG20(0.50mm²) should be used and tighten screw bolt on terminal block with 0.74N•m to 0.90N•m strength.**
   It may cause a malfunction or a 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 organic solvent. And use dry cloth.**
   It might cause an electric shock or a fire.
6. **Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray the sun, 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 measurement terminals.**
   It may cause a fire or explosion.

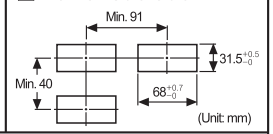
■ Front panel identification



1. HI: High output indication of preset
2. GO: Go output indication of preset
3. LO: Low output indication of preset
4. MODE: Mode Key
5. ▽△: Control key
6. Unit label part

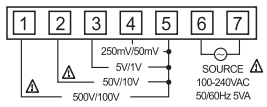
※There are no 1, 2, 3 output indication in Indicator type.

■ Panel cut-out

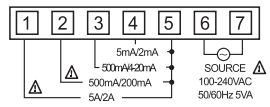


■ Terminal connection

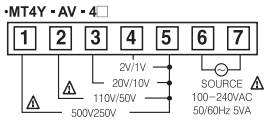
•MT4Y - DV - 4□



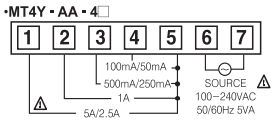
•MT4Y - DA - 4□



•MT4Y - AV - 4□

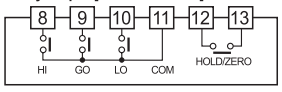


•MT4Y - AA - 4□

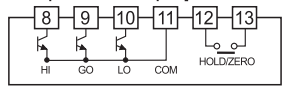


<Option>

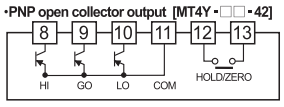
•Relay output [MT4Y - □□ - 40]



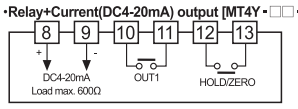
•NPN open collector output [MT4Y - □□ - 41]



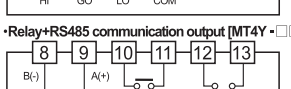
•PNP open collector output [MT4Y - □□ - 42]



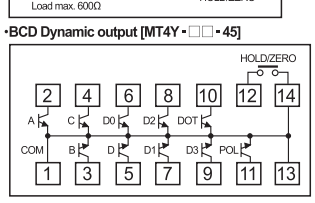
•Relay+Current(DC4-20mA) output [MT4Y - □□ - 43]



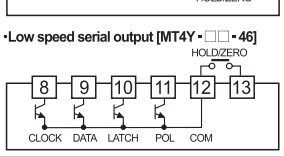
•Relay+RS485 communication output [MT4Y - □□ - 44]



•BCD Dynamic output [MT4Y - □□ - 45]

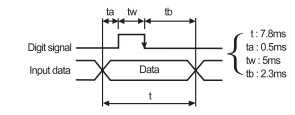


•Low speed serial output [MT4Y - □□ - 46]

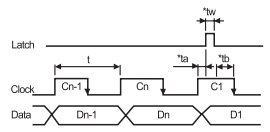


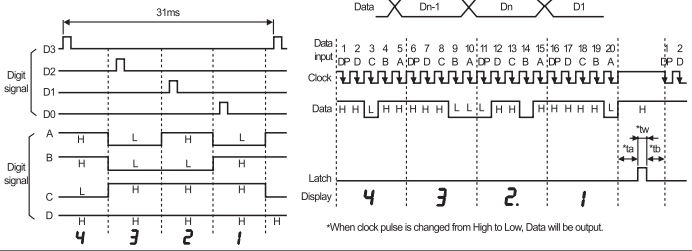
■ Time chart of serial output and BCD output

※BCD output(Negative logic)



※Low-speed serial output(Negative logic)

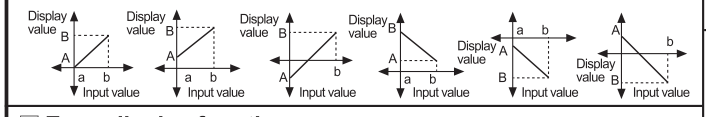




*When clock pulse is changed from High to Low, Data will be output.

■ Prescale function[PA 1: H-SC / L-SC]

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' 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	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-SC setting value
d-LL	Flashes when display input is exceeded L-SC setting value
F-HH	Flashes when input frequency is exceeded the max. display value of measurement range
ouEr	Flashes when it exceeds zero range (±99)

※Error display is released automatically when it is in the measured and display range.
※"LLLL" is displayed when the measured input is 4-20mA.
※After flashing "ouEr" 2 times when it exceeds the zero range, it returns to RUN mode.

■ Monitoring max./min. display value function
[PA 0: H.PEU / L.PEU, PA 2: PEU.t]

It monitors max./min. value of display value based on the current displays value and then displays the data at H.PEU, L.PEU of parameter 0. Set the delay time(0 to 30 sec.) at PEU.t of parameter 2 in order to prevent malfunction 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 the set time.When pressing any one of ▽△ keys at H.PEU, L.PEU of parameter 0, the monitored data is initialized.
※Monitoring function is not displayed when the delay time is set as "00 S" at PEU.t of parameter 2.

※The above specifications are subject to change and some models may be discontinued without notice.

■ Specifications

Series	MT4Y
Power supply	100-240VAC 50/60Hz (90 to 110% of rated voltage)
Power consumption	5VA
Display method	7Segment LED Display(Red)
Display accuracy	23°C ± 5°C ☞ DC Type: F.S.±0.1% rdg±2digit / AC Type: F.S.±0.3% rdg±3digit (Frequency: F.S.±0.1% rdg±2digit) F.S +0.3% rdg +3digit max. only for 5A terminal. -10°C to 50°C ☞ DC/AC Type: F.S.±0.5% rdg±3digit
Input specification	DC Voltage/Current, AC Voltage/Current, AC Frequency
Max. allowable input	110% F.S. for each measured input range
A/D conversion method	Practical oversampling using successive approximation ADC
Sampling cycle	50ms (DC), 16.6ms (AC 60Hz)
Max. indication range	-1999 to 9999 (4Digit)
Preset output	• Relay output ☞ Contact capacity:250VAC 3A, 30VDC 3A/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, Communication method: 2-wire half duplex, Synchronous method: Asynchronous method, Protocol: Modbus type • Serial/BCD output ☞ NPN Open collector output, 12-24VDC Max. 50mA(Resistive load) • DC4-20mA output ☞ Resolution: 12,000division (Load resistance max. 600Ω), Response time:Max. 450ms
AC measurement function	Selectable RMS or AVG
Frequency measurement function	Measured range:0.100 to 9999Hz(Variable by decimal point position)
Hold function※1	Includes(External hold function)
Environment: Ambient temperature	-10 to 50°C, Storage: -20 to 60°C
Environment: Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH
Insulation type	Double insulation or reinforced insulation (Dielectric strength between the measuring input part and the power part : 1kV)
Approval	CE cULus
Unit weight	Approx. 134g

※1: The indicator type has no Hold function.
※Environment resistance is rated at no freezing or condensation.

■ Specification of measured input and range [PA 1: in-r]

Type		Measured input and range	Input impedance	Display range [Stnd]
DC Volt	0-500V	[500u]	4.33315MΩ	0.0 to 500.0(Fixed)
	0-100V	[100u]	4.33315MΩ	0 .0 to 100.0(Fixed)
	0-50V	[50u]	433.15kΩ	0.00 to 50.00(Fixed)
	0-10V	[10u]	433.15kΩ	0.00 to 10.00(Fixed)
	0-5V	[5u]	43.15kΩ	0.000 to 5.000(Fixed)
	0-1V	[1u]	43.15kΩ	0.000 to 1.000(Fixed)
	0-250mV	[0.25u]	2.15kΩ	0.00 to 250.00(Fixed)
	0-50mV	[50An]	2.15kΩ	0.00 to 50.00(Fixed)
DC Ampere	0-5A	[5A]	0.01Ω	0.000 to 5.000(Fixed)
	0-2A	[2A]	0.01Ω	0.000 to 2.000(Fixed)
	0-500mA	[0.5A]	0.1Ω	0.0 to 500.0(Fixed)
	0-200mA	[0.2A]	0.1Ω	0.0 to 200.0(Fixed)
	0-50mA	[50An]	1.0Ω	0.00 to 50.00(Fixed)
	4-20mA	[4-20]	1.0Ω	4.00 to 20.00(Fixed)
	0-5mA	[5An]	10.0Ω	0.000 to 5.000(Fixed)
	0-2mA	[2An]	10.0Ω	0.000 to 2.000(Fixed)
AC Volt	0-500V	[500u]	4.987MΩ	0.0 to 500.0(Fixed)
	0-250V	[250u]	4.987MΩ	0.0 to 250.0(Fixed)
	0-110V	[110P]	1.087MΩ	0.0 to 440.0(Fixed)
	0-50V	[50u]	1.087MΩ	0.00 to 50.00(Fixed)
	0-20V	[20u]	200kΩ	0.00 to 20.00(Fixed)
	0-10V	[10u]	200kΩ	0.00 to 10.00(Fixed)
	0-2V	[2u]	20kΩ	0.000 to 2.000(Fixed)
	0-1V	[1u]	20kΩ	0.000 to 1.000(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)
	0-1A	[1A]	0.05Ω	0.000 to 1.000(Fixed)
	0-500mA	[0.5A]	0.1Ω	0.0 to 500.0(Fixed)
	0-250mA	[0.25A]	0.1Ω	0.0 to 250.0(Fixed)
	0-100mA	[0.1A]	0.5Ω	0.0 to 100.0(Fixed)
	0-50mA	[50An]	0.5Ω	0.00 to 50.00(Fixed)

dot	Display range
0	-1999 to 9999
0.0	-199.9 to 999.9
0.00	-19.99 to 99.99
0.000	-1.999 to 9.999

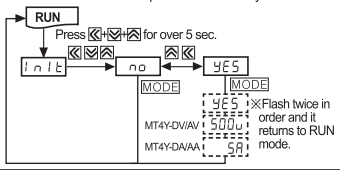
(Display range is variable according to decimal point position.)

※Please wire the proper terminal to its max. input within 30 to 100% of the input terminal.
When it is higher than input , it may cause terminal breakdown and over display range.
The accuracy is decreased when it is connected to the terminal under 30%.

※ 110P is standard specification 440V/110VAC P.T.

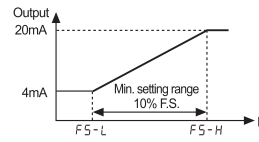
■ Initialization function

This function is to initialize parameter as factory default.



■ Current output(DC4-20mA) scale adjustment function
[PA 2: FS-H / FS-L]

It sets current output for the display value at the output current DC 4-20mA.
It sets display value for 4mA at FS-L and 20mA at FS-H and the range between FS-H and FS-L should be 10% F.S.(When it sets 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.



■ Error correction function
[PA 1: inb.H / inb.L]

It corrects display value error of measured input.
inb.L :±99 (Adjust deviation of low value)
inb.H: 5.000 to 0.100(Correct gradient(%) of high value)
Display value=(Measured value × inb.H) + inb.L
When the measured range is 0 to 500V, and the display range is 0 to 500.0. If the low display value is "12" to 0V input, set -12 as the inb.L value to display "0.0" by adjusting the offset of the low value. The display value to the 500V measured input varies by adjusting the offset of the low value. If this display value is "501.0", calculate 500.0/501.0 (the desired display value/the display value), and set the 0.998 correction value as the inb.H to display "500.0" by adjusting the gradient of the high value.

※The offset correction range of inb.L is within -99 to +99 regardless of dot.

■ AC frequency measurement function [PA 1: di SP]

It measures input signal frequency when it is AC input.
It uses fixed decimal point[PA1: dot], measured range can be changed by setting and measured range of decimal point position is as below chart. It is available to adjust the upper gradient at [PA 1: inb.H] and [PA 1: inb.E]. In order to measure frequency normally, input signal, over 10% F.S. of the measured range, should be supplied. Please select the proper point of measurement terminal.

①Measured range

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

※Accuracy of frequency measurement: Below 1kHz, F.S. ±0.1rdg ±2digit. From 1kHz to 10kHz, F.S. ±0.3rdg ±2digit.
②inb.H: 0.100 to 9.999
(Gradient adjustment of high value)
③inb.E : 10⁻², 10⁻¹, 10⁰, 10¹
(Index adjustment of inb.H)

■ Zero adjustment function

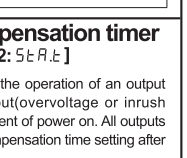
It adjusts the indication value of the optional configured input value as zero by force, zero point error can be adjusted with 3 ways as below.
When zero adjustment adjustment with front key and Hold terminal is finished normally, zero of measurement terminal is displayed and the adjusted value is saved at inb.L automatically.

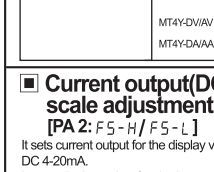
Operation	Input correction value	Front key	Input external signal
Description	PA 1: Direct input correction value method at inb.L.	Press both ▽△ keys for 3 sec. at the RUN mode.	Short-circuit external Hold terminal no.12, 13 over min.50m.

※Refer to description "■ Error correction function, ■ Error display function, ■ Parameter 2" for function and error.

■ Gradient correction function [PA 1: inb.H]

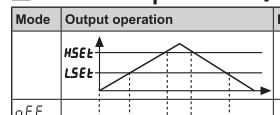
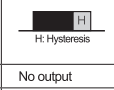
It corrects the gradient of prescale value and display value.
(Figure 1)Display value Y can be adjusted as α, β times against X input value by correction function [inb.H] and used as correction function of max. display value [H-SC]. Adjustment range is 0.100 to 5.000 and multiply current gradient.
Ex)Input:200mVDC, Display:3.000 for MT4Y-DV type
①Select 0-1VDC for measured input in Parameter 1.
②Standard specification in input: 0-1VDC and 1.000 therefore it has to be 15.000(H-SC) for 1VDC(Input) in order to display 3.000 for 200mVDC(Input).
But it is unable due to setting range is 9.999.
③In this case, please check below chart. Please set as inb.H × H-SC = 15.000





Setting method	H-SC	L-SC	inb.H	Note
①	Unavailable	0.000	1.000	-
②	7.500	0.000	2.000	In this case, any setting methods display the same display 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: oUt.t]

Mode	Output operation	Description
HSEt / LSEt		 H: Hysteresis
oFF		No output
L.St	GO / LO	If it is equal or lower than Low setting value, LO output is ON. If it is higher than Low setting value, GO output is ON.
H.St	HI / GO	If it is equal or higher than High setting value, HI output is ON. If it is equal or lower than High setting value, GO output is ON.
L H.St	HI / GO / LO	LO output is ON when it is equal or lower than Low setting value. HI output is ON when it is equal or higher than High setting value. GO output is ON when it is higher than Low setting value, and lower than High setting value.
HH.St	HI / GO / LO	LO output is ON when it is equal or higher than Low setting value. HI output is ON when it is equal or higher than High setting value. GO output is ON when it is lower than Low/High setting value.
LL.St	HI / GO / LO	LO output is ON when it is lower with Low setting value. HI output is ON when it is equal or lower than High setting value. GO output is ON when it is higher than Low/High setting value.
Ld.St	GO / LO / HI:	It is operated same with L.St but LO output does not operate under initial Low setting value, and it is ON from under next Low setting value. If this is higher than Low setting value, GO output is ON.

※HSEt / LSEt are displayed according to the setting of output operation mode, when user sets "oFF", HSEt / LSEt are not displayed.
※RS485 / DC4-20mA outputs provide L.St only.
※BCD Dynamic output / Low speed serial output are not available.

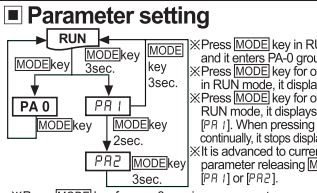
■ Display cycle delay function [PA 2: di S.t]

In some applications the measured input may fluctuate which in turn causes the display to fluctuate. By adjusting the display cycle delay function time at di S.t of 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.

■ Parameter

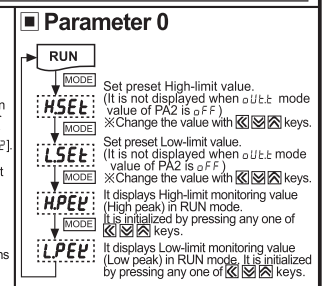
Parameter	Display		Function	Note
PA 1 (Parameter 1)	in-t	Input type	Selectable RMS/AVG in AC type	Available AC type only.
	in-r	Input range	Selection of input range	-
	di SP	Display	Selection of display type	Selectable: Stnd/SCAL/FrE9
	Stnd	Standard	Standard scale range	Display max. display value of Stnd
	FrE9	Frequency	Frequency display	Available AC type only.
	SCAL	Scale	Scale range	These are displayed at SCAL only . It sets max/min. display value(-1999 to 9999).
	H-SC	High scale	Set max. value of display range	
	L-SC	Low scale	Set min. value of display range	
	dot	Dot	Set decimal point position	It is displayed in SCAL/FrE9 only and set the position.
	inb.H	Input bias high	Correct high-limit value of display value	Stnd/SCAL: Correction range: 0.100 to 5.000 FrE9: Correction range: 0.100 to 9.999
	inb.L	Input bias low	Correct low-limit value of display value	Set range:-99 to +99
	inb.E	Input bias exponent	Set display index of frequency mode	Set range: $10^{-2}/10^{-1}/10^{0}/10^{1}$
PA 2 (Parameter 2)	oUt.t	Out type	Set operation mode of preset output	Selectable oFF/LSt/HSt/LHSt/HHSt/LLSt/LdSt
	HYS	Hysteresis	Set hysteresis value	Set range: 1 to 10% F.S.
	StA.t	Startup compensation time	Set startup compensation time	Set range: 0.0 to 99.9 sec.
	PEU.t	Peak time	Set monitoring delay time for peak value(sec)	Set range:00sec to 30sec
	di S.t	Display time	Set sampling time(sec.)	0.1 to 5.0 sec.(Variable by 0.1 sec.)
	ZEro	Zero key	Set usage of front side zero adjustment key	no: Not use front side zero adjustment key YES: Use of front side zero adjustment key
	Eu In	Event input	Set external terminal(12, 13) function	Hold: Use external terminal as Hold terminal ZEro: Use external terminal as zero point adjustment terminal
	FS-H	Full scale high	Set the upper value output point or PV output	Min. set range: Min. 10% F.S.
	FS-L	Full scale low	Set the lower value output point or PV output	Max. set range: Max. FS-H 10%
	Adr5	Address	Set communication address	Set range : 01 to 99
	bPS	Bit per second	Set baud rate(bps)	Selectable 1200/2400/4800/9600
	PrtY	Parity bit	Set parity bit	Selectable nonE/EuEn/odd
	St P	Stop bit	Set stop bit	Selectable 1/2
	rSU.t	Response waiting time	Set response wating time	Set range : 5 to 99
	Loc	Lock	Set lock function	Selectable oFF/Loc1/Loc2/Loc3
PA 0 (Parameter 0)	H.SEt	High set	Set high setting value	Setting range can be set within the display range of Stnd/SCAL
	L.SEt	Low set	Set low setting value	
	H.PEU	High peak	Max. value by data monitoring	Initializes the monitored data value by pressing any one of ▽△ keys.
	L.PEU	Low peak	Min. value by data monitoring	

■ Parameter setting



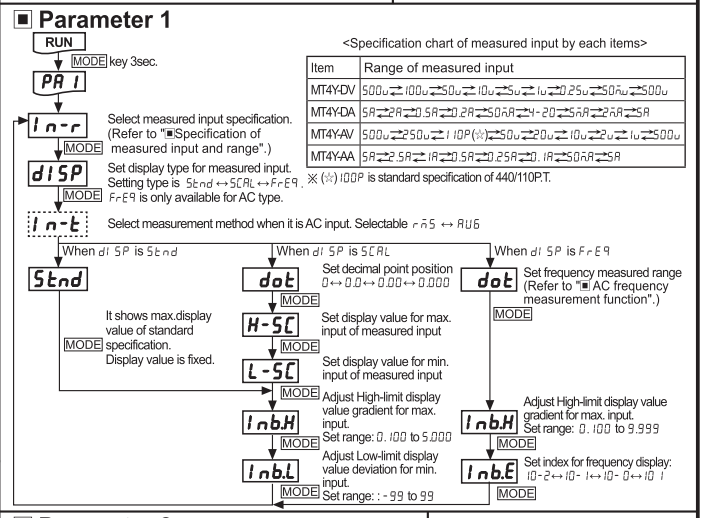
※Press MODE key in RUN mode and it enters PA-0 group.
※Press MODE key for over 3 sec. in RUN mode, it displays [PA 1].
※Press MODE key for over 5 sec. in RUN mode, it displays [PA 2] after [PA 1]. When pressing MODE key continually, it stops displaying at [PA 2].
※It is advanced to current display parameter releasing MODE key at [PA 1] or [PA 2].
※Press MODE key for over 3 sec. in any parameter groups, it returns to RUN mode.
※If any key is not entered for 60 sec. in each parameter, it returns to RUN mode.
※After returning to RUN mode, press MODE key within 2 sec., it returns to previous parameter. (Refer to the below descriptions of each parameter group.)
※PA-0 group cannot be entered when preset output mode of [PA 2] group is OFF.

■ Parameter 0



※If PEU.t monitoring delay time of Parameter 2 is set as "00 S", HPEU and LPEU are not displayed.

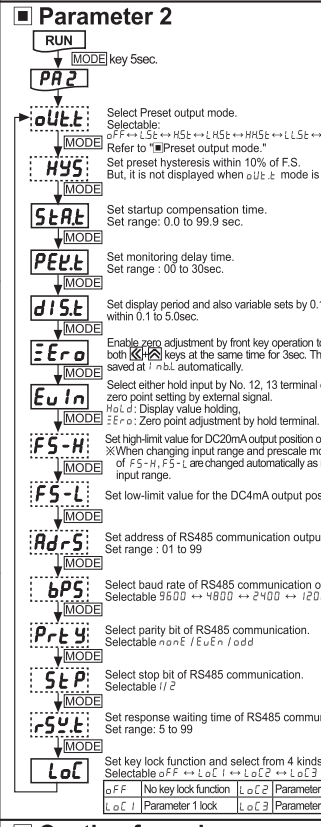
■ Parameter 1



<Specification chart of measured input by each items>

Item	Range of measured input
MT4Y-DV	500u⇄100u⇄50u⇄10u⇄5u⇄1u⇄0.25u⇄50mu⇄500u
MT4Y-DA	5A⇄2A⇄0.5A⇄0.2A⇄50mA⇄4-20⇄5mA⇄2mA⇄5A
MT4Y-AV	500u⇄250u⇄110P(☆)⇄50u⇄20u⇄10u⇄2u⇄1u⇄500u
MT4Y-AA	5A⇄2.5A⇄1A⇄0.5A⇄0.25A⇄0.1A⇄50mA⇄5A

■ Parameter 2



oFF	No key lock function	Loc2	Parameter 1, 2 lock
Loc1	Parameter 1 lock	Loc3	Parameter 0, 1, 2 lock

■ Change the parameter setting value

1. Advance to the parameter to be changed when pressing MODE key continuously in RUN mode and releasing MODE key at the parameter.(Refer to "■Parameter setting")
2. When pressing MODE key in each parameter, the initial mode of the parameter is displayed. (Refer to the description of each parameter.)
3. When pressing one of ▽, ▽, △ keys in display mode, the saved setting value is displayed.

Ex) Mode: in-r → Press one △ → Setting value: 250u → The saved setting value flashes every 0.5 sec.

4. Change the setting value by △ or ▽ key when setting value flashes.

Ex) Change AC type measured input from 250V to 125V.
Mode: in-r → Press one △ → Setting value: 250u → Press one ▽ → Setting value: 125u → MODE → diSP

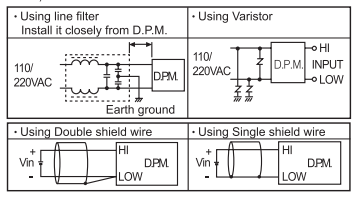
5. When confirming the setting value with MODE key , the changed setting value flashes twice and enters into the next setting.
6. It returns RUN mode from parameter by pressing MODE key for 3 sec.

■ User manual for communication

Visit our website (**www.autonics.com**) to download the user manual for communication of MT series.

■ Caution for using

1. Allowable installation environment
   ①If shall be used indoor ②Altitude Max. 2000m ③Pollution Degree 2 ④Installation Catergory II
2. Please use the terminal(M3.5, Max.7.2mm) when connecting the AC power supply.
3. Please use separated line from high voltage line or power line in order to avoid inductive noise.
4. Please install power switch or circuit breaker in order to cut off the power supply.
5. The switch or circuit breaker should be installed near by users for safety.
6. Be sure to avoid using the following unit near by machinery making strong high frequency noise. (High frequency welder & Sewing machine, High capacity SCR unit etc.)
7. When input is applied, if "HHHH" or "LLLL" is displayed, there is some problem with measured input, please check the line after power off.
8. Noise inflowing from power line can cause serious problem for D.P.M.(Digital Panel Meter) driving by AC power supply. Even though there is condenser for protecting noise between lines at primary side of power transformer, but it is very difficult to install protection components at small size product like D.P.M. Therefore, please use noise absorber circuit such as line filter, varistor in external lines when voltage failure occurs by power relay, magnet S/W and high frequency equipment are operated in same line or surge occurs by spark of high voltage or thunder etc.
9. Input line: Shield wire must be used when the measuring input line is getting longer in the place occurring lots of noise.



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

■ Major products

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connector/Sockets
- Temperature controllers
- Temperature/Humidity transducers
- SSR/Power controllers
- Counters
- Timers
- Panel meters
- Tachometer/Pulse(Rate) meters
- Display units
- Sensor controllers
- Switching mode power supplies
- Control switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper motors/drivers/motion controllers
- Graphic/Logic panels
- Field network devices
- Laser marking system (Fiber, CO_2, Nd:YAG)
- Laser welding/soldering system

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