

TOHO ELECTRONICS INC.

DIGITAL INDICATOR **TRM-006**

INSTRUCTION MANUAL

Thank you for purchasing model TRM-006 Digital Indicator.

Please go through this Instruction Manual carefully and use the unit in proper manner.

TRM-006 is the Digital Indicator covering the basic function of indicator as well as an optional Communication function by RS-485. It indicates digital display of temperature signal and Current/Voltage signal from Thermocouple and R.T.D as an Input, and also indicates Peak/Bottom Hold value.

In addition to these functions, it functions as Event Output(Option) at specific temperature (range).

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1. NOTICE BEFORE OPERATION

- Confirm the merchandises at hand shows the correct model and optional goods.
For confirmation of model name, please refer [8. ORDERING INFORMATION]
- The following symbol marks are used in this Instruction Manual for handling this model safely.



WARNING

In case of mishandling, serious danger may occur to the operator such as death, electrocution and a skin burn.



CAUTION

In case of mishandling, it may cause some damage to the unit or the operator getting slight injury.



CAUTION

- Do not push the keys by sharp points(i.e.Ball-point-pen, metals) for prevention of its malfunction.

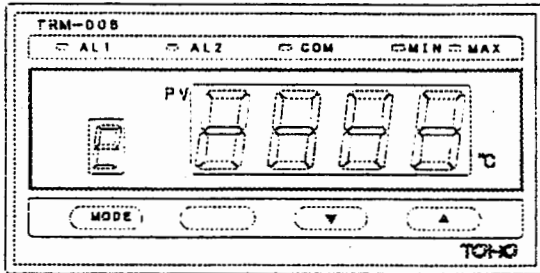


WARNING

- Make sure the correct wiring connection before turning on electricity.
Miswiring may cause malfunction of the unit and may cause a fire.
- Do not alter the unit for prevention of malfunction of unit and a fire.
- Please confirm the attachments of this unit such as: Instruction Manual(This booklet).
- Types of Input and Output cannot be altered after receiving the unit.
However, the type of Input specified thermocouple 3 types and R.T.D 2 types can be changed.
- After the delivery from our factory, if you take out the unit from the original box, it may terminate our warranty prior to the original warranty period.
- Please put this Instruction Manual aside of the operator of unit.
- Copy or Reprint of this manual, wholly or partially, is not allowed.
- The contents of this manual may change without notice in future.
- Please be noted that we shall not be responsible to all of the defaults resulted by using of the unit.

2. PARTS INDICATION

PV DISPLAY: Indicates PV with 4 digit
 CHARACTER DISPLAY: Indicates the condition at Display and Setting.



AL1 : Lights On when an optional Event Output 1 turns ON mode.
 AL2 : Lights On when an optional Event Output 2 turns ON mode.
 COM : Lights ON at Communication mode and blinks while operation.
 (For the unit with an optional Communication function.)

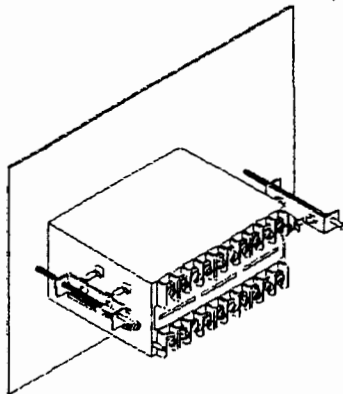
MAX : Lights On when the display indicates Peak Value.
 MIN : Lights On when the display indicates Bottom Value
 MODE KEY : Utilize to changeover each Mode of Display and Setting.
 SHIFT KEY : Utilize to shift Parameter in combination with MODE Key.
 UP/DOWN Key: Utilize to change Setting Value

3. INSTALLATION METHOD

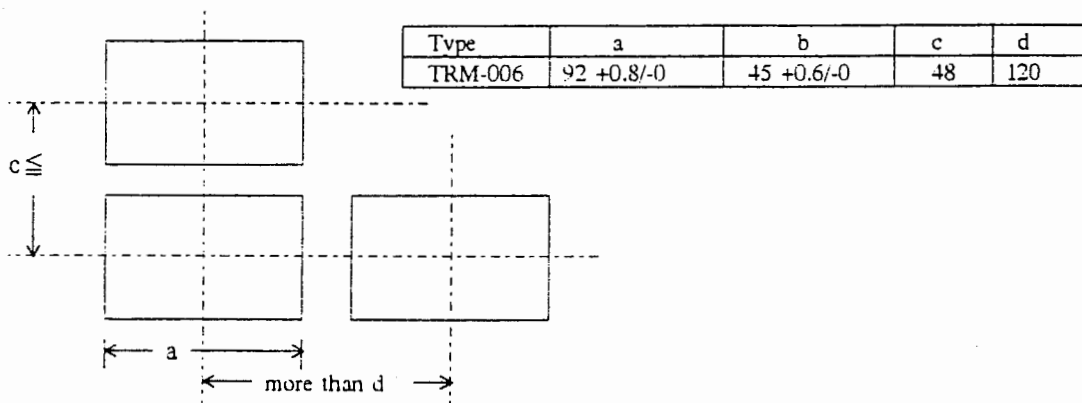
For proper operation of unit, please mount this unit at the following locations.

- Temperature and Humidity are within the limit of operation environment.
- Away from the gas of sulfide, oil and corrosion.
- Far away from the equipments using high-voltage ignition devices and also away from the influence of electromagnetic field.
- Less mechanical vibration and shock.
- Away from the direct sunshine.
- Away from the direct dampness or the flood with water.

Mounting Method



3.1 Dimensions and Drawing of Panel Cut

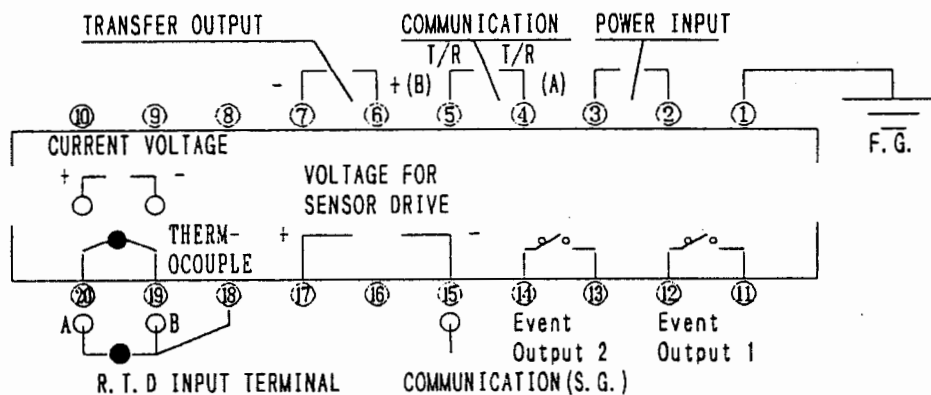


4. TERMINAL CONNECTION DRAWING

- Caution for wiring connection:
 - For prevention of miswiring, please make sure to confirm the name labels i.e. Input terminal, Power source terminal and Option terminals etc beside the each wire.
 - Please make connection to the ground earth for the items with FG terminals.
 - The wiring material to connect R.T.D. and this unit should be used the one having wire resistance less than 5 Ω per wire.
 - The wiring material to connect Thermocouple and this unit should be used the specified extension leadwire of thermocouple or leadwire itself.
 - In case this unit should be used close to the noise generators, please use shield-wires. Please do not wire the Input/Output lines inside of the same duct and the pipes of electric wires.
 - The signal wire of Input/Output should be away from power supply and loaded lines at least 50cm.
 - This unit does not function for approx. 4 seconds after Power input. (No function at Output side) Please be cautious when this unit is used as Interlock circuit.

- Terminals:

The crimp terminals for wiring connection should be fit with the nuts of M3.5.



5. OPERATION FLOW AND PARAMETER

Operation key	Description
MODE	Utilize for changing over Character Display
UP/DOWN	Utilize for alteration of each setting value
SHIFT + UP/DOWN	Utilize to input from 3rd digit numbers, and also for setting the value of Input Abnormal Event Output.
UP/DOWN (Hold) SHIFT+MODE (Simultaneous)	Utilize to change the value continuously of each setting value. When SHIFT and MODE keys are pressed for more than 2 seconds simultaneously, the display of MODE and PARAMETER may change. (If no key operation made for more than 2 minutes at Parameter Display, the display may change automatically to MODE Display.)

When 2 different Characters indicated on the display in this chart, it means that the display may change alternately at every 0.5 seconds.

MODE DISPLAY (Display may change by pressing Mode Key)

	□	Display Type of Input. Displays approx. 4 seconds after Power input. ↓ Press MODE Key
A		Process Value (PV) ↓ Press MODE Key
B	Lights ON LED "MIN"	PV Bottom Hold Value. Display at the setting of Bottom Hold/Peak/Bottom Hold Setting ↓ Press MODE Key

C	Lights ON LED 'MAX'	PV Peak Hold Value. Display at the setting of Peak Hold/Peak/Bottom Hold Setting ↓ Press MODE Key
D	I L	Event Output 1 Low Limit Setting Value. Displays when an optional Event Output 1 selected. ↓ Press MODE Key
E	I H	Event Output 1 High Limit Setting Value. Displays when an optional Event Output 1 selected. ↓ Press MODE Key
F	2 L	Event Output 2 Low Limit Setting Value. Displays when an optional Event Output 2 selected. ↓ Press MODE Key
G	2 H	Event Output 2 High Limit Setting Value. Displays when an optional Event Output 2 selected. ↓ Press MODE Key to return A.

CHARACTER DISPLAY (Display may change by pressing SHIFT-MODE Keys for more than 2 seconds.)

	Indicate	Displays	Remarks	
1	A	00	Display Type of Input ↓ Press MODE Key	
2	L	1000	Scaling Low Limit ↓ Press MODE Key	
3	H	9000	Scaling High Limit ↓ Press MODE Key	
4	u	0	PV Correction Value ↓ Press MODE Key	
5	F	1	Digital PV Filter ↓ Press MODE Key	
6	u	OFF	PV Hold Function Setting ↓ Press MODE Key	
7	E 1	000	Event Output 1 Function Setting ↓ Press MODE Key	Displays at Event Output 1.(Option)
8	E 2	000	Event Output 2 Function Setting ↓ Press MODE Key	Displays at Event Output 2.(Option)
9	E C	0	Event Output Sensitivity ↓ Press MODE Key	Displays at Event Output 1 or 2.
10	E	u0	Select Transfer Function Setting ↓ Press MODE Key	Displays at Transfer function(Option)
11	.	0.0	Decimal Position ↓ Press MODE Key	
12	o	oC	Changeover °C / ° F ↓ Press MODE Key	
13	b	on	Buzzer Sound YES/NO ↓ Press MODE Key	Displays when an optional Buzzer is selected.
14		6872	Communication Parameter ↓ Press MODE Key	Displays when an optional Communication is selected.
15	S	4800	Designate Communication Speed ↓ Press MODE Key	- ditto -
16	A	1	Communication Address ↓ Press MODE Key	- ditto -
17	B	0	Response Delay Time ↓ Press MODE Key	- ditto -
18	o	LCL	Changeover Local/Communication ↓ Press MODE Key	- ditto -
19	u	OFF	Designate Key Lock ↓ Press MODE Key to return 1.	

6. DESCRIPTION OF SETTING (SETTING RANGE / MEANINGS)

Character	Description	Setting Range	Initial Value	Remarks
A	Lights OFF	PV display		Indicates PV value
B	MIN-LED	PV Bottom Hold Value	PV from Power Input	Displays at setting of Bottom Hold or Peak/Bottom Hold. Push UP key for 2 sec.to reset
C	MAX-LED	PV Peak Hold Value	PV from Power Input	Ditto.but at Peak Hold or Peak/Bottom Hold.
D	1↔L	Event Output 1 Low Limit Setting	Thermocouple -1999~9999	Displays at Event Output 1 with output setting at Low Limit or High/Low Limit.
E	1↔H	Event Output 1 High Limit Setting	R.T.D. -199.9 ~ 999.9	Ditto, but at High or High/Low Limit
F	2↔L	Event Output 2 High Limit Setting	Current/Voltage: -1999~9999 -199.9 ~ 999.9 -19.99 ~ 99.99	Displays at Event Output 2 with output setting at Low Limit or High/Low Limit.
G	2↔H	Event Output 2 High Limit Setting	-1.999 ~ 9.999	Ditto, but at High or High/Low Limit

The Characters of the above D ~ G appear on the display alternately with 0.5 seconds interval.

Character	Description	Setting Range	Initial Value	Remarks				
1	□ TYPE OF INPUT	Thermocouple	00 K Thermocouple 01 J Thermocouple 02 E Thermocouple 03 T Thermocouple 04 R Thermocouple 05 S Thermocouple 06 N Thermocouple 07 W5Re/W26Re	00	Displays for 4 seconds after Power input.			
		R.T.D.	10 Pt100 Ω 11 JPt100 Ω	10				
		Current	30 4~20mA	30				
		Voltage	20 1~5VDC	20				
			40 0~1VDC	40				
			50 0~10VDC	50				
			60 0~10mVDC	60				
			70 0~5VDC	70				
		2	L	SCALING LOW LIMIT: Thermocouple		Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling High Limit should be more than 50 °C / ° F Setting unit: 1 °C or 1 ° F	0	Displays at Transfer Output.
				R.T.D.		Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling High Limit should be more than 50 °C / ° F Setting unit: 1 °C or 1 ° F	-1000	
Current/ Voltage	Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling High Limit should be more than 50 digit Setting unit: 1 digit			-1000	Displays at any cases.			

3	H	SCALING HIGH LIMIT: Thermocouple	Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling Low Limit should be more than 50 °C / ° F Setting unit: 1 °C or 1 ° F	1200	Displays at Transfer Output.	
		R.T.D.	Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling Low Limit should be more than 50 °C / ° F Setting unit: 1 °C or 1 ° F	5000		
		Current/ Voltage	Setting range: Full span Low Limit ~ Full span High Limit. However, the difference with Scaling Low Limit should be more than 50 digit Setting unit: 1 digit	9000	Displays at any cases.	
4	L	PV Correction Value	Setting range: ± 10% (Against full span) Setting unit: Same as its basic unit	0	Displays at any cases.	
5	F	Digital PV Filter Setting Value	Setting range: 0 ~ 99 seconds Setting unit: Second (Time constant)	1	Displays at any cases.	
6	C	PV Hold Function Setting	OFF without Hold PEAK Peak Hold BOT Bottom Hold PEBT Peak/Bottom Hold	OFF	Displays at any cases.	
7	M	EVENT OUTPUT 1 FUNCTION:		000	The followings displays at Event Output 1. Indication at the digit of 100. Indication at the digit of 10. Indication at 1st digit. If the type of Event Output set at 0, only 0, 1, 2, 4 available. In case of no Buzzer, only 0, 1, 3, 5 available.	
		Input Abnormal Event Output	<input type="checkbox"/> None <input type="checkbox"/> Yes			
		Type of Event Output	<input type="checkbox"/> None 1 Event Output High/Low Limit 2 Event Output High Limit 3 Event Output Low Limit 4 Event Output High/Low Limit range			
		Additional Function	<input type="checkbox"/> None 1 Event Output Hold 2 Buzzer 3 Stand-by Sequence 4 Event Output Hold + Buzzer 5 Event Output Hold + Stand-by Sequence 6 Buzzer + Stand-by Sequence 7 Event Output Hold + Buzzer + Stand-by Sequence			
8	M	EVENT OUTPUT 2 FUNCTION	Same as above Event Output 1	000	Same as Event Output 1.	
9	M	EVENT OUTPUT SENSITIVITY	Setting range: 0 ~ 10% (Against full span) Setting unit: Same as its basic unit	<input type="checkbox"/> or 00	Displays when the type of Event Output is 0 at Event Output 1 or 2.	
10	E	SELECT TRANSFER FUNCTION	Current/Voltage	<input type="checkbox"/> Current Output <input type="checkbox"/> Voltage Output	10 or 00	Displays only at Transfer Output. No alteration of Current/Voltage possible. (Indications of Current/Voltage at 10th digit and Operation at 1st digit)
		Operation	<input type="checkbox"/> Normal <input type="checkbox"/> Reverse			

11	DECIMAL POINT: R.T.D.	<input type="checkbox"/> No Decimal point <input type="checkbox"/> Display down to 1st decimal	<input type="checkbox"/>	Displays at R.T.D Input.
		<input type="checkbox"/> No decimal point <input type="checkbox"/> Display down to 1st decimal <input type="checkbox"/> Display down to 2nd decimal <input type="checkbox"/> Display down to 3rd decimal	<input type="checkbox"/>	Displays at Current/ Voltage Input.
12	°C/° F Changeover	<input type="checkbox"/> C or <input type="checkbox"/> F	<input type="checkbox"/>	Displays at Thermocouple and R.T.D Input.
13	Buzzer Sound	<input type="checkbox"/> ON or <input type="checkbox"/> OFF	<input type="checkbox"/>	Displays when an optional Buzzer selected.
14	Communication Parameter	BCC: <input type="checkbox"/> No BCC check <input type="checkbox"/> With BCC check	<input type="checkbox"/>	Display at 4th digit.
		Data Length: <input type="checkbox"/> Data length 7 bit <input type="checkbox"/> Data length 8 bit		Display at 3rd digit.
		Parity check: <input type="checkbox"/> No parity <input type="checkbox"/> Odd parity <input type="checkbox"/> Even parity		Display at 2nd digit.
		Stop Bit: <input type="checkbox"/> Stop bit 1 <input type="checkbox"/> Stop bit 2		Display at 1st digit.
15	Communication Speed	<input type="checkbox"/> 1200 1200BPS <input type="checkbox"/> 2400 2400BPS <input type="checkbox"/> 4800 4800BPS <input type="checkbox"/> 9600 9600BPS	<input type="checkbox"/>	Displays at an optional Communication
16	Communication Address	Setting range: 1 ~ 99 Setting unit: 1	<input type="checkbox"/>	Displays at an optional Communication
17	Response Delay Time	Setting range: 0 ~ 250 Setting unit: mSEC	<input type="checkbox"/>	Displays at an optional Communication
18	Communication /Local Changeover	Local Mode(Only valid by LLL front key operation)	<input type="checkbox"/>	Displays at an optional Communication
		<input type="checkbox"/> Communication Mode(Setting by Communication possible)		
19	Key Lock Designation	<input type="checkbox"/> No Key lock	<input type="checkbox"/>	Displays at any cases.
		<input type="checkbox"/> All Parameter lock		
		<input type="checkbox"/> Parameter display lock		

7. OTHER DISPLAY INDICATIONS

	Display	Description	Trouble Shooting
PV Abnormal Indications	----	Displays when PV Value exceeded the High limit of Display range.	Check the snapping of thermocouple. 0-10mV Input and R.T.D. Input.
	----	Displays when PV value exceeded the Low limit of Display range.	Check short circuit of Input line at 1-5VDC and 4-20mADC. and also lines between A-B and A-b at R.T.D Input.
Warning Indications	LoC	Displays when Parameter to be changed while in Lock condition	Operate after cancelling Key Lock.
	CoN	Displays when Communication Parameters to be changed while in Lock condition.	Operate after setting operation mode into LLL .
Error Indications	Err0	Memory error.	In case this indication shows after the reinput of power, the repairing service is necessary.
	Err1	A/D converter error.	In case this indication shows after the reinput of power, the repairing service is necessary.

8. ORDERING INFORMATION

T R M - 0 0 6 - - -

Input	Symbol	Option	Symbol	Power supply(Option)	Symbol
Thermocouple	0	Event output 1(Relay contact)	A	85V ~ 264VAC	
R.T.D.	1	Event output 2(Relay contact)	B	24VAC/DC	24
1 ~ 5VDC	2	Buzzer	C		
4 ~ 20mADC	3	Transfer Output 1 ~ 5VDC	F		
0 ~ 1VDC	4	Transfer Output 0 ~ 10VDC	G		
04 ~ 10VDC	5	Transfer Output 0 ~ 10mVDC	H		
0 ~ 10mVDC	6	Transfer Output 4 ~ 20mADC	I		
0 ~ 5VDC	7	Communication(RS-485)	M		
		Sensor Drive Voltage (5VDC)	L		
		Sensor Drive Voltage (12VDC)	Q		

9. SPECIFICATION STANDARD

General specifications

Memory tip	EEP-ROM	
I/O isolation	Isolation between each Outputs and CPU. No isolation between Input and CPU.	
Power voltage	85 ~ 264VAC 50/60Hz or 24VAC/DC $\pm 10\%$ (option products)	
Power consumption	Below 12VA(264VAC), below 8VA(24VAC), below 5W(24VDC)	
Momentary power cut off	Within 1 cycle(20mS). Cut 100% power off on 100VAC at max. power consumption	
Insulation resistance	Between measuring terminal and the case itself. between power terminal and the case itself. 500VDC 20M Ω	
Voltage resistance	Between measuring terminal and the case itself 1000V/1 min between power terminal and the case itself 1000V/1 min.	
Standard environment	Temperature & Humidity range	23 \pm 10°C / 45~75%RH (Avoid making dew)
	Supply Voltage	100V \pm 5VAC (50Hz)
	Mounting angle	Datum surface ± 3 degrees
	Vibration	0G
	Impact	0G
Operation environment	Temperature & Humidity range	0 ~ 55°C 35% ~ 85%RH (Avoid making dew)
	Supply Voltage	85~264VAC (50~60Hz)
	Mounting angle	Datum surface ± 10 degrees
	Vibration condition	0.2G(10 ~ 55Hz Install the unit on vertical panel and make vibration to X.Y.Z direction for 2 hours.)
	Impact condition	0 ~ 1G(Install the unit on vertical panel and make an impact to X.Y.Z direction. but not continuous impact.)
Transportation/ storage environment	Temperature & Humidity range	-20 ~ 65°C 35 ~ 85%RH
	Vibration condition	0.5G(10 ~ 55Hz Install the unit on vertical panel and make vibration to X.Y.Z direction for 2 hours.)
	Impact condition	0 ~ 50G(Install the unit on vertical panel and make an impact to X.Y.Z direction. but not continuous impact.)
	Package Drop test	Drop from the height 60cm(Once for every 6 surfaces. Free drop method without any rotation movement.)
	Mechanical Specifications	Weight
Material		ABS resin (Front Case)

Standard and Performance

PV INPUT SECTION	Type of Input	Designate it at order among Thermocouple, R.T.D, Current and Voltage(5 types) The types of Thermocouple (8 types) can be selected by key operation. The 2 types of R.T.D can be also selected by key operation.			
	Sampling Cycle	0.5 sec. (same as output alteration cycle. However, it effect slightly difference by the setting of PV Filter)			
	Correction Function	PV Correction / Digital PV Filter / PV Hold			
	Input Resistance	Thermocouple	R.T.D.	Voltage	Current
		more than 1M Ω		more than 500K Ω (1~5V/0~1V/0~5VDC) more than 1M Ω (0~10V/0~10mVDC)	250 Ω
	Bias Current	approx.0.18 μ A (plus terminal)	Approx.0.2mA (from A terminal)	max.9nA(1~5V/0~1VDC /0~10V/0~5V) approx.0.18 μ A (plus terminal)	max.9nA
	Burn Out	Displays "OVER"			Zero input figure (0~1V/0~10V/0~5VDC) Display UNDER(1~5VDC) and OVER(0~10mVDC)
External Resistance	less than 100 Ω (as leadwire resistance)	less than 5 Ω (per 1 wire)			
DISPLAY/ SETTING SECTION	Display Indication System	PV	4 figures 7 segment LED(green) Height: 15mm		
		Character	4 figures 7 segment LED(red) Height: 8mm		
		Event Output 1	LED lamp (red)	Lights On at Event Output 1 start.	
		Event Output 2	LED lamp (red)	Lights On at Event Output 2 start.	
		Communication Mode	LED lamp (green)	Lights On while in Communication.	
		Bottom Value	LED lamp (red)	Lights On while indicating bottom value.	
		Peak Value	LED lamp (red)	Lights On while indicating peak value.	
Indication Accuracy	Thermocouple	R.T.D.	Current/Voltage		
	$\pm 0.3\%$ +1 digit of indicated value . or $\pm 3^{\circ}\text{C}$ (6°F), whichever larger.	$\pm 0.3\%$ +1 digit of indicated value . or $\pm 0.9^{\circ}\text{C}$ (1.3°F), whichever larger.	$\pm 0.3\%$ +1 digit against full span		
Setting Method	Set all parameters by the front keys. Except communication parameter. the setting can be altered by communication while in communication mode.				
Lock functions	Lock Release/ All Parameter Lock/ Parameter Display Lock				
Event Output	Specification Standarontact point: 1a Contact capacity: 250VAC 0.5A or 125VAC 1A (Load resistance) 220VDC 0.5A or 60VDC 1A (Load resistance) Endurance: more than 100.000 times. Minimum load resistance applicable:10mVDC 10 μ A				
ADDITION-AL FUNCTION	Transfer	TYPE	Output Capacity Range	Load Resistance	Common Specifications
	Output	1~5V DC 0~10V DC 0~10mV DC 4~20mA DC	0.6~5.4V DC 0~11V DC 0~11mV DC 2.4~21.5mA DC	more than 1K Ω more than 1K Ω more than 100K Ω less than 600 Ω	Output Resolving Power: More than each display resolving capacity. Output Response Time: within 600mSEC Output Accuracy: $\pm 0.3\%$

(continued from page 9.)

ADDITION -AL FUNCTION	Communi- cation	Communication system	Protocol: Specifications as per Toho Electronics standard Network :Conform to RS-485 standard./ Multi-drop method(max. 1:31 channels) Direction: semi duplex Synchronization: Start-Stop Synchronization Transfer code: ASCII (Except BCC data section)
		Interface System	Signal line: 3 line system(2 line for transmit/receive and 1 line for signal ground) Communication Speed: Select from 1200/2400/4800/9600 BPS. Communication distance: 500m(max. extension)
		Character	Start Bit: Fix at 1 bit. Stop Bit: Select from 1 / 2 bit. Data length: Select from 7 / 8 bit. Parity Bit: Select from None / Odd number / Even number. BCC check: Select from Yes / None. Communication address: Setting to 1 ~ 99
	Sensor Drive Voltage	5V DC	Loaded resistance: more than 500 Ω / Output Accuracy: less than ± 5%
		12V DC	Loaded resistance: more than 1.2K Ω / Output Accuracy: less than ± 5%

10. FUNCTION / DEFINITIONS

10.1 INPUT RANGE CHART

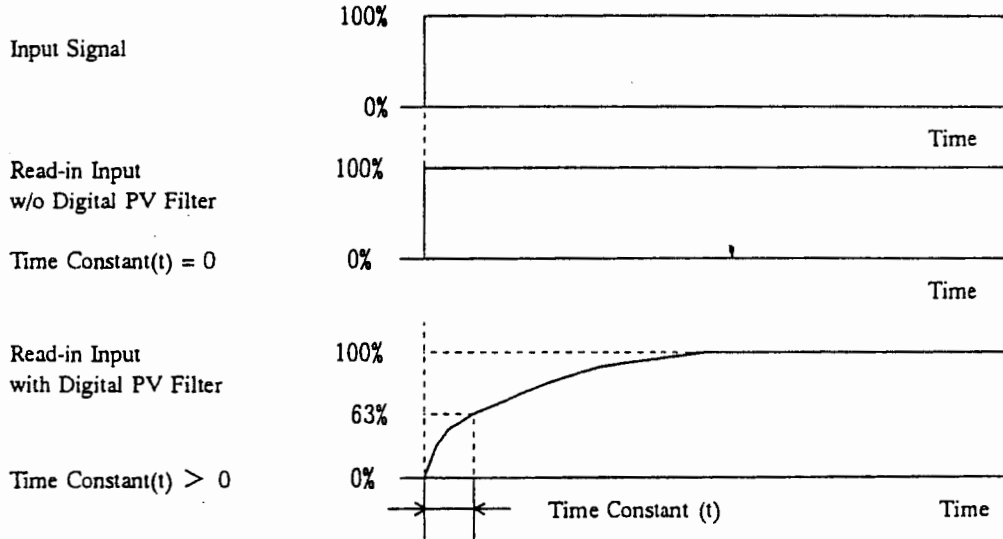
THERMOCOUPLE		Display Range	Setting Range	THERMOCOUPLE		Display Range	Setting Range
K (JIS/IEC)	°C	-40~1326	0~1200	R (JIS/IEC)	°C	0~1755	0~1700
	°F	-40~2501	0~2500		°F	32~3192	32~3100
J (JIS/IEC)	°C	-31~850	0~800	S (JIS/IEC)	°C	0~1730	0~1700
	°F	-24~1563	0~1450		°F	32~3146	32~3100
E (JIS/IEC)	°C	-27~833	0~800	N (IEC)	°C	0~1335	0~1300
	°F	-16~1531	0~1450		°F	32~2435	32~2350
T (JIS/IEC)	°C	-231~407	-200~400	W5Re/W26Re (ASTM)	°C	0~2336	0~2300
	°F	-385~765	-330~750		°F	32~4236	32~4200
R.T.D.		Display Range	Setting Range				
Pt100 (JIS/IEC)	°C	-199.9 ~ 539.1	-199.9 ~ 500.0				
	°F	-199.9 ~ 999.9	-199.9 ~ 950.0				
JPl100 (JIS)	°C	-199.9 ~ 529.0	-199.9 ~ 500.0				
	°F	-199.9 ~ 984.4	-199.9 ~ 950.0				
CURRENT/VOLTAGE		Display Range	Setting Range				
1~5V DC		Within setting range of: (FS-12%)~(FS+12%)	One of the following ranges:- -1999 ~ 9999 or -199.9 ~ 999.9 or -19.99 ~ 99.99 or -1.999 ~ 9.999				
4~20mA DC							
0~1V DC		Within setting range of: (FS-2%)~(FS+10%)					
0~10V DC							
0~10mV DC							
0~5V DC							

10.2 Peak Hold / Bottom Hold

Memorize the Bottom Value and the Peak Value of Process Variable(PV) from Power input. and anonfirm its value whenever it is necessary. It is also possible to display(memorize) only Bottom Value or Peak Value by setting. By holding down UP key for more than 2 seconds while indication of Peak/Bottom Value, the value indication be reset.

10.3 DIGITAL PV FILTER

By the operation of time lag of first order to the PV(Process Variable), it materialize CR Screen Effect on the software. The screen effect can be set by the time constant(t).
 (Time Constant means the time to achieve approx. 63% of PV value when the input changed in step)

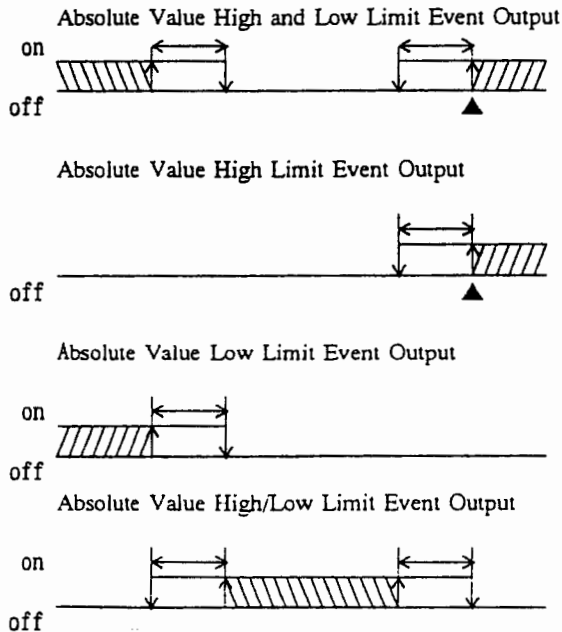


The use of Digital PV Filter:

- 1) Elimination of High Frequency noise: The noise to be reduced when the electric oscillation noise invaded to the input.
- 2) It can delay the response at the drastic change in input.

10.4 Event Output

The operation of each Event Output to be described as follows:-



The types of Event Output indicated left can be set optionally. Also the operation at Contact ON can be designated from the following additional functions:-

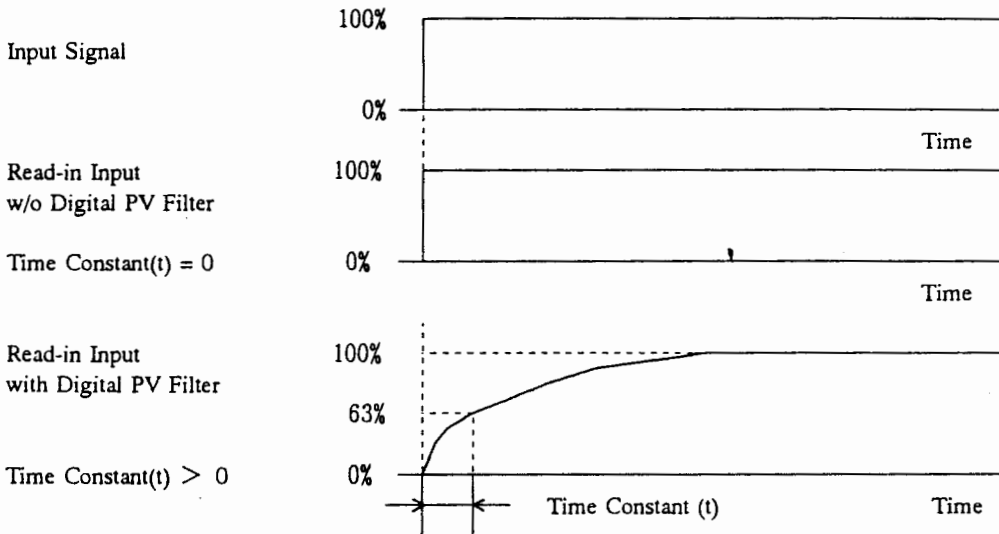
- None
- 1 Event Output Hold
- 2 Buzzer
- 3 Stand-by Sequence
- 4 Event Output Hold + Buzzer
- 5 Event Output Hold + Stand-by Sequence
- 6 Buzzer + Stand-by Sequence
- 7 Event Output Hold + Buzzer + Stand-by Sequence

10.5 Communication Standard

When an optional Communication was selected. Communication conformity with RS-485 can be utilized. In case of connection with the personal computer, please convert signal by using the converter of RS-232C/485. As for the details in communication command etc., the separate specification sheets are available with us. Please contact us to receive the separate "Communication Function Specification".

10.3 DIGITAL PV FILTER

By the operation of time lag of first order to the PV(Process Variable), it materialize CR Screen Effect on the software. The screen effect can be set by the time constant(t).
 (Time Constant means the time to achieve approx. 63% of PV value when the input changed in step)

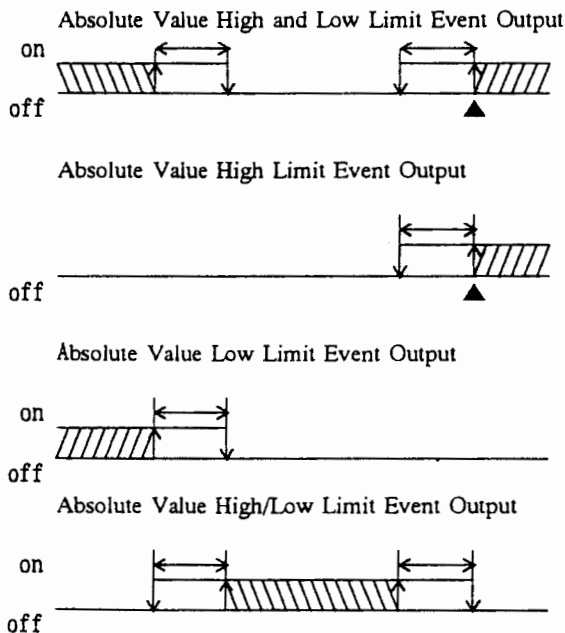


The use of Digital PV Filter:

- 1) Elimination of High Frequency noise: The noise to be reduced when the electric oscillation noise invaded to the input.
- 2) It can delay the response at the drastic change in input.

10.4 Event Output

The operation of each Event Output to be described as follows:-



The types of Event Output indicated left can be set optionally. Also the operation at Contact ON can be designated from the following additional functions:-

- 0 None
- 1 Event Output Hold
- 2 Buzzer
- 3 Stand-by Sequence
- 4 Event Output Hold + Buzzer
- 5 Event Output Hold + Stand-by Sequence
- 6 Buzzer + Stand-by Sequence
- 7 Event Output Hold + Buzzer + Stand-by Sequence

10.5 Communication Standard

When an optional Communication was selected, Communication conformity with RS-485 can be utilized. In case of connection with the personal computer, please convert signal by using the converter of RS-232C/485. As for the details in communication command etc., the separate specification sheets are available with us. Please contact us to receive the separate "Communication Function Specification".

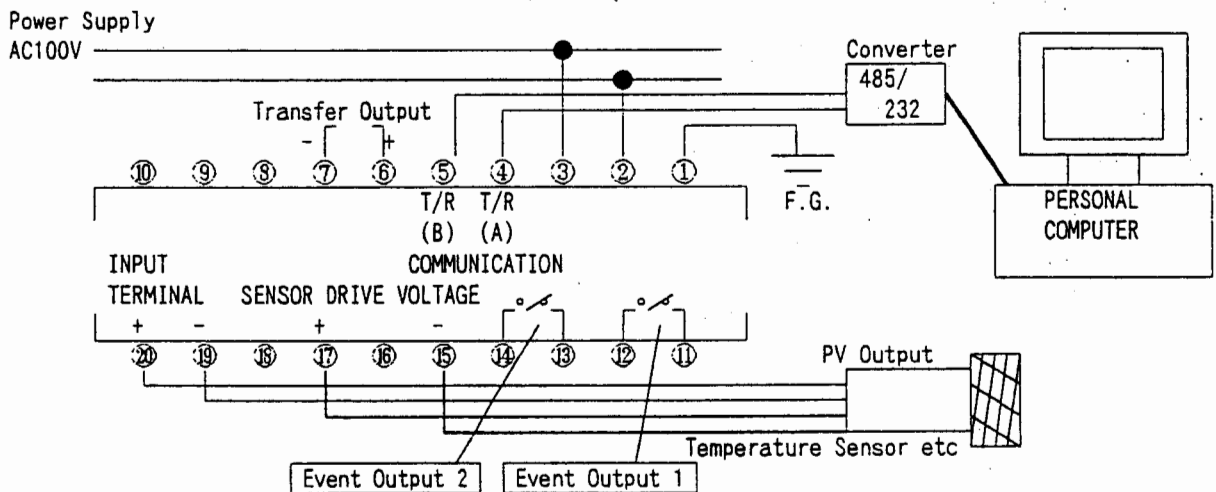
11. MAINTENANCE AND TROUBLE-SHOOTING

In case of the following difficulties found, please at first refer the column of Troubleshooting /confirmations as described below. If the trouble caused by the other reasons, please contact us for our official repairing service.

Troubles	Check points
Display does not come out.	Does the instrument correctly inserted in the case? Does the power terminals correctly connected? Does the Power sufficiently supplied?
Process Variable Incorrect	Does the type of sensor correctly set up? Does the proper figures set at PV correction value? Is the sensor normal? (Does another unit make the same error?)
Abnormal Output	Does output terminal correctly connected?

12. AN EXAMPLE IN USE

- Supply the Power to Temperature sensors etc., and make it operate to take the datas. The datas collected should be transmitted to the personal computers to utilize it for storage, editing and analyzing. For connection, utilize our model TRM-006-0 (or other Input)-ML (or Q(12V)).



TOHO ELECTRONICS INC.

HEAD OFFICE: 10213-23 Tana, Sagami-hara-city, Kanagawa 229-1124, Japan

Phone: 81-42-777-3311

FAX: 81-42-777-3751

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