

# MITSUBISHI

*Changes for the Better*

ZJ-4034C



TENSION METER  
MODEL LM-10PD  
INSTRUCTION MANUAL

# Cautions on Safety



(Make sure to read this page before using the unit .)



To assure safety	
<ul style="list-style-type: none"> <li>· Make sure the user thoroughly read this instruction manual before using the unit , and pay attention in assuring safety while using the unit.</li> <li>· The unit is manufactured under the severe quality control . When a severe accident or loss is expected in the equipment used due to failure of the unit , provide a backup function or the fail-safe function in the system .</li> </ul>	



In this manual , cautions of safety are classified into "DANGER" and "CAUTION".



 <b>DANGER:</b> When the unit is handled incorrectly , a dangerous situation may occur and the possibility of death or serious injury is expected.
 <b>CAUTION:</b> When the unit is handled incorrectly , a dangerous situation may occur and the possibility of medium or slight injury is expected or property damage exclusively is expected.



Even an item is classified as "CAUTION", its contents are important and it may lead to a serious result depending on the situation. Make sure to observe every item .



 <b>DANGER</b> Turn off all the phases of the external power supply before starting installation and wiring .
 Otherwise, electrical shock or damage in the unit may occur. Make sure to turn off all the phases of the external power supply before starting installation and wiring.



 <b>DANGER</b> Design the installation plan using the wire size suitable to the current capacity .
 Use the wire size suitable to the current capacity to supply the power to the load . If a wire having smaller current capacity is used, the insulation sheath will be melted and insulation will become defective . In this situation, electrical shock or a short-circuit may occur, and fire may occur .


 <b>DANGER</b> Perform grounding ( grounding resistance 100Ω or less).
 Otherwise, electrical shock may occur. Perform grounding ( grounding resistance 100Ω or less) to the unit using a wire of 2 mm <sup>2</sup> or more, otherwise, electrical shock may occur. Never share the grounding with a strong electric system.



 <b>DANGER</b> Set up the emergency stop circuit independently of the product .
 Otherwise, the unit may become out of order and an accident may occur when malfunction occurs in the tension controller . Make sure to assemble the emergency stop circuit outside the tension controller .


 <b>DANGER</b> Never open the covers while the power is supplied to the unit or when the unit is operating.
 Never supply the power to the unit nor operate the unit while the main body cover and the terminal cover are open . When the covers are open , a high voltage area may be exposed and electrical shock may occur .



 <b>DANGER</b> Never use the unit in an atmosphere where inflammation or explosion can occur.
 Otherwise, inflammation or explosion may occur .


 <b>DANGER</b> Never touch a switch with a wet hand .
 Never touch a switch with a wet hand , otherwise, electrical shock may occur.

 <b>CAUTION</b> Separate the wiring of the strong electric system from the wiring of the weak electric system.
Separate the wiring of the strong electric system from the wiring of the weak electric system, and make sure that noises are not superimposed on the wiring of the weak electric system. Otherwise, the unit may not operate correctly.

 <b>DANGER</b> Never drop cutting chips and wire chips while screw holes are tapped and wiring work is performed.
 Damage , fume , fire , malfunction or others may be caused in the unit .

 <b>CAUTION</b> Confirm the ambient environments .
Never install the unit with an environment where dusts , soot, conductive dusts or corrosive gas is present or a place exposed to high temperature , condensation or wind and rain. Otherwise, the unit may be damaged , malfunction or be deteriorated .

 <b>DANGER</b> Never modify nor disassemble the unit
 Never modify nor disassemble the unit . Otherwise, the unit may become defective or an accident such as fire , damage , etc. may occur.

 <b>CAUTION</b> Do not use any unused terminals for any external lines.
Correctly connect the AC power cable to the specified terminal, and do not use any unused terminals for any external lines. Improper connection may seriously damage the product .

## CAUTION

- We shall not be responsible for any damage caused by repair , disassembly, modification, etc. performed by a third party other than MITSUBISHI or a company specified by MITSUBISHI .
- The cautions on safety and the specifications described in the instruction manual are subject to change without notice .

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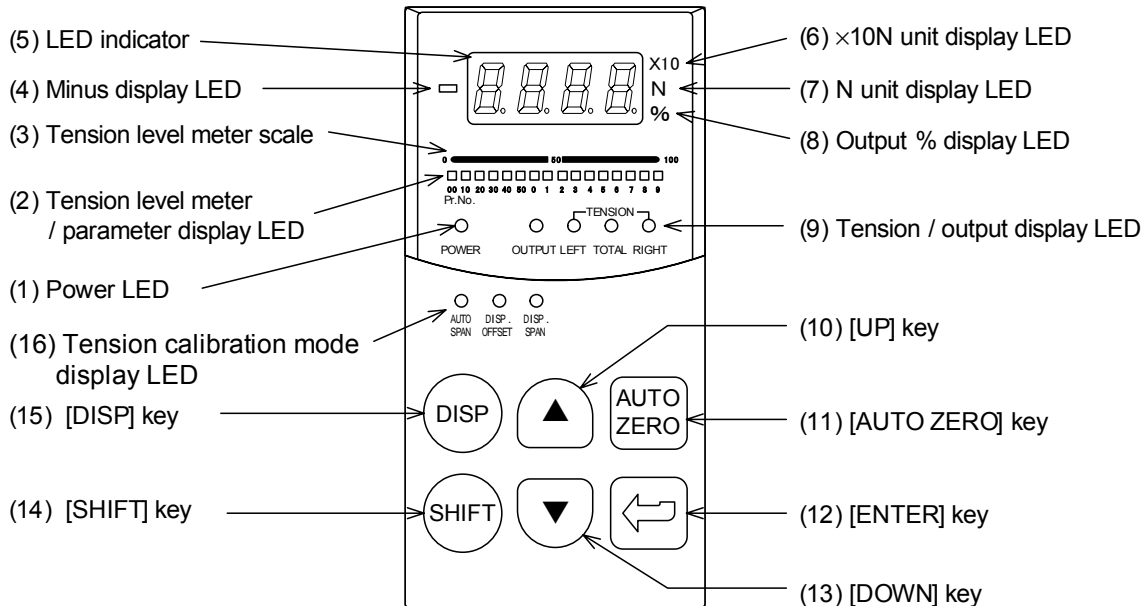
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# 1. Outline

## 1.1 Outline of LM-10PD type tension meter

LM-10PD type tension meter is used together with LX-TD type tension detectors and / or strain gauge type sensors. The tension meter is designed to display the tension from [1 to 2000] N or  $\times 10N$ , give tension signals to a recorder, external tension meter, sequencer, etc. or give signals of detection of specified tension (detection at 2 points).

## 1.2 Panel configuration



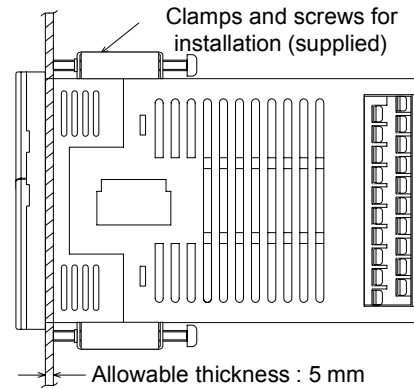
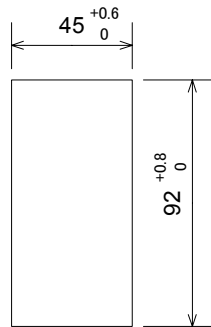
- |   |   |
|---|---|
| <p>(1) Power LED<br/>Lights when power is applied.</p> <p>(2) Tension level meter/parameter display LED<br/>Displays the tension level meter in the tension monitor mode and the parameter numbers in the parameter setting mode.</p> <p>(3) Tension level meter scale<br/>Scale of tension level meter</p> <p>(4) Minus display LED<br/>Lights when the tension/output/setting becomes a minus value.</p> <p>(5) LED indicator<br/>Displays the tension/output in the tension monitor mode and the setting in the tension calibration mode/parameter setting mode.</p> <p>(6) <math>\times 10N</math> unit display LED<br/>This LED and the [N] LED in (7) light simultaneously when the tension is displayed on the LED indicator and the unit of tension is set to <math>\times 10N</math>.</p> <p>(7) N unit display LED<br/>Lights when the tension is displayed on the LED indicator and the unit of tension is set to N.</p> <p>(8) Output % display LED<br/>Lights when the output is displayed on the LED indicator.</p> | <p>(9) Tension / output display LED<br/>Indicates the kind of data displayed on the LED indicator.</p> <p>(10) [UP] key<br/>Increments the parameter number or setting.</p> <p>(11) [AUTO ZERO] key<br/>Keeping pressing this key for 3 sec. in the tension monitor mode executes automatic zero adjustment. One-shot operation of the key in the tension calibration mode executes automatic zero adjustment.</p> <p>(12) [ENTER] key<br/>Enters the setting parameter number or setting in the memory.</p> <p>(13) [DOWN] key<br/>Decrements the parameter number or setting.</p> <p>(14) [SHIFT] key<br/>Pressing this key and another key simultaneously shifts the digit of the parameter number or setting.</p> <p>(15) [DISP] key<br/>Switches the data displayed on the LED indicator in the tension monitor mode.</p> <p>(16) Tension calibration mode display LED<br/>Displays the setting state in the tension calibration mode.</p> |
|---|---|

# 2. Installation and wiring

## 2.1 Installation

Cut a panel as shown below, and install the tension meter with the supplied clamp screws for installation.

Panel cutting dimensions

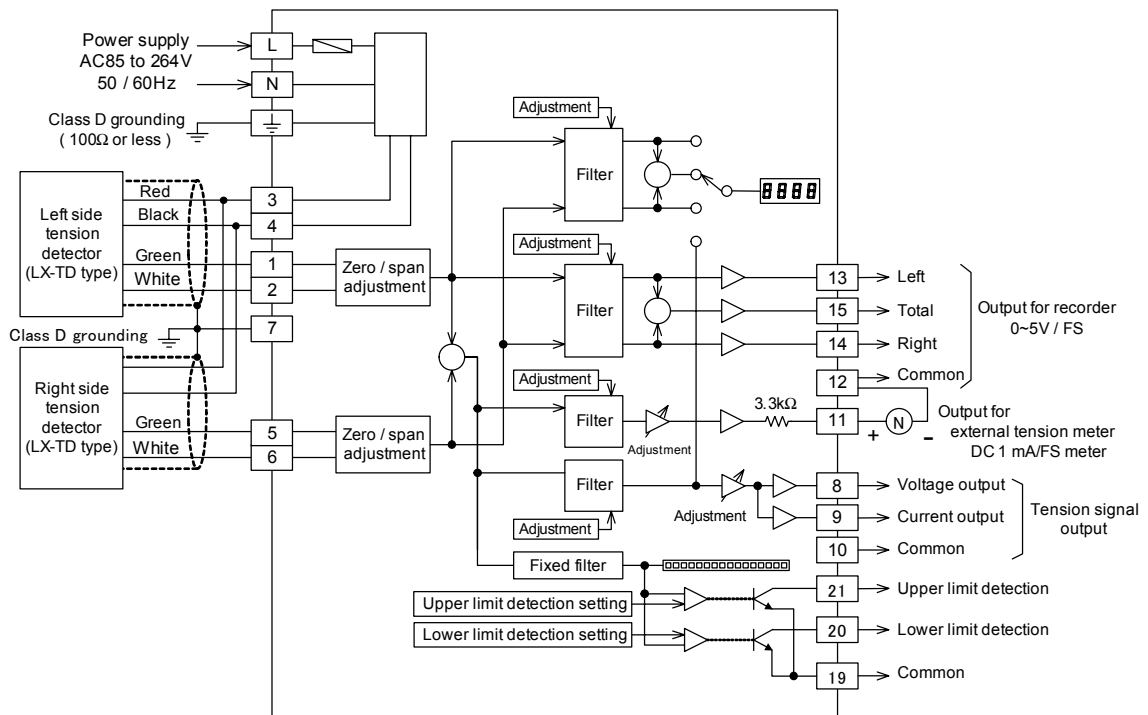


## 2.2 Wiring

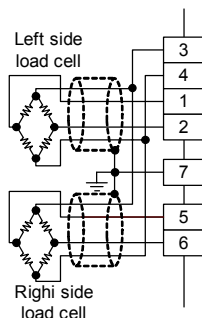
Wire the meter, referring to the following external wiring diagram and terminal arrangement chart.

For wiring, use crimp style terminals for M3. The terminal tightening torque shall be 0.5 to 0.8 Nm. Tighten the terminals securely so that no malfunctions will occur.

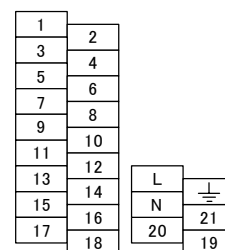
## 2.3 External wiring diagram and terminal arrangement



For strain gauge type tension detector



Terminal arrangement



# 3. Operation

## 3.1 Operation mode

### 1. Variety of operation modes

#### (1) Tension monitor mode

- The current tension is monitored.
- The peak value of tension can be memorized and monitored.
- The zero points of the tension detectors can be adjusted (automatic zero adjustment).

#### (2) Parameter setting mode

- The parameters listed on page 13 can be set.

#### (3) Tension calibration mode

- Zero point adjustment (automatic zero point adjustment) and span adjustment (automatic span adjustment) can be made to the tension detectors.
- The zero point of display and the gain gradient can be shifted for tension signals.

### 2. Switching the operation mode

#### (1) Tension monitor mode

- Press the [DISP] key, and the meter will enter the tension monitor mode.

#### (2) Transition between modes

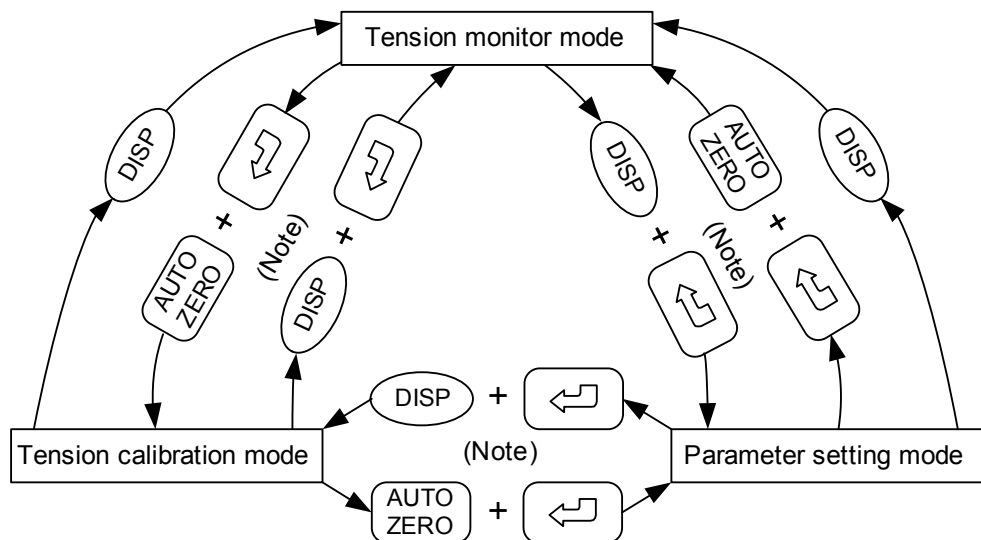
- To make the transition between modes, press simultaneously the [AUTO ZERO] or [DISP] key and the [ENTER] key, and the mode will change as shown below.

- [AUTO ZERO] + [ENTER]

: Tension monitor mode → Tension calibration mode → Parameter setting mode

- [DISP] + [ENTER]

: Tension monitor mode → Parameter setting mode → Tension calibration mode



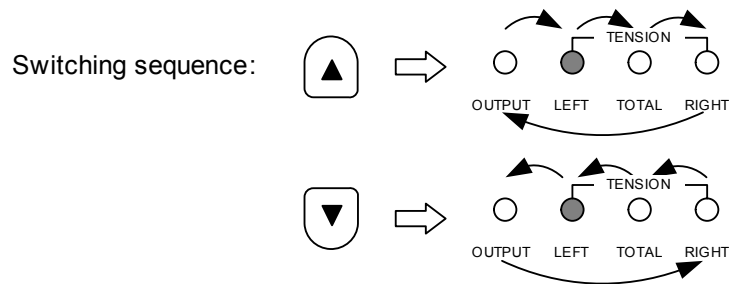
Note: Press simultaneously the [DISP] and [ENTER] keys or the [AUTO ZERO] and [ENTER] keys.

### 3. Operation procedures

#### (1) Operation in tension monitor mode

##### (a) Switching the display

- Every pressing the [▲] or [▼] key switches the tension / output display LED as shown below.



- OUTPUT: Displays the tension signal output in %.
- LEFT : Displays the tension detected by the left tension detector (connected to the terminals [1] and [2]).
- TOTAL : Displays the total of tension detected by the left and right tension detectors.
- RIGHT : Displays the tension detected by the right tension detector (connected to the terminals [5] and [6]).

##### (b) Storage of tension peak value

- [1] The peak value of tension obtained while the power is on is memorized, and the memorized tension peak value is displayed while the [SHIFT] and [▲] keys are kept pressed.
- [2] The memorized tension peak value is cleared by turning off power, switching the mode to a mode other than the tension monitor mode or pressing the [SHIFT] and [▼] keys.

**Note : Simultaneously press the two keys, [SHIFT] and [▲] keys or [SHIFT] and [▼] keys. (The same applies to the following cases.)**

#### (2) Operation in parameter setting mode

##### (a) Selecting the item

- [1] The parameter number is displayed by two LEDs on the level meter, one LED for the second digit and one LED for the first digit, and the current parameter setting is displayed on the LED indicator.
- [2] The blinking parameter display LEDs corresponding to the parameter number show that the parameter number has been selected. Pressing the [▲] or [▼] key increments or decrements the figure in the first digit of the parameter number. Pressing the [SHIFT] and [▲] keys or the [SHIFT] and [▼] keys increments or decrements the figure in the second digit of the parameter number.
- [3] Press the [ENTER] key while the parameter display LEDs are blinking. Then, the set parameter will be stored in the memory, the parameter display LEDs will light, and the setting corresponding to the parameter number will be displayed on the LED indicator. Then, press the [ENTER] key, and the figure in the first digit will blink. The indicator will wait for input in the first digit.

(b) Setting the value

[1] Press the [▲] or [▼] key while the indicator is waiting for input of a figure in any digit, and the figure in the digit will be incremented or decremented by one. (Even if the key is kept pressed, the figure will not be incremented or decremented quickly.)

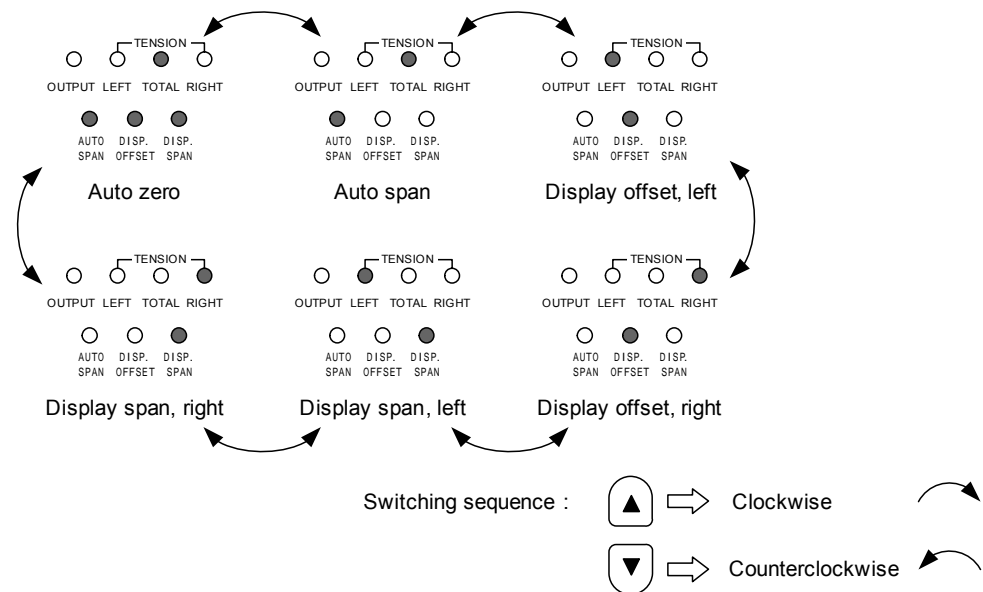
[2] Press the [SHIFT] and [▲] or [SHIFT] and [▼] keys while the indicator is waiting for input of a figure in a digit, and the digit in the wait state will be shifted to the right or left.

[3] Pressing the [ENTER] key stores the input figure in the memory, cancels the wait state for input of a figure and changes the state to the state in which the item to be adjusted can be selected (the LEDs corresponding to the parameter number blink).

(3) Operation in tension calibration mode

(a) Selection the item

[1] Press the [▲] or [▼] key in the tension calibration mode, and the tension / output display LED and the tension calibration mode display LED will change as shown below. The item to be adjusted will be changed to [Auto zero] → [Auto span (AUTO SPAN)] → [Display offset, left (DISP. OFFSET LEFT)] → [Display offset, right (DISP. OFFSET RIGHT)] → [Display span, left (DISP. SPAN LEFT)] → [Display span, right (DISP. SPAN RIGHT)] → [Auto zero], and the current value of the item to be adjusted will be displayed on the LED indicator.



[2] When the [ENTER] key is pressed, the item to be adjusted is determined, and the first digit on the LED indicator blinks and waits for input of a figure.

(b) Setting the value

[1] Press the [▲] or [▼] key while the indicator is waiting for input of a figure in any digit, and the figure in the digit will be incremented or decremented by one. (Even if the key is kept pressed, the figure will not be incremented or decremented quickly.)

[2] Press the [SHIFT] and [▲] or [SHIFT] and [▼] keys while the indicator is waiting for input of a figure in a digit, and the digit in the wait state will be shifted to the right or left.

[3] Pressing the [ENTER] key stores the input figure in the memory, cancels the wait state for input of a figure and changes the state to the state in which the item to be adjusted can be selected.

[4] After storing the figure in the memory, press the [ENTER] key again, and the adjustment will be executed.



(4) Resume function

- [1] Turn on power, and the meter will start in the state selected before.
- [2] When the meter is switched to the parameter setting mode first after power is turned on, the parameter setting starts with the parameter 1 (Pr No.01).
- [3] When the meter is switched to the tension calibration mode first after power is turned on, the item [Automatic zero point adjustment] is selected.
- [4] If the mode is switched without power being turned off, the meter is set to the state selected before.

## 3.2 Setting and adjustment

1. Initial setting : Set the parameters in the parameter setting mode.

(1) The defaults for the sensor type, unit of tension, tension full-scale value and decimal point for tension are as shown below. Check the working conditions, and change the settings if necessary.

- (a) Pr No.01 : Sensor type ----- LX-TD type tension detector
  - (b) Pr No.02 : Unit of tension ----- N
  - (c) Pr No.03 : Tension full-scale value ----- 500
  - (d) Pr No.04 : Decimal point for tension ----- 1
- } Full-scale value = 500 N

(2) Tension display filter

- The filter for displaying the tension on the LED indicator is set. If the default is improper, change the setting.

Pr No.20 : Tension display filter ----- Default = 0.5 s

(3) When the tension signal output is used, set the following parameters in the parameter setting mode.

(a) Setting the output mode : Set the output range of tension output signals in Pr No.10 in the tension range from 0 to the full-scale setting.

- In the case of voltage output : Use the terminals [8] and [10].  
The setting range is 0 to 5 V, 0 to 10 V or 1 to 5 V.
- In the case of current output : Use the terminals [9] and [10].  
The setting range is 4 to 20 mA.

Note : When the voltage output is used, do not use the current output terminals.  
When the current output is used, do not use the voltage output terminals.

(b) Setting the output bias : Set the bias value to be added to the tension output signal in Pr No.11.

(c) Setting the output gain : Set the gain value by which the tension output signal will be multiplied in Pr No.12.

(d) Setting the output filter : Set the filter time constant in Pr No.21. (Default = 0.5 s)

The output bias and output gain should be set when the output for tension is intentionally added the bias or multiplied by the gain. The output after setting is expressed by the following formula.

$$F_{out} = \left( \alpha \times \frac{F}{F_s} + \beta \right) \times \left( \frac{V_f - V_o}{100} \right) + V_o$$

$\alpha$  : Output gain (default = 100%)

$\beta$  : Output bias (default = 0%)

$F_{out}$  : Output signal value

$F_s$  : Tension full-scale setting

$F$  : Current tension

$V_f$  : Output setting at full-scale tension

$V_o$  : Output setting at tension of zero

(4) When the external tension meter (between the terminals [12] and [11]) is used.

(a) When the indication on the LED indicator does not identical to the indication on the external tension meter, adjust the parameter.

- External tension meter correction : Pr No.15 (default = 100%)

(b) Set the time constant of filter as necessary.

- Setting of external tension meter output filter : Pr No.23 (default = 1.0 s)

(5) When the output for recorder (between the terminals [13] and [12], [14] and [12], [15] and [12]) is used, set the time constant of filter as necessary.

(a) Setting of recorder output filter: Pr No.22 (default = 0.5 s)

(6) When the upper and lower limit tension detection function (between the terminals [20] and [19], [21] and [19]) is used, set the detection values in the parameter setting mode.

(a) Setting of lower limit tension detection value : Pr No.13 (default = 0)

When the tension is lower than the setting, the output (between the terminals [20] and [19]) is turned on.

(b) Setting of upper limit tension detection value : Pr No.14 (default = 0)

When the tension is higher than the setting, the output (between the terminals [21] and [19]) is turned on.

When the settings are zero, the outputs are kept off.

## 2. Adjustment

(1) Zero point adjustment of tension detector : Correct the zero point for tare load, such as detection rolls and bearings. Make adjustments with the detection rolls fitted and with no materials loaded.

(a) In tension monitor mode

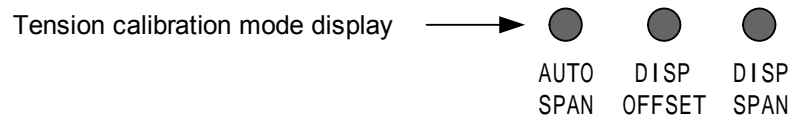
[1] Press the [AUTO ZERO] key for three seconds, and the auto-zeroing function will work to zero the tension.

[2] If no abnormalities occur after the adjustment, the meter enters the ready state for automatic zero adjustment again.

[3] If any abnormality occurs, the alarm code is shown on the 7-segment display. When any key is pressed while the alarm is on the display, the alarm display is canceled, and the meter is set to the ready state for automatic zero adjustment again. After taking measures according to the alarm code, perform automatic zero adjustment again.

(b) In tension calibration mode

[1] Pressing the [AUTO ZERO] key in any tension calibration mode turns on the three tension calibration mode display LEDs and sets the meter to the ready state for automatic zero adjustment.



[2] Press the [AUTO ZERO] key again, and the automatic zero adjustment will be executed.

[3] If any abnormality occurs after the execution of adjustment, the meter enters the ready state for automatic zero adjustment again.

[4] If any abnormality occurs, the alarm code is shown on the 7-segment display. When any key is pressed while the alarm is on the display, the alarm display is canceled, and the meter is set to the ready state for automatic zero adjustment.

When one of the left and right tension detectors is connected (one tension detector is used), the alarm "AL04" (zero adjustment voltage imbalance) is displayed after the completion of zero adjustment. Press any key, and the alarm will disappear. The tension meter can be used.

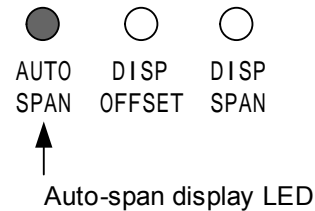
If the displayed tension cannot be set to zero by one zero point adjustment, perform the zero point adjustment again.

When one tension detector is used, short-circuit the green and white connecting terminals (terminals [5] and [6] or [1] and [2]) of the unused tension detector.

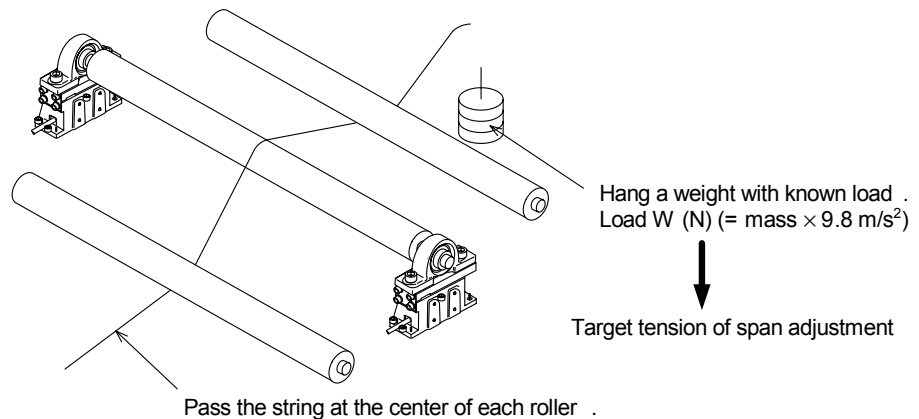
(2) Span adjustment of tension detector : The load applied by the material tension to the tension detector varies depending on the detector mounting direction and material loading angle. To correct the load, adjust the span.

[1] In the tension calibration mode, press the [▲] or [▼] key to light the [AUTO SPAN] display LED. Then, press the [ENTER] key to set the meter to the ready state for automatic span adjustment.

→ The first digit on the LED indicator blinks to prompt the operator to input a value.



[2] Hang a weight whose load  $W$  (N) is known on the detection rolls. Hang a static load as close to the full-scale tension value as possible (hang a static load of 1/3 to 1 of the full-scale tension value, and set the span in the range of 20 to 80% of the rated load of the tension detector at the full-scale tension).



[3] Input the value corresponding to the load  $W$  (N), and press the [ENTER] key to enter the input value in the memory.

→ The value displayed on the LED indicator stops blinking and lights, and the value is stored.

Ex. : When a weight having a mass of 10 kg is hung, multiply the mass by the acceleration of gravity,  $9.8 \text{ m/s}^2$ , and input the obtained value 98 (N).

[4] Press the [ENTER] key, and {SPAN} will be displayed on the LED indicator for several seconds. Then, the span adjustment of the tension detector will be executed.

[5] If any abnormality occurs, the alarm code is shown on the 7-segment display. When the [ENTER] key is pressed while the alarm is on the display, the alarm display is canceled, and the meter is set to the ready state for automatic span adjustment again. After taking measures according to the alarm code, perform automatic span adjustment again.

When one of the left and right tension detectors is connected (one tension detector is used), the alarm "AL05" ( low span load ) or the alarm "AL06" ( low span load ) and the alarm "AL09" (span load imbalance) are displayed after the completion of span adjustment. Press any key, and the alarm will disappear. The detector can be used.

If the tension specified above (the value equivalent to the mass of the weight: target tension of automatic span adjustment) cannot be displayed on the tension display by one span adjustment, execute the span adjustment again.

(3) To shift the displayed values

- The zero point of display and gain gradient can be shifted for tension signal output by setting the following items in the tension calibration mode after the completion of zero adjustment and span adjustment.

(a) Display offset (DISP. OFFSET) : To add the offset to the right or left display

(b) Display span (DISP. SPAN) : To multiply the right or left display by the coefficient

- Setting procedures

[1] In the tension calibration mode, select [DISP. OFFSET LEFT] , [DISP. OFFSET RIGHT] , [DISP. SPAN LEFT] or [DISP. SPAN RIGHT] pressing the [▲] or [▼] key, and press the [ENTER] key.

→ The tension setting for the selected item is displayed on the LED indicator, and the first digit of the setting blinks to prompt the operator to input the value.

[2] Input the value, and press the [ENTER] key to enter the input value in the memory.

→ The entered value stops blinking and lights, the tension for the relevant item is displayed, and the meter enters the state in which the item to be adjusted can be selected.

- The tension displayed after the display offset and display span are set is expressed by the following formula.

$$\text{Displayed tension } F = \frac{Sp}{100} \times Fo + Of \quad (\text{N})$$

Sp : Display span (default = 100%)

Of : Display offset (default = 0 N)

Fo : Tension value corresponding to tension signal output

### 3.3 Alarm list

Alarm No.	Outline	Details
AL01	Excessive input value, left	The left input voltage became excessively large in the monitor display mode.
AL02	Excessive input value, right	The right input voltage became excessively large in the monitor display mode.
AL03	Out of input voltage range for zero adjustment	The input voltage for zero adjustment exceeded the range.
AL04	Zero adjustment voltage unbalance	Unbalance between left and right voltage values exceeded 30% during zero adjustment.
AL05	Low span load, left	The input voltage for span adjustment was low, and span adjustment on the left side ended unsuccessfully.
AL06	Low span load, right	The input voltage for span adjustment was low, and span adjustment on the right side ended unsuccessfully.
AL07	Over span load, left	The left input voltage for span adjustment was excessive.
AL08	Over span load, right	The right input voltage for span adjustment was excessive.
AL09	Span load unbalance	Unbalance between left and right voltage values exceeded 30% during span adjustment.

The display mode for “AL01” or “AL02” are set as follows.

Set parameter No.05 to “0” -- The alarms, “AL01” or “AL02”, will continue to be displayed until the excessive value is removed from the input, and a key is pressed. The meter will, then, return to the tension display mode.

Set parameter No.05 to “1” -- The meter will return to the tension display mode automatically when the excessive value is removed from the input.

AL01 and AL02 are not recorded in the alarm history in parameter No.35 to 38.

**(Caution)** The “Excessive input” alarms are displayed when an overload of about 1.5 times (or more) the rated load of the tension detectors is applied to the tension detectors. If the tension detectors are used in this overload condition, the tension detectors may be seriously damaged. When the “Excessive input” alarms are displayed, ( whether parameter No.05 is set to “0” or “1” ) make sure to remove the cause of the overload to the tension detectors before using again.

# 4. Specifications

## 4.1 I/O Specifications

Item		Terminal	Specifications		
Power supply	Input	L	• 100 to 240V AC (-15 tp +10 %) 50/60Hz 50 VA		
		N			
		$\perp$			
	Output	3	Red(+)	• For tension detector, 5 V DC, 40 mA (max.)	
4		Black(-)			
Input	Tension detector	Left	1	Green	• Input terminals for tension detectors • When one tension detector is used, short-circuit the terminals of the unused detector.
			2	White	
		Right	5	Green	
			6	White	
	—	7	• Shielded grounding terminal		
Contact output	Tension detection	21	Upper limit detection	• Detection of upper limit of tension. • On at tension higher than setting.	• Open collector output • DC30V/0.5V
		20	Lower limit detection	• Detection of lower limit of tension. • On at tension lower than setting.	
		19	Common		
Analog output	Tension signal	8	Voltage output	• Switching among 0 to 5 V, 0 to 10 V and 1 to 5 V / FS • Load resistance: 1 k $\Omega$ or more	
		9	Current output	• 4 to 20 mA/FS Load resistance: 500 $\Omega$ or less	
		10	Common		
	Output for external tension meter	11	+	• DC1mA/FS meter (internal resistance: 1.5 k $\Omega$ or less) is used.	
		12	-		
	Output for recorder	13	Left	• Output for recorder Load resistance: 10 k $\Omega$ or more • Output voltage = 0 to 5 V according to tension full scale	
		14	Right		
		15	Total		
12		Common			
Display functions	Tension display	• A 4-digit value is displayed digitally on the 7-segment LED. The full scale can be set in the range from 0.01 to 20000 N. • The unit can be switched between N and $\times 10N$ . • Level meter displayed by 16 LEDs • The display can be switched among left, total and right.			
	Output display	• The analog output is displayed in % on the 7-segment LED.			
	Setting parameter display	• The item No. is displayed with LEDs, and the setting is displayed on the 7-segment LED.			
	LED display	• Tension on the left, total tension, tension on the right and output percentage are identified. • Display of power supply • Auto span, manual offset and manual span adjustments are identified.			
Weight		• Approx. 500 g			

## 4.2 Environmental specifications

Ambient temperature	• 0 to 55°C during operation
Ambient humidity	• 35 to 80% RH (no condensation) during operation
Vibration resistance	• In accordance with JIS C0040, 10 to 55 Hz, 0.5mm ( 4. 9m / s <sup>2</sup> maximum), 2 hours in each of X,Y,Z axis directions .
Impact resistance	• In accordance with JIS C0041, 98m/s <sup>2</sup> 3 times in each of X,Y,Z axis direction.
Noise resistance	• By noise simulator with 1,000Vp-p noise voltage, 1 $\mu$ s noise width and 30 to 100Hz.
Dielectric withstand voltage	• 1,500V AC, 1 minute : Between all terminals as a whole and the case. • 500V AC, 1 minute : Between open corrector output and input / output terminals. (Not isolation between input terminals and output terminals.)
Insulation resistance	• 5 M $\Omega$ or more by 500V DC megger (Between all terminals as a whole and ground terminal.)
Operation atmosphere	• Free from corrosive gas and dust, no rain or drops of water.

### 4.3 Setting values (Parameters)

Pr No.	Description	Default	Min. value	Max. value	Unit
00					
01	Sensor type *1	LX-TD type	LX-TD type, strain-gauge type		
02	Unit of tension *2	N	N, ×10N		
03	Full scale tension	500	1	2000	N, ×10N
04	Decimal point for tension	1	1, 0.1, 0.01		–
05	Display mode of "Excessive input" alarm *3	Keep displayed	Keep / do not keep displayed		
06					
07					
08					
09					
10	Output mode *4	0 to 10V	0 to 5V, 0 to 10V, 1 to 5V, 4 to 20mA		
11	Output bias	0.0	-100.0	100.0	%
12	Output gain	100.0	50.0	200.	%
13	Setting of lower limit tension detection value	0	0	2000	N, ×10N
14	Setting of upper limit tension detection value	0	0	2000	N, ×10N
15	External tension meter correction	100	50	150	%
16					
17					
18					
19					
20	Tension display filter	0.5	0.3	2.0	(s)
21	Output filter	0.5	0.0	2.0	(s)
22	Recorder output filter	0.5	0.0	2.0	(s)
23	External tension meter output filter	1.0	0.1	2.0	(s)
24					
25					
26					
27					
28					
29	System ROM version monitor	*,**	0.00	9.99	–
30	Auto-span target tension setting monitor	500	0.01	2000	N, ×10N
31	Left display offset setting monitor	0	-1000	1000	N, ×10N
32	Right display offset setting monitor	0	-1000	1000	N, ×10N
33	Left display span setting monitor	100.0	50.0	300.0	%
34	Right display span setting monitor	100.0	50.0	300.0	%
35	Alarm history 0 monitor				
36	Alarm history 1 monitor				
37	Alarm history 2 monitor				
38	Alarm history 3 monitor				
39	Parameter setting range	0	0	2	–

\*1 Display of sensor type : H = LX-TD type tension detector, L = strain gauge type sensor

\*2 Display of unit of tension : 0 = N, 1 = ×10N

\*3 Display mode of "Excessive input" alarm : 0=Keep displayed, 1=Do not keep displayed

\*4 The output mode is displayed as 0-5, 0-10, 1-5, or 4-20.

- The auto-span target tension can be changed only in the automatic span adjustment mode. If the full scale tension in Pr No.03 is changed, the auto-span target tension is set to the changed full-scale tension value.
- The display offset and span ( Pr Nos. 31 to 34 ) can be changed only in the tension calibration mode.
- Alarms are stored in the alarm history Pr Nos.35, 36, 37 and 38 in the order in which the alarms occur.
- The unit (s) of the filters is not displayed.
- Each setting can be returned to the default by the following operations.
  - (1) Press simultaneously the [SHIFT] and [ENTER] keys, and {inti} will be displayed on the LED indicator for 3 sec.
  - (2) Press simultaneously the [▲] and [ENTER] keys while {inti} is on the indicator.
- The empty columns have no settings (no values are displayed).

## 4.4 Dimensions

