

DIGITAL ALARM SETTER MODEL TW-3RA INSTRUCTION MANUAL

Caution

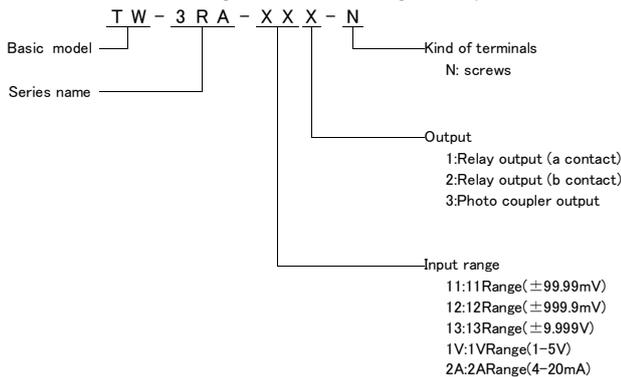
- (1) The equipment may be damaged if the input current or voltage exceeds the maximum allowed value.
- (2) Only use a supply voltage which is in the usable voltage range. Using a voltage outside this range may result in fire, electric shock, or damage to the equipment.
- (3) Please note that the contents of this manual may be changed without notice due to product modifications.
- (4) In preparing this manual, we made every effort to provide the best manual possible. Please contact your dealer or Watanabe Electric Industry if you notice any deficiencies, errors, omissions, etc.
- (5) After you finish reading the manual, keep it handy for future access.

1. Before using the product

Thank you for purchasing the TW-3RA Series. Keep this operating manual handy so that you can refer to it in the future. Check the contents of your package and contact your dealer or Asahi Keiki if you notice any problems (e.g., equipment damage).

1.1 Equipment numbers

The equipment numbers used with the TW-3RA Series follow the chart shown below. Make sure the product you selected when you placed your order has the same model number and specifications as the product you received.

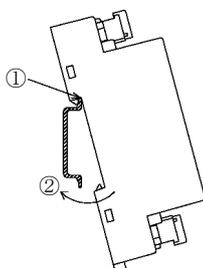


1.2 Standard accessories check

The TW-3RA package includes an operating manual (this document) two terminal cover and one unit seal.

2. Mounting • Dismounting

2.1 Mounting

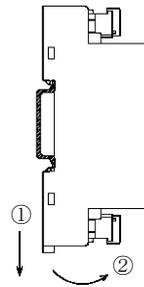


- ① Engage the top side of the transducer with the rail.
- ② Push the bottom side of the transducer into the rail.

Note:

If the transducer is dislocated after its mounting, it is recommended that a clamp be used.
(For example E/NS35N made by PHOENIX CONTACT)
When two or more meters are mounted side by side, avoid their contact by inserting a spacer between them.

2.2 Dismounting

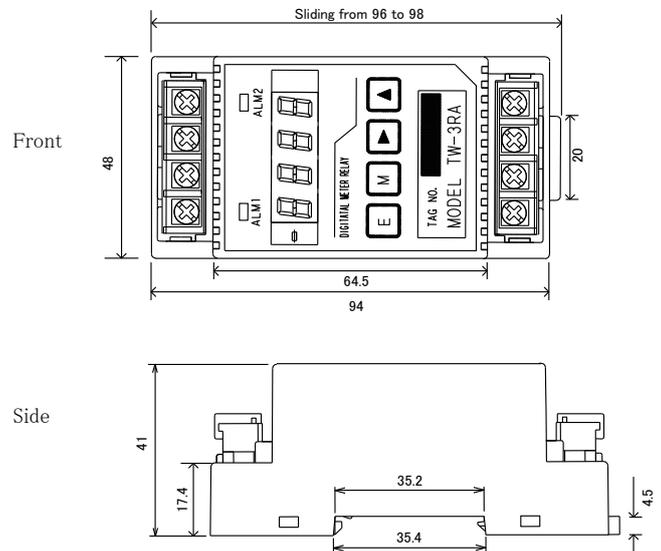


- ① Push down the slider using a screwdriver. Push up the bottom side of the transducer.
- ② Disengage the top side of the transducer from the rail.

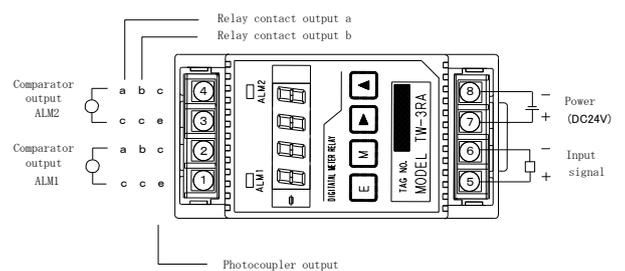
Caution

- (1) Make sure the installation location is strong enough to support the unit's weight. If it is not strong enough, or if the unit is not properly attached, the display may fall, possibly resulting in injury.
- (2) When installing the unit in a system, be sure there is sufficient heat dissipation so that the temperature inside the system does not reach or exceed 50°C.
- (3) Vibration or impact may be applied to the meter.

2.3 External dimensions



3. Terminal connection



Caution Note: Pay attention to the connection polarity.

⑦⑧ : Power source terminals (DC 24V POWER)

- A power source is connected to a power source terminal. The TW-3RA does not have a power switch. The power is turned ON as soon as the power source is connected.
- ⑤⑥ : Input signals
- Make the input signal lines as short as possible. Keep them away from other signal lines.
- If there is a lot of external noise, use a two-wire shielded cable and from a single connection between the outer sheath and the LO side at the signal source.
- If a harmonic noise is superimposed with the input signal, use a low-pass filter on the input side. However, note that a delay in response time may result depending on the operating condition.

①~④ : Comparative output terminals

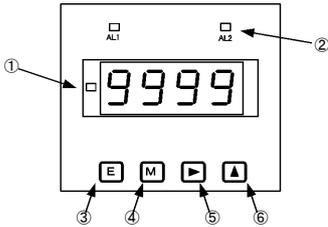
- Relay output
 - Contact capacity : 24V DC /1A(resistive load)
 - Mechanical lifespan : 5 million times min.
 - Electrical lifespan : 100,000 times min. (resistive load)
 - Photocoupler output
 - Output capacity : Voltage MAX.30V Current MAX.50mA
 - The maximum output saturation voltage is 1.2V at 50mA.
- *Use the relay output and photocoupler output within the range of the rated capacity.

Caution

- (1) Apply the rated voltage at once (gradually increasing the applied voltage may not turn the machine ON).
- (2) The time interval for turning the power ON/OFF should be at least 10 seconds(turning the power ON/OFF within 10 seconds may not turn the machine ON).

4. Parameter Setting

4.1 Component Name and Function



- ① Main display area: Displays measured values, as well as menus and their contents for parameter setting.
 - ② Check results display area: Displays the check results (When using the GO output, neither the AL1 nor the AL2 is flashing).
 - ③ ENTER switch: Move from the measurement mode to the parameter setting mode ("ENTER"+"Mode").
 - ④ Mode switch: IN the parameter setting mode, switch from one item to another. Move to the shift data setting mode ("Mode"+"Shift"). Turn the DZ terminal ON/OFF on the front panel ("Mode"+"Increment").
 - ⑤ Shift switch: In the parameter setting mode, switch from one digit to another. Move to the shift data setting mode ("Mode"+"Shift").
 - ⑥ Increment switch: Select numerical value("Increment")and the contents for parameter setting.
- *All parameters can be initialized by switching on a power supply, pushing all keys.

Parameter group

The parameters of the TW-3RA fall into the five categories below.

Condition data	A group of parameters that relate to the basic operations and functions of the TW-3RA, such as sampling rate.
Comparator data	A group of parameters that relate to comparative outputs.
Scaling data	A group of parameters that relate to measurements, such as decimal point and displayed value, and input signals.
Shift data	A parameter that relates to the function to forcibly shift a displayed value.
Linearize data	A parameter that performs corrections to determine a straight line representing input signals and displayed values.

4.1.1 Condition Data Setting

1234 (Measurement operation)

If M key is pushed in the state of each menu or there is no key operation during 1 second, it will shift to contents selection of a parameter. Moreover, when there is no key operation during 8 seconds at the time of selection of the contents of a parameter, it returns to a menu.

cond

Menu name The contents of a parameter

PL (Protect level)	PL0 All parameters are displayed	PL2 Only comparator data are displayed
	PL1 Comparator and scaling data are displayed	PL3 Only pl parameters are displayed
Average frequency)	1 Once(25 times/sec)	20 20 times (1.25 times/sec)
	2 Twice(12.5 times/sec)	40 40 times(0.625 times/sec)
	4 4 times(6.25 times/sec)	80 80 times (0.31 times/sec)
	8 8 times(3.125 times/sec)	100 100 times(0.25 times/sec)
	10 10 times(2.5 times/sec)	200 200 times(0.13 times/sec)
Moving-average calculation frequency)	off (no moving average calculation)	8 8 times
	2 twice	16 16 times
	4 4 times	32 32 times
Step wide)	1 Normal	5 The smallest digit is 0 or 5
	2 The smallest digit is an even number.	0 The smallest digit is 0

blnF (Display blanking)	off Brightest	b-2 Dim	on Turned off
	b-3 Bright	b-1 Dimmest	
dL.t (Digital limiter typ)	cut Retained as a digital limiter value.	off Displayed as a value out of the digital limiter value.	
b. UP (Not Used)	off The digital zero value is stored when the power is turned OFF	on The digital zero value is not stored when the power is turned OFF	
	*Select OFF only.		
L.nE (Linearize)	off The linearize function is not used.	on The linearize function is used.	
	*clr The linearize data is initialized.		
Er t (Not Used)	00-99 Tracking zero correction time (set value × times of sampling)		
	*Select 00 only.		
Er u (Not Used)	00-99 Tracking zero correction width(set value × digit)		
	*In selection, a menu does not come out of 00 by ErE		
Pon (Delay time when the power is turned ON)	off No delay time when the power is turned ON.	00-30 No delay time when the power is turned ON is set (set value × second)	

4.1.2 Comparator Data Setting

1234 (Measurement operation)

cond

con

If M key is pushed in the state of each of menu name or there is no key operation during 1 second, it will shift to contents selection of a parameter. Moreover, when there is no key operation during 8 seconds at the time of selection of the contents of a parameter, it returns to a menu.

- ▶ Digit shift
- ▲ Numerical value or option change
- ◀ Back to measurement operation
- Default value

Menu name	The contents of a parameter
con.t (Comparative output type)	HLL HI-LO check operation(HI/LO comparative output)
	HHH HH check operation(HH/GO comparative output)
	LLL LL check operation(GO/LL comparative output)
	* Select HCL only.
S-HL (Check value 1)	-9999-9999 Check value 1 is set (setting varies depending on the COM.T setting.)
	*The default value is 1000
S-Lo (Check value 2)	-9999-9999 Check value 2 is set (setting varies depending on the COM.T setting.)
	*The default value is 500
H-HL (Hysteresis 1)	0-999 Hysteresis 1 is set (setting varies depending on the COM.T setting.)
	*The default value is 0
H-Lo (Hysteresis 2)	0-999 Hysteresis 2 is set (setting varies depending on the COM.T setting.)
	*The default value is 0
L-HL (Output 1 Logic)	oo Normally open
	oc Normally closed
L-Lo (Not Used)	
	*This parameter is not available for this model.
L-HL (Output 2 Logic)	oo Normally open
	oc Normally closed
AL1 (AL1 lighting selection)	HH AL1 is turned on by HI. LL AL1 is turned on by LO.
	Hc AL1 is turned on by HI. Ll AL1 is turned on by LL
	Co AL1 is turned on by GO.
AL2 (AL2 lighting selection)	HH AL2 is turned on by HI. Lc AL2 is turned on by LO
	Hc AL2 is turned on by HI. Ll AL2 is turned on by LL
	Co AL2 is turned on by GO
	*The parameter of AL1 and AL2 is set to GO with both sides immediately after changing a comparison output type parameter.

Comparative output type

The comparative outputs of this model can be selected to **HCL** only and operate as described below.

■ HI/GO/LO mode (Setting of "Hi limit value > Lo limit value" required)

Comparator condition		Check results		Output	
		AL1	AL2	AL1	AL2
Measurement value >	Hi limit value	OFF	ON	ON	OFF
Hi limit value ≥	Measurement value ≥	Lo limit value	OFF	OFF	OFF
Lo limit value >	Measurement value	ON	OFF	OFF	ON

Relay contact output (b contact)

Comparator condition		Check results		Output	
		AL1	AL2	AL1	AL2
Measurement value >	Hi limit value	OFF	ON	OFF	ON
Hi limit value ≥	Measurement value ≥	Lo limit value	OFF	OFF	ON
Lo limit value >	Measurement value	ON	OFF	ON	OFF

4.1.3 Scaling Data Setting

• Displayed value setting

The concept of the scaling data and an example setting of a full-scale value are presented below:

Displayed value = (a × X) + b

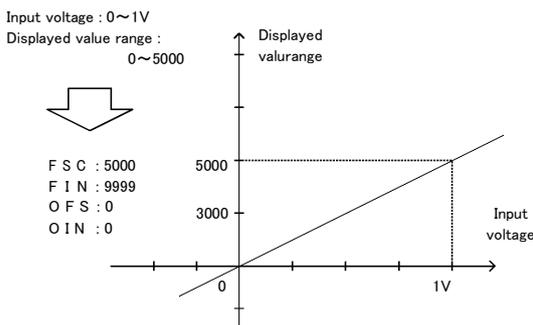
a = (Displayed full-scale value - Displayed offset value) / (Input full-scale value - Input offset value)

b = Displayed offset value - (Input offset value × a)

* X: Input value; a: Gain; b: Offset

1234 (Measurement Operation)
 ↓ (E)+(M)
 cond
 ↓ (M) twice
 nE
 ↓ (M)
 Menu name The contents of a parameter

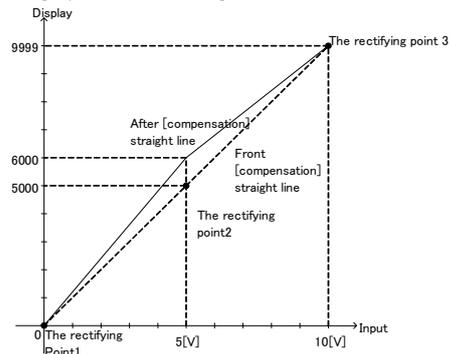
FSc (Displayed full-scale value)	-9999~9999 The value to be displayed at the time of FIN signal input is set. *The default value 9999
FIn (Input full-scale value)	-9999~9999 Input full-scale signal. *The default value is 9999 in the 11-13 range, 20.00 in the 2A range, And 5.000 in the 1V range.
oFS (Displayed offset value)	-9999~9999 The value to be displayed at the time of OIN signal input is set. *The default value 0
oIn (Input offset value)	-9999~9999 Input offset signal *The default value is 0 in the 11-13 range, 4.00 in the 2A range, And 1.000 in the 1V range.
dLHc (Digital limiter HI value)	-9999~9999 The upper limit value of the displayable range is set *The default value 9999
dLLO (Digital limiter LO value)	-9999~9999 The lower limit value of the displayable range is set *The default value -9999
dEP (Decimal point)	At sahdira Flashing decimal indicator is turned ON/OFF. *The default value is OFF(during setting all of the indicators are turned ON.) * (M) Set up by the key



4.1.4 Linearize compensation function

• View

This linearize function depends the linearity between compensation mark on input value (display value before compensation), and output value (display value after compensation).



- ① A rectifying point is set up with 3.
- ② The input value(0) and the output value(0) of the rectifying point 1 are set up.
- ③ Since the value (scaling is an initial state) when inputting the rectifying point 2 5V to 13 ranges turns into input value, input value is set up with 5000 and output value is set up with 6000.
- ④ The input value(9999) and the output value(9999) of the rectifying point 3 are set up.

• The operation method

1234 (Measurement operation)
 ↓ (E)+(M)
 cond
 ↓ (M) 3 times
 LcNE
 ↓ (M)
 n-00 (Compensation mark input)
 ↓ (M)
 n-01 (Rectifying point 1 setup)
 ↓ (M)
 0 (Rectifying point 1 input value)
 ↓ (M)
 0 (Rectifying point 1 output value)
 ↓ (M)
 n-02 (Rectifying point 2 setup)
 ↓ (M)
 0 (Rectifying point 2 input value)
 ↓ (M)
 0 (Rectifying point 2 output value)
 ↓ (M)
 n-16 (Rectifying point 16 setup)
 ↓ (M)
 0 (Rectifying point 16 input value)
 ↓ (M)
 0 (Rectifying point 16 output value)
 ↓ (E)
 1234 (Measurement operation)

In the state of the input value/output value of rectifying point X, when there is no key operation during about 8 seconds (0 etc.), it returns to the display of n-XX.

Digit shift Numerical value or option change
 Back to measurement operation Default value

02 ~ 16 Compensation mark are inputted. The setup of the rectifying point set up by this parameter is set up with the following parameters.
 *The default value is 00.

-9999~9999 The input value (display value before linearity compensation) of the rectifying point 1 is inputted.
 *Setting condition (rectifying point n input value) > (rectifying point n-1 input value)

-9999~9999 The output value (display value before linearity compensation) of the rectifying point 1 is inputted

-9999~9999 The input value (display value before linearity compensation) of the rectifying point 2 is inputted.
 *Setting condition (rectifying point n input value) > (rectifying point n-1 input value)

-9999~9999 The output value (display value before linearity compensation) of the rectifying point 2 is inputted.

-9999~9999 The input value (display value before linearity compensation) of the rectifying point 16 is inputted.
 *Setting condition (rectifying point n input value) > (rectifying point n-1 input value)

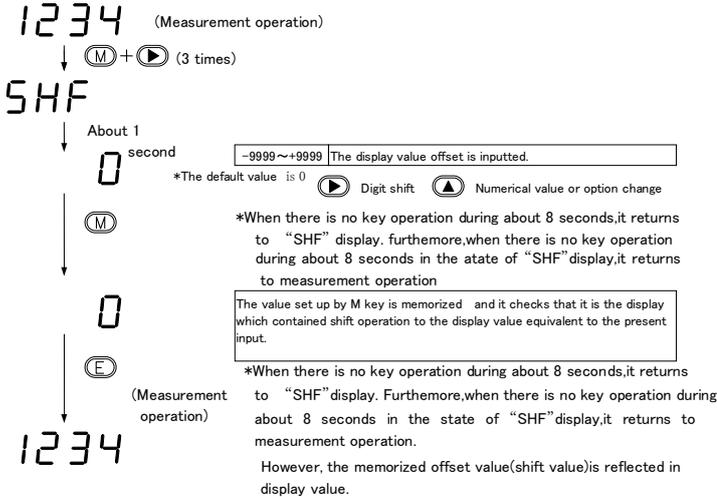
-9999~9999 The output value (display value before linearity compensation) of the rectifying point 16 is inputted.

4.1.5 Shift function

•View

This shift function is a function which shifts display value compulsorily (offset),and the uncontrollable numerical specification of it is attained in digital zero.

•The operation method



5. Specifications

■Input apifications

●DC voltage measurements

Range	Measurement range	Display	Input impedance	Maximum allowed input
11	±99.99mV	Offset ±9999 Full scale ±9999	100MΩ or greater	±50V
12	±999.9mV		100MΩ or greater	±50V
13	±9.999V		Approximately 1MΩ	±50V
1V	1-5V		Approximately 1MΩ	±50V

Accuracy:±(0.03% of rdg + 2digit) (at 23°C±5°C)

●DC current measurements

Range	Measurement range	Display	Input impedance	Maximum allowed input
2A	4-20mA	Offset ±9999 Full scale ±9999	Approximately 50Ω	±50mA

Accuracy:±(0.1% of rdg + 2digit) (at 23°C±5°C)

*This accuracy is for (FSC-OFS)/(FIN-OIN)≤1

■General specifications

- Measurement function : Select either DC voltage or DC current(single range)
- Input circuit : Single ended
- Operation type : Sigma-Delta conversion
- Sampling speed : Maximum 25 per second
- Display : Red 7-segment LED display (character height: approximately 8 mm)
- Polarity display : A minus sign is displayed if the operation result is negative.
- Out-of-range warning : "oL" or "-oL" is displayed with respect to the input signal when the value is outside the display range.
- Maximum display : ±9999(full 4 digits)
- Decimal point : Can be set at any position using the front-panel flat switches.
- Zero display : Leading zero suppress
- Backup : Settings are held in EEPROM (guaranteed for 100,000 writes)
- Operating temperature : 0 to 50°C ,35 to 85% RH(no condensation) and humidity ranges
- Storage temperature : -20 to 70°C ,60% or lower RH(no condensation) and humidity range
- Supply voltage : DC 24V±20%
- Consumed power : Approximately 1.5W
- External dimensions : 98mm(W)×41mm(H)×48mm(D)
- Weight : Approximately 140g
- Withstand voltage : DC 500V for one minute across power terminals/ input terminals and each output terminal.
DC 500V for one minute across input terminals/each output terminal
AC 1500V for one minute across case/power terminals,input terminals,and each output terminal.
- Insulating resistance : 100MΩ or higher with DC 500V across the terminals listed above
- Standard accessories : Operating manual, Terminal cover 2 PC., unit seal

●Comparator unit

- Control method : Microcomputer computation
- Setting range : -9999~+9999
- Comparator operation : Depends on sampling speed.
- Comparator conditions : HI/GO/LO mode
Check results (HI, LO LED display),
Comparator output ,Relay contact output or Photocoupler output
- Hysteresis : For each comparator all limit value can be set as 1 to 999 digits.

- Relay output unit (not available with photocoupler output unit)
Output ratings (capacity of contacts) : AC125V 0.3A, DC30V 1A(resistance load)
- Photocoupler output unit (not available with relay output unit)
Output ratings : MAX. 30V 50mA
Output saturation voltage : 1.2V max. at 50mA

■HI/GO/LO mode (Setting condition:Hi limit value > Lo limit value)

Relay contact output (a contact) or Photocoupler output

Comparator condition	Check results		Output	
	AL1	AL2	AL1	AL2
Measurement value > Hi limit value	OFF	ON	ON	OFF
Hi limit value ≥ Measurement value ≥ Lo limit value	OFF	OFF	OFF	OFF
Lo limit value > Measurement value	ON	OFF	OFF	ON

Relay contact output (b contact)

Comparator condition	Check results		Output	
	AL1	AL2	AL1	AL2
Measurement value > Hi limit value	OFF	ON	OFF	ON
Hi limit value ≥ Measurement value ≥ Lo limit value	OFF	OFF	ON	ON
Lo limit value > Measurement value	ON	OFF	ON	OFF

*The above conditions are at the default values of comparator data.

6. Error messages

Error Display	Details	Recovery Response
	When an input or displayed Value is out of the measured value range	Use the relay so that input and displayed values are in the measured value range.
	When the micro-computer is waiting for data input.	Make sure that the averaging frequency is not set too high.
	Error in the internal memory of the relay.	Turn the power of the relay OFF and turn it ON again. If the relay still does not recover, contact our dealer or office.
	Condition data error	Reset the condition data. *Change at least one of the data in a parameter and cycle through all of the other parameters.
	Comparator data error	Reset the comparator data. *Change at least one of the data in a parameter and cycle through all of the other parameters.
	Scaling data error	Reset the scaling data. *Change at least one of the data in a parameter and cycle through all of the other parameters.
	Linearize data error	Reset the linearize data. *Change at least one of the data in a parameter and cycle through all of the other parameters.
	Shift data error	Reset the shift data.
	Digital zero value backup data error	Perform a writing operation for the digital zero value.

7. Warranty and after-sales service

7.1 Warranty

The warranty last one year from the date of delivery. If an equipment failure which is considered to be clearly at the fault of Watanabe Electric Industry occurs during this period, we will repair the equipment at no charge.

7.2 After-sales service

This product was manufactured, tested, and inspected according to rigorous quality control procedures before it was shipped from the factory. If an equipment failure should occur, please contact your dealer or Watanabe Electric Industry (send the product to us). (Along with the failed product, please include a description with as much information as possible.)

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