T904 Intelligent Ampere , voltage and Process Meter

■ Features

- Super version of panel meter.
- Various output options(Default : Indicator)
  RS485 Communication output, Current(4-20mA), NPN/PNP open collector output,
  Relay output.
- Max. measuring input specification: 500VDC, 500VAC, 5ADC, 5ACA.
- Max. display range : -1999 t0 9999.
- High/Low scale function.
- AC frequency measurement function : 0.1 t0 9999Hz.
- Various functions : Monitoring function for max. and min. display value function, display cycle delay function,Zero function, High display correction function,Current output scale function.
- Wide range of power supply : 12-24VDC, 100-240VAC 50/60Hz.

> ⚠ Please read "Caution for your safety" in operation manual before using.

■ ordering information

T904 — ① ② ③ — ④

①

Code	Dimensions (width X height)
G	48X48mm
F	48X96mm

②

Code	Signal input type
AA	AC Ampere
AV	AC Voltage
Hz	AC frequency
DA	DC Ampere
DV	DC Voltage
SVA	Analog signal (Process Meter)

*measuring input range as shown in Table 1

③

Code	OUTPUT
N	indication type(no output function)
0	relay contact output
1	transmission output(4-20mA)
2	RS485 communication output
3	relay+4-20mA
4	relay+RS485
5	relay+4-20mA+RS485

④

Code	measuning method for AC
None	average: avg/root
R	mean square: rms

■ Measuning input and range

Table 1

Type	Measuning input and range
AC Ampere	0.000-5.000A
	0.000-1.000A
	0.0-200.0mA
	0.00-20.00mA
AC Voltage	0.0-500.0V
	0.0-200.0V
	0.00-20.00V
	0.000-2.000V
AC frequency	1-9999Hz/0.1-999.9Hz/0.10-99.99Hz/0.100-9.999Hz
DC Ampere	0.000-5.000A
	0.000-1.000A
	0.0-200.0mA
	0.000-2.000mA
DC Voltage	0.0-500.0V
	0.0-200.0V
	0.00-20.00V
	0.000-2.000V
Analog signal (Process Meter)	0-20mA/4-20mA/0-10V/2-10V/0-5V/1-5V/0-1V/0-500mV/0-200mV/ 0-100mV

■ Specifications

|	
Display accuracy	● 23℃+5℃ - DC Type: F.S. +0.1% rdg+2digit /AC Type: F.S. +0.3% rdg+3digit 　　　　　 DC/AC Type F.S +0.3% rdg +3digit max. only for 5A terminal. ● -10℃ t0 50℃ - DC/AC Type: F.S.+0.5% rdg+3digit
Power supply	100-240VAC 50/60Hz(Allowable voltage range: 90 t0 110%)
Power consumption	≤5VA
Display method	7Segment LED display(red)
Measurement input	AC Ampere/AC Voltage/AC frequency/DC Ampere/DC Voltage/Analog signal
Max. allowable input	110% F.S for each measured input range
A/D conversion method	Practical oversampling using successive approximation ADC
Sampling cycle	DC type: 50ms, AC type: 16.6ms
Max. indication range	−1999 t0 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. (Resistive load)

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 DC4-20mA output - Resolution: 12,000 division(Load resistance max. 600Ω)
AC measuring function	Selectable RMS or AVG
Frequency measurement function	Measurement range : 0.100 t0 9999Hz(Variable by decimal point position)
Hold function	Includes(External hold function)
Auxiliary output voltage	DC24V 50mA.Max
Insulation resistance	Min. 100MΩ(at 500VDC megger) between external terminal and case
Dielectric stength	2,000VAC for Iminute between external terminal and case
Noise stength	±2kV the square wave noise(pulse width : 1μs) by the noise simulator
ambient temperature	−10 t0 50℃, storage: -20 t0 60℃
ambient humidity	35 t0 85%RH storage: 35 t0 85%RH

＊AC measuring function, and frequency measuring function are only for AC measuring input type.
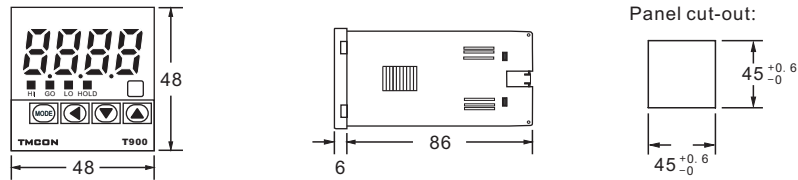
＊Environment resistance is rated at no freezing or condensation.

■ DimenSionS(Unit:mm)

● T904-F （48X96mm）

Panel cut-out:

● T904-G （48X48mm）

Panel cut-out:
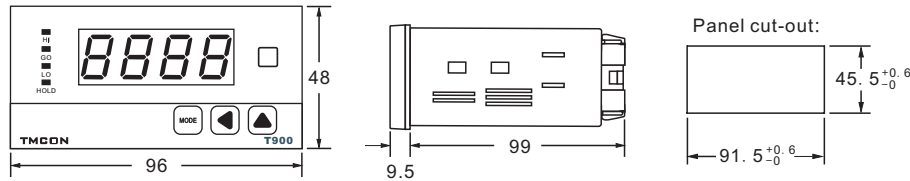
■ Front panel identification

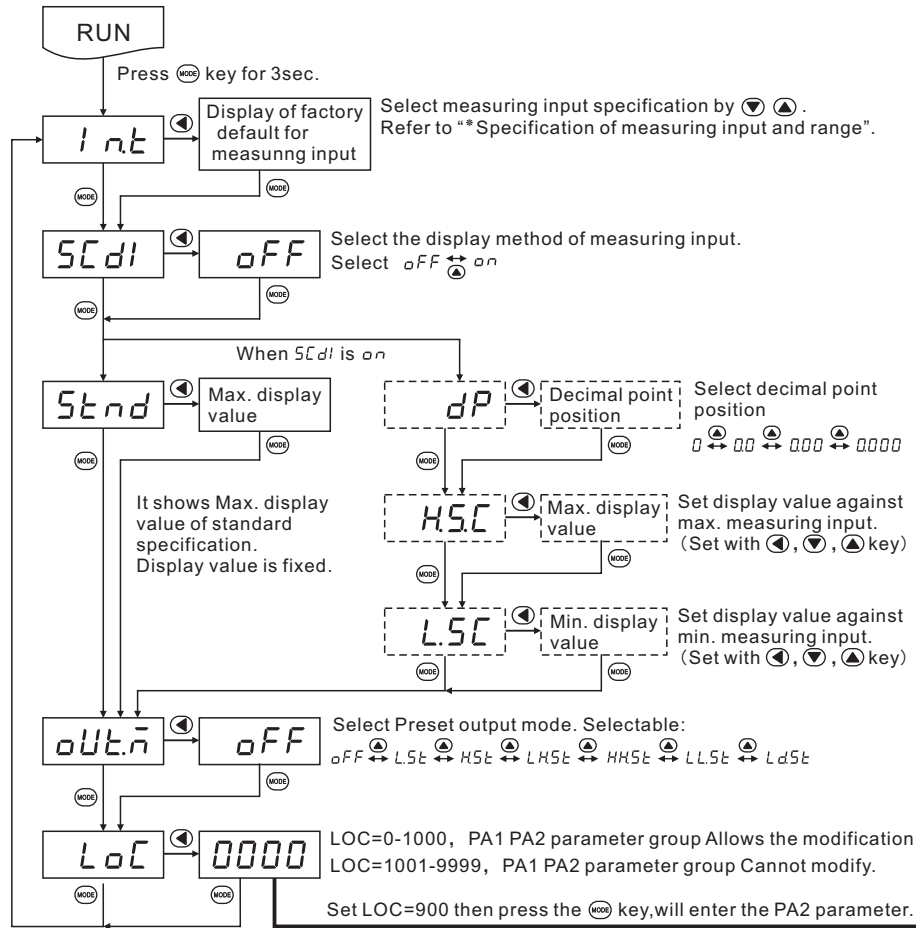| lamp	Explain	Key	Explain
HI	HI : High output indication of preset	MODE	Mode Key,enters parameter mode.
GO	GO : GO output indication of preset	◀	Moves digit
LO	LO : Low output indication of preset	▲	changes Sv, up key
HOLD	HOLD input signal indication	▼	changes Sv, down KEY (T904-F Without this key)

■ Parameter setting
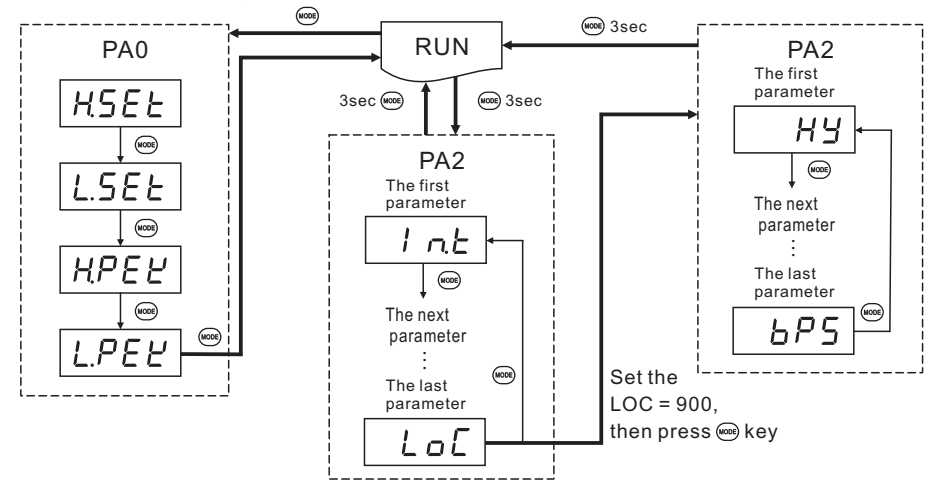
＊Press MODE key in RUN status, it will advance to [PA0](Parameter 0) group.
＊Press MODE key for 2 sec. in RUN mode, [PA1] is displayed.
＊set LOC=900 then press the mode key,in [PA1](Parameter 1),[PA2] is displayed.
＊Press MODE key for 3 sec., it is returned to RUN at any position.
＊If any key is not touched for 60 sec. in each parameter, it returns to RUN mode.
＊Press the MODE key in the parameter group can switch the display the next parameter.
＊It cannot advance to[PA0] when preset output operation mode of [PA1] is [OFF] .

■ [PA0](Parameter 0) group

Set preset High-Iimit value. (Set with ◀ , ▼ , ▲ key)
＊It is displayed when set the preset only.
When set oFF in oUt.ā mode if parameter 1 group, the parameter is not displayed.

Set preset Low-Iimit value. (Set with ◀ , ▼ , ▲ key)
＊It is displayed when set the preset only.
When set oFF in oUt.ā mode if parameter 1 group, the parameter is not displayed.

It shows High-Iimit monitoring value while it is in RUN mode
It will be reset by pressing ◀ key.

It shows Low-Iimit monitoring value while it is in RUN mode
It will be reset by pressing ◀ key.
＊If "00" is set in PEEE mode of PA-2, HPEE and LPEE modes will not be displayed.

■ [PA1](Parameter 1) group

RUN

Press ⓜ️ₒdₑ key for 3sec.

I n.t → Display of factory default for measuring input

Select measuring input specification by ▼ ▲.
Refer to "＊Specification of measuring input and range".

SCdI → **oFF**

Select the display method of measuring input.
Select oFF ⇄ on

When SCdI is on

Stnd → Max. display value

It shows Max. display value of standard specification.
Display value is fixed.

dP → Decimal point position

Select decimal point position
0 ⇄ 0.0 ⇄ 0.00 ⇄ 0.000

H.SC → Max. display value

Set display value against max. measuring input.
(Set with ◀, ▼, ▲ key)

L.SC → Min. display value

Set display value against min. measuring input.
(Set with ◀, ▼, ▲ key)

oUt.ñ → **oFF**

Select Preset output mode. Selectable:
oFF ⇄ L.St ⇄ H.St ⇄ LHSt ⇄ HHSt ⇄ LL.St ⇄ LdSt

LoC → **0000**

LOC=0-1000, PA1 PA2 parameter group Allows the modification.
LOC=1001-9999, PA1 PA2 parameter group Cannot modify.

Set LOC=900 then press the ⓜ️ₒdₑ key,will enter the PA2 parameter.

＊Measuring input chart by model.

Item	Range of measuring input
T904-□AA	5A ⇄ 1A ⇄ 0.2A ⇄ 20ñA (5A)　(1A)　(200mA)　(20mA)
T904-□AV	500u ⇄ 200u ⇄ 20u ⇄ 2u (500V)　(200V)　(20V)　(2V)
T904-□DA	5A ⇄ 1A ⇄ 0.2A ⇄ 2ñA (5A)　(1A)　(200mA)　(2mA)
T904-□DV	500u ⇄ 200u ⇄ 20u ⇄ 2u (500V)　(200V)　(20V)　(2V)
T904-□SVA	0-20 ⇄ 4-20 ⇄ 0-10 ⇄ 2-10 ⇄ 0-5 ⇄ 1-5 ⇄ 0-1 ⇄ 500 ⇄ 200 ⇄ 100 (0-20mA)　(4-20mA)　(0-10V)　(2-10V)　(0-5V)　(1-5V)　(0-1V)　(0-500mV)　(0-200mV)　(0-100mV)

■ [PA2](Parameter 2) group

HY → **000.0**

Set preset hysteresis. Within 10% of F.S.
But, it is not displayed when oUt.ñ mode is oFF.

I n.b.H → **1.000**

It corrects a gradient of High-limit display value against max. input.
The settng range is 0.100 t0 5.000(%).

I n.b.L → **00**

It corrects deviation of Low-limit display value against Min. input
Setting range is -99 t0 99 (Refer to zero point function)

AuG.n → **2**

Average Processing(Setting range :OFF-2-4-8-16-32-64-128).
The value of AuG.n will determine the ability of filtering noise.
When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, it can be set to 2 to 8.

PEU.t → **00 S**

Set monitoring delay time.
Setting range : 00 t0 30sec.

ΞUE.Y → **on**

Select zero function with operation at front.
When ◀ + ▲ Key key are pressed for 3 sec to set YES, it will be zero function and the deviation value is saved automatically at I n.b.L mode. oFF ⇄ on

Coñr → **00**

Zero-limit Function.
The zero-limit function changes any value below the set value to zero.(Setting range : 00~99.)

EuI n → **HoLd**

Select input with 6, 7(T904-F) terminal or zero function for extemal signal.
HoLd :Holding display value, ΞEro : Zero function using Hold/Zero terminal.

LoP.t → **4-20**

Transmission output selection.(0-20mA/4-20mA)
0-20 ⇄ 4-20

H.LoP → **500.0**

Set the high limit value, output point of current output 20mA.
(When changing measuring input and prescale mode, it is changed automatically as maximum value of input range)

L.LoP → **000.0**

Set the low limit value, output point of current output 4mA.
(When changing measuring input and prescale mode, it is changed automatically as minimum value of input range)

Adr S → **01**

Set the address of RS485 communication output.
Setting range : 01~ 99

bPS → **9600**

Select Baud rate of RS485 communication output.
9600 ⇄ 4800 ⇄ 2400 ⇄ 1200

＊After setting each mode, press ⓜ️ₒdₑ key for 3 sec. to return to RUN mode.

■ Functions

•Display scale function[PA1 group: HSC / LSC]

This function is to display setting(-1999 t0 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.
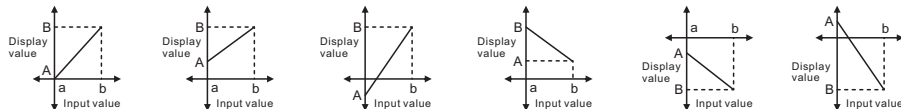
•Gradient correction function[PA2 group: $InbH$]

It corrects the gradient of prescale value and display value (Picture 1) Display value Y can be used as a, ß times against X input value by correction function[$InbH$] and used as correction function of max. display value(HSC). Adjustment range is 0 100 t0 5 000 and multiply current gradient.

Ex)input:200mVDC, Display:3.000 for T904-FDV type

① Select 0-1VDC(1V) for measured input in Parameter 1

② Standard specification in input: 0-1VDC and 1.000 therefore it has to be 15.000(HSC) for 1VDC (input) in order to display 3.000 for DC200mV(input).
But it is unable due to setting range is 9.999

③ in this case, please check below chart.
Please set as $InbH$ x HSC =15.000

setting method	H.SC	L.SC	Inb.H	note
①	unavailable	0	1.000	In this case, any setting methods display the same display value
②	7500	0	2.000	
③	5000	0	3.000	
④	3750	0	4.000	
⑤	3000	0	5.000	

(Picture 1)

(Example of gradient correction)
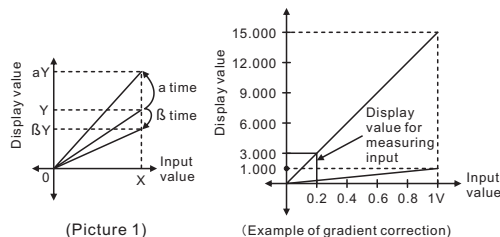
•Error correction function[PA2 : $InbH$ / $InbL$]

It corrects display value error of measured input.

$InbL$: +99(Adjust deviation of low value)

$InbH$: 5.000 to 0.100(Correct gradient(%) of high value)

Diplay value=(Measured value x $InbH$) + $InbL$

When the measured range is 0 to 500V, and the display range is 0 to 500.0. if the low display value is "l2" to 0V input, set -12 as the $InbL$ value to display "00"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 " 50 10 ",calculate 500.0/501.0(the deslred dlsplay value/the display value), and set the 0.998 correction value as the $InbH$ to display "5000" by adjusting the gradient of the high value.

*The offset correction range of $InbL$ is within -99 to for D^{-0}, D^{-1} mdigit regardless of dicimal point.

•Average Processing[PA2 : $AuGn$]

Average processing stabilizes displayed values to minimize flicker by averaging the fluctuating input signals. Average processing can be performed for the measurement values in either of eight steps (OFF, 2 times, 4 times, 8 times,16 times,32 times,64 times, or 128 times). This is useful for ignoring rapid fluctuations, e.g., eliminating spike noise.

•Zero adjustment function(Deviation correction function of low limit display value)

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 measurement terminal is displayed and the adjusted value at saved in $InbL$ automatically.

Operation	Input correction value	Front panel key	External input signal
Description	PA1: Direct input correction value method at $InbL$ mode.	Press both ◀ , ▲ keys for 3 sec. at the measuring mode.	Short-circuit external Hold terminal No.6, 7(T904-F)]over min. 50ms. *It is enable to use in option mode.

＊Refer to "•Error correction function", "•Error display function" and" ■Parameter 2" for function and error.

•Current output(DC4-20mA) scale function[PA2 group: $HLoP$ / $LLoP$]

It sets current output for the display value at the output current DC 4-20mA.

It sets display value for 4mA at $LLoP$ and 20mA at $HLoP$ and the range between $HLoP$ and $LLoP$ should be 10%

＊When min. set interval between $HLoP$ and $LLoP$ is 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 $LLoP$ and 20mA at over $HLoP$.
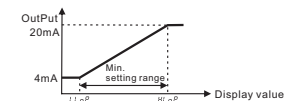
•Monitoring max./min. display value function[PA 0: $HPEU$ / $LPEU$,PA2 : $PEUt$]

It monitors Max. /Min. display value based on the current displays value and then displays the data at $HPEU$, $LPEU$ of parameter 0. Set the delay time(0 t0 30sec.) at $PEUt$ of parameter 2 in order to prevent malfunction caused by initial over current or over voltage, when monitoring the peak value. Delay time is 0 t0 30sec. and it starts to monitor the peak value after the set time. When pressing any one of ◀ key at $HPEU$, $LPEU$ of parameter 0, the monitored data is initialized.

＊Monitoring function is not displayed when the delay time is set as "00 5" at $PEUt$ of parameter 2.

•Zero-limit Function[PA2 : $CoЗr$]

The zero-limit function changes any value below the set value to zero. This is useful when you want to change negative values to zero rather than display them, or when you want to make the display in the smallest part of the input range zero.
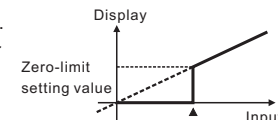
•Error display function

Display	Description
$HHHH$	Flashes when measurement input is exceeded the max allowable input (110%)
$LLLL$	Flashes when measuremnet input is exceeded the min allowable input (-10%)
$d-HH$	Flashes when display input is exceeded HSC set value
$d-LL$	Flashes when display input is exceeded LSC set value
$H-HH$	Flashes when input frequency is exceeded the max. display value of measured range
$ЗEno$	Flashes when it exceeds zero range (+ 99)

•Initialization function

It initializes as the factory default status. If press ⓜⓞⓓⓔ , ◀, ▲ keys together for 2sec. in RUN mode, $InLt$ mode and the setting value(no) is displayed every 0.5 sec. and it will be initialized as the factory default when press ⓜⓞⓓⓔ key after change no ↔ yES

•AC frequency measurement function

It measures input signal frequency when it is AC input. It uses fixed decimal point[PA1: dP], 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 2: $InbH$]and [PA 2: $InbE$]. 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

① Measuring range

Decimal point position	0.000	00.00	000.0	0000
Measurement range	0.100~9.999HZ	0.10~99.99HZ	0.1~999.9HZ	1~9999HZ

*Accuracy of frequency measurement :
Below 1kHz, F.S. ±0.3rdg ±2digit.
From 1kHz t0 10kHz, F.S. ±0.3rdg ±2digit.
② $InbH$: 0.100 to 9.999 [Gradient adjustment of high value]
③ $InbE$: 10^{-2} , 10^{-1} , 10^{0} , 10^{1} [Index adjustment of $InbH$]

•Preset output mode[PA 1: $oUt.\bar{n}$]

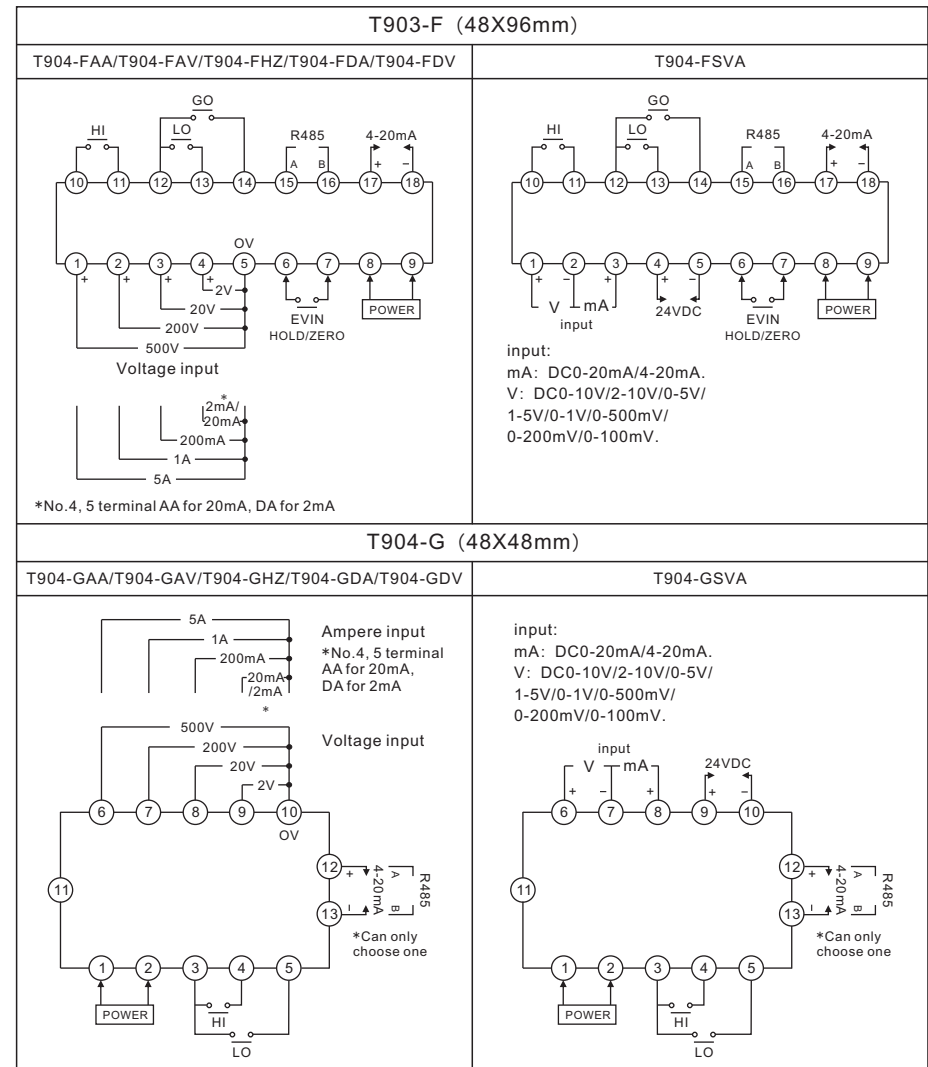| Mode	Output operation	Operation
	H.SEt L.SEt	HY: Hysterisis
oFF		No output
$L.5t$	GO LO HY	If is equal or lower than Low setting value, LO output is ON. if it is higher than Low setting value, GO output is ON.
$H.5t$	HI HY GO	If it is equal or higher than High Setting value, HI output is ON. If it is equal or lower than High Setting value, GO output is ON.
$LH.5t$	HI HY GO LO HY	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.
$HH.5t$	HI HY GO LO HY	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.
$LL.5t$	HI HY GO LO HY	LO output is ON when it is lower than 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.
$Ld5t$	GO LO HY	It is operated same with $L.5t$ but LO output does not operated 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

*$H5Et$ is displayed according to the Setting of output operation mode,when user sets " oFF ", $H5Et$ / $L5Et$ are not displayed.

•User manual for communication
To support the MODBUS RTU communication protocol.
Visit our website (www.china-tmcon.com) download or contact us directly.

■ Terminal connection

T903-F （48X96mm）	
T904-FAA/T904-FAV/T904-FHZ/T904-FDA/T904-FDV	T904-FSVA
Voltage input *No.4, 5 terminal AA for 20mA, DA for 2mA	input: mA：DC0-20mA/4-20mA. V：DC0-10V/2-10V/0-5V/ 1-5V/0-1V/0-500mV/ 0-200mV/0-100mV.

T904-G （48X48mm）	
T904-GAA/T904-GAV/T904-GHZ/T904-GDA/T904-GDV	T904-GSVA
Ampere input *No.4, 5 terminal AA for 20mA, DA for 2mA Voltage input *Can only choose one	input: mA：DC0-20mA/4-20mA. V：DC0-10V/2-10V/0-5V/ 1-5V/0-1V/0-500mV/ 0-200mV/0-100mV. *Can only choose one

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