INSTRUCTION MANUAL

MULTICHANNEL TENSION METER

Model : MSM

Detection card　TCH-770

EIKO SOKKI CO., LTD.

SM-MSM-TCH7-B1

ISSUED : APR 15th, 2022

Precautions for use

Thank you for purchasing our product.
Please note the following points when installing and using.

(1) Be sure to use the power supply voltage within the specified range.
In particular, it is very dangerous to connect a higher voltage than the specification, as it may cause ignition.
Be sure to check the power supply voltage when wiring.

(2) Connect the power supply to the specified terminal.
If connected incorrectly, this unit may malfunction.

(3) For models with a ground terminal, be sure to use class D grounding (formerly class 3 grounding).
If you do not ground the wire, you may get an electric shock just by touching the case.

(4) Wiring work should be done by an electrical work specialist.

(5) It cannot be used in explosion-proof areas except for models that are specified as explosion-proof.

(6) ⚠ mark is affixed to the power connection part of this unit.
If you touch it while the power is on, you will get an electric shock, so be careful not to touch it.

(7) Do not disassemble the unit unnecessarily as it may cause electric shock.

(8) Be careful not to let flammable materials, water, metal, etc. get inside this unit, as this may cause malfunction.

(9) Install a safety device when applying to a machine where serious loss of human life or equipment is expected due to the failure of this product.

(10) If you notice any abnormalities such as strange smells or smoke coming from the unit, turn off the power immediately and contact our service department.

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MULTICHANNEL TENSION METER Model : MSM

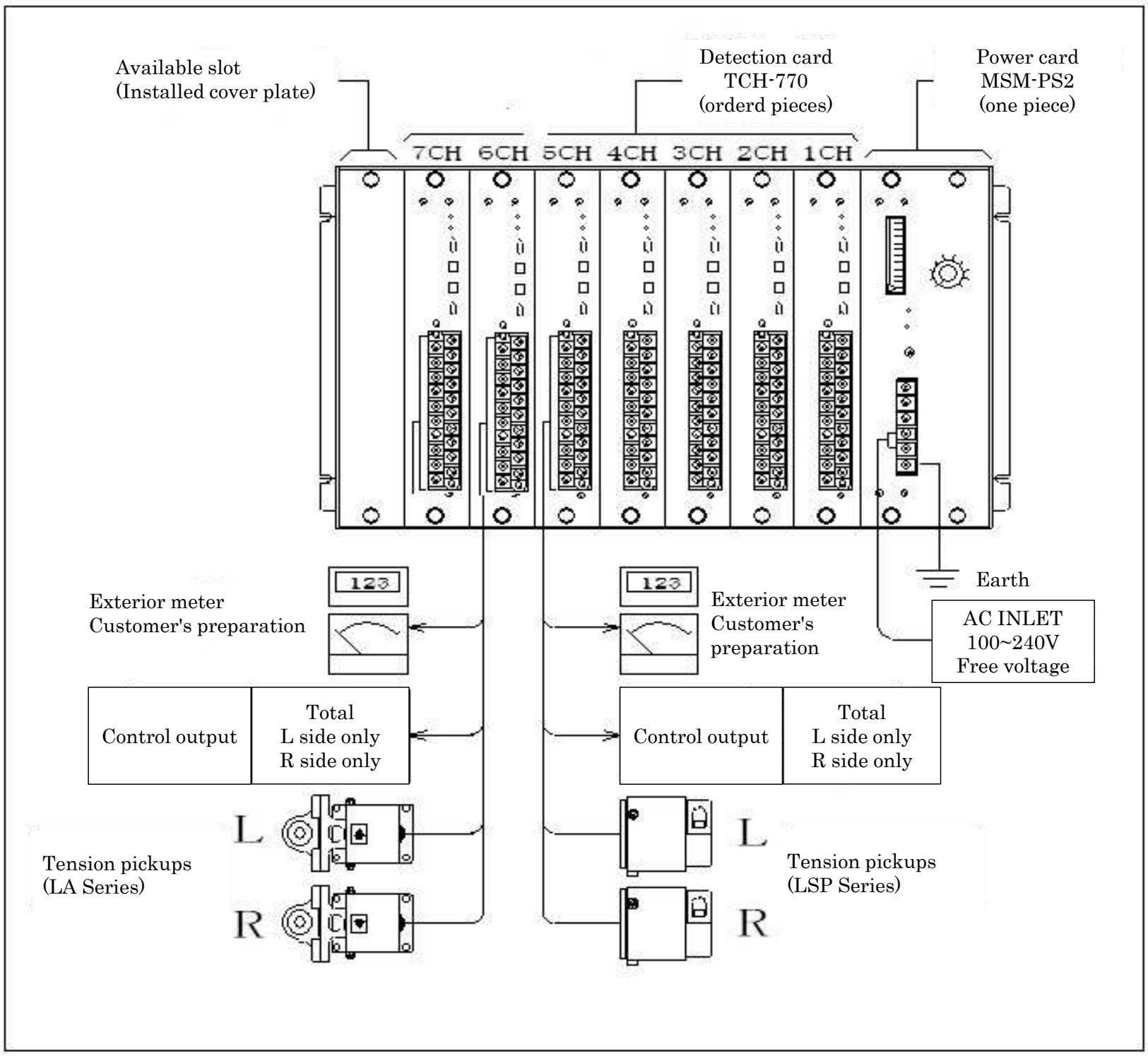
Detection card TCH-770

** INDEX **

1．CONSTRUCTION

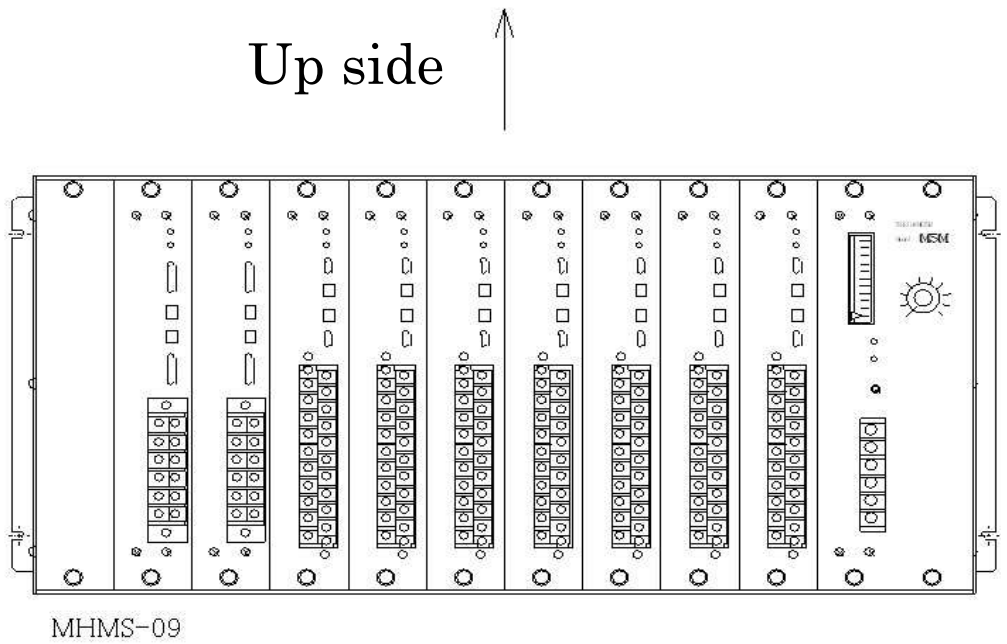
This is a multichannel tension meter that measures the tension of paper, cloth, rubber, film, fiber, electric wire, etc. while it is running.

（1）A maximum of 10 channels can be measured.
（2）Tension detection card TCH-770 is used by installing the required number of cards in the slot of the device.
One type of detection card can be used for both coil-based (LA type) and strain gauge-based (LSP type) tension pickups.
（3）The TCH-770 can be installed together with the conventional detection cards TCS-550HG, TCM-550, and TCM-660.
This manual describes the TCH-770. If a conventional model is installed, please refer to the instruction manual for that model.
（4）Each detector card is labeled with the channel number, the maximum scale of the detector, and the name of the location where the detector is used.
（5）Four systems of tension signals, Total 1, Total 2, Total 3 (or left only), and Total 4 (or right only), are output from each detection card.
Each output can be selected as voltage or current output, and filter characteristics can be selected as fast or slow response, so it can be used as control output or output for analog indicator.
（6）If there is an available slot, a cover plate is installed and can be added later.



2 . INSTALLATION

Install in a location to the following conditions.
That is free from…water drops, corrosive gases,
dirt dust and vibration, and sunbeam.
The mounting direction is in the vertical plane.



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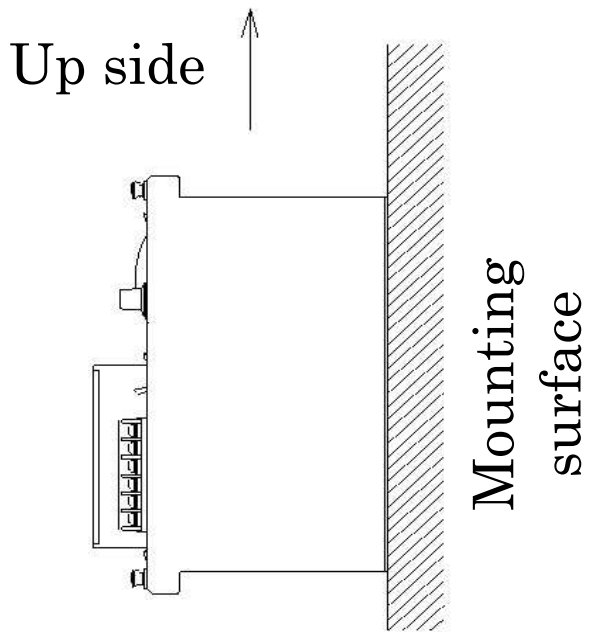


3．WIRING

（1）Notice for wiring

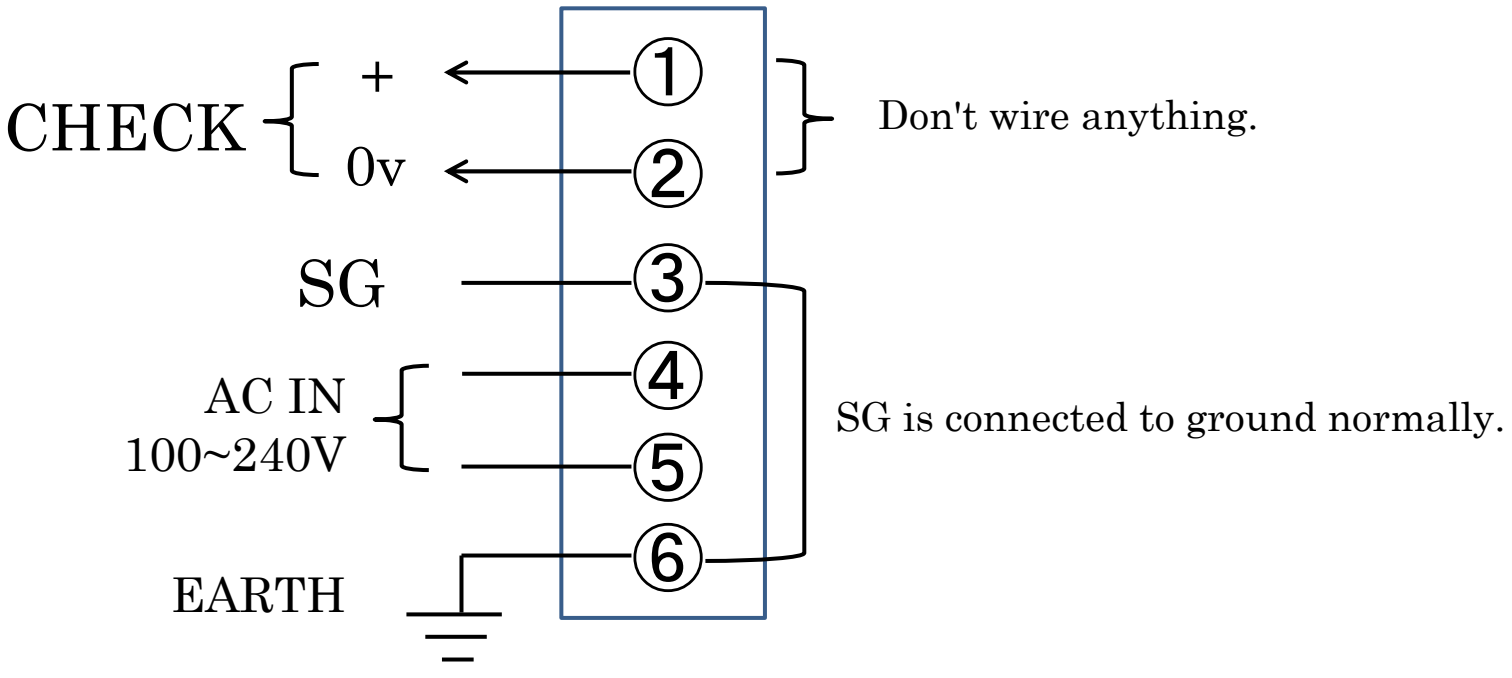
・A screw size of the terminal board is M4 for the power line and M3.5 for the detection card.
Use the Y or ○ type pressure terminals.
・The ground terminal must be grounded.
・Use a shielded wire for the pickup cable.
The longer the wiring length, the more susceptible to external influences, so please contact us if you are concerned.
・The shield wire should be connected to terminals No. 5 and No. 10 of the detection card for each channel.
The No. 5 and No. 10 terminals of each channel are combined internally and connected to the SG terminal of the power line.
This SG terminal is usually connected to the ground terminal to drop the shield to ground.
・The CHECK terminal of the power card is for checking the internal circuitry, do not wire it.
・If the control output wiring is long, or if this signal is connected to a control device that does not have an isolated input circuit, it may malfunction due to noise.
Use an insulated input circuit as much as possible and keep the wiring as short as possible.
・After wiring, check the miss wiring or loose screws before turning on the power.

（2）In case of the single (or cantilever) type tension pickup.

・In case, connect the pickup to terminal of the detection card No. 1~5 (L side) or, No. 6~10(R side), and turn to on switch of the use side only.
・A red "S" sticker is attached to the top of each channel.
Please be careful not to mistake the connection channel.
・If you want to change it for two tension pickups,
you need to change the DIP switches setting.

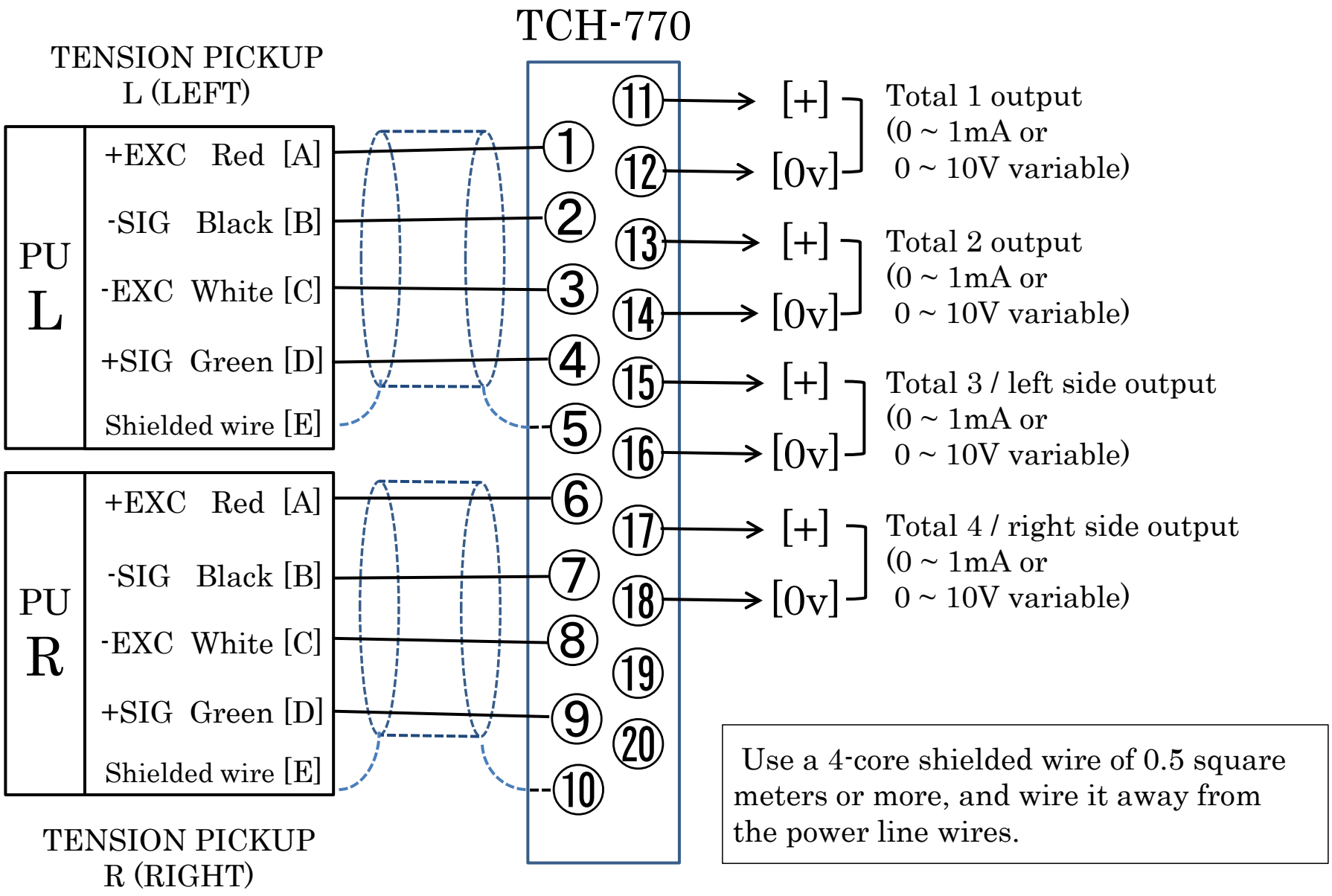
（3）Power card (MSM-PS2)

MSM-PS2

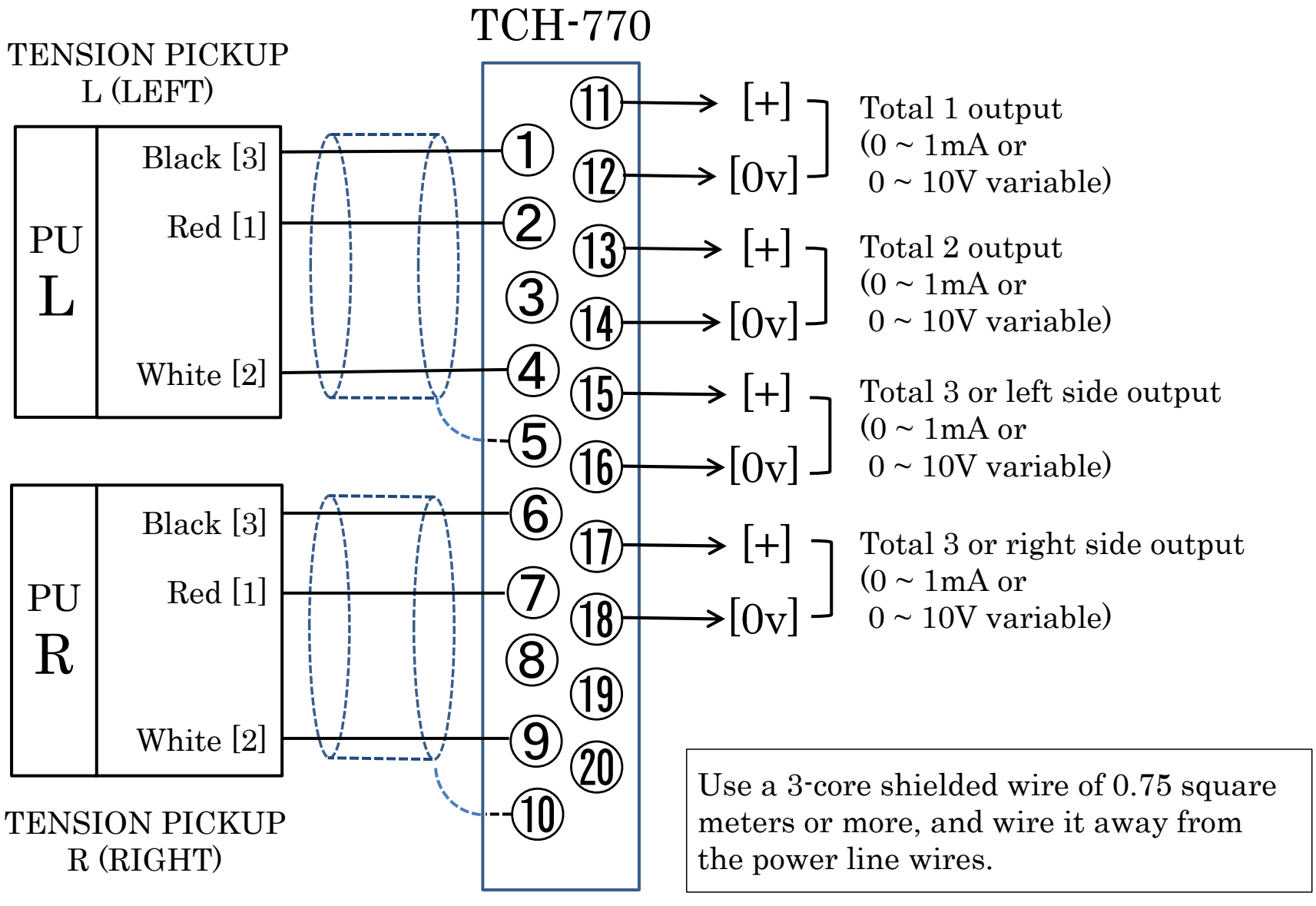


Be sure to wire for grounding.

（４）Detection card (TCH-770) for LSP tension pickup.



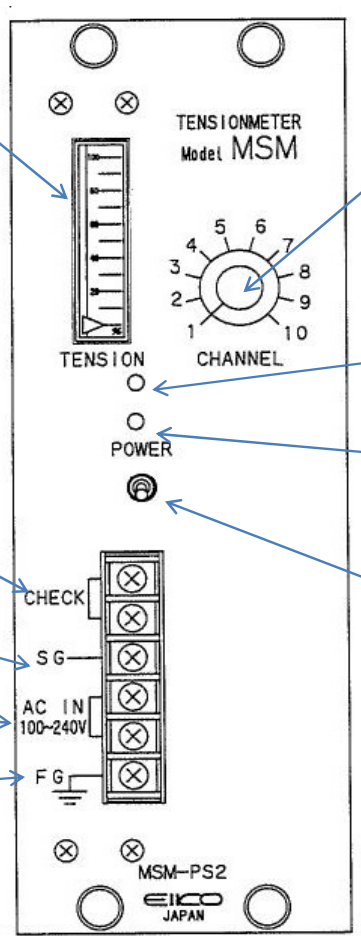
（５）Detection card (TCH-770) for LA tension pickup.



4．NAMES AND FUNCTIONS OF EACH PART

（1）NAMES

①Tension indicator (0~100%)
This meter indicates tension value of selected channel by the selector switch.



②Channel selector switch

③Tension indicator adjustor VR

④Power lamp

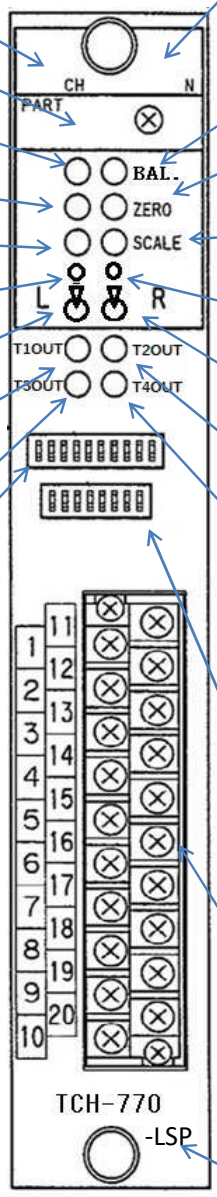
⑤Power switch

⑥Check terminals
(for meter and output adjust)

⑦Shielded wire grounding

⑧Power input
(AC100～240V)

⑨Earth terminal
(power source grounding)



⑩Channel No.

⑪Detective capacity

⑫Using location

⑬Left side balance adjustor VR(LA type only)

⑭Right side balance adjustor VR(LA type only)

⑮Left side zero adjustor VR

⑯Right side zero adjustor VR

⑰Left side scale adjustor VR

⑱Right side scale adjustor VR

⑲Left side detecting ON/OFF indicator lamp

⑳Right side detecting ON/OFF indicator lamp

㉑Left side detecting ON/OFF switch

㉒Right side detecting ON/OFF switch

㉓Total 1 output level adjustor VR

㉔Total 2 output level adjustor VR

㉕Total 3 / left side output level adjustor VR

㉖Total 4 / right side output level adjustor VR

㉗DIP switches for various settings (DSW1)

㉘DIP switches for filter setting (DSW2)

㉙External connection terminals

㉚Connectable detector seal
-LSP or -LA

（2）FUNCTIONS

The standard DIP switch settings are designed to match those of the previous TCM-550 model.

No.	NAME	FUNCTION
①	Tension indicator	・Tension value of selected channel by ② switch, it's indicate 0 ～ 100% unit.
②	Channel selector switch	・Channel select for intend to check on ① indicator.
③	Tension indicator adjustor VR	・For ① indicator adjustor. ・No use to customer side.
④	Power lamp	・Lighten at the ⑤ sw. ON. ・Combine indicates ±15V DC power.
⑤	Power switch	・Power line SW.
⑥	Check terminals	・Check for the base voltage on each detection card. ・Use for adjusts on external meter and controller voltage.
⑦	Shielded wire grounding	・It is connected to the terminal for connecting the shield wire of the pickup cable provided on each detection card.
⑧	Power input	・Supply 100 ～ 240V AC. ・Free voltage.
⑨	Earth terminal	・Ground the grounding.
⑩	Channel No.	・Each channel No., is indicated here. ・No.1 channel is side of power source.
⑪	Detective capacity	・Detective capacity is indicated here, it's capacity equal to the full-scale number of exterior tension meter.
⑫	Using location	・If customer demanded that using location or channel No., and be specify here.
⑬	Left side balance adjustor VR	・For the left side balance adjustor. ・It is used only with LA tension pickup.
⑭	Right side balance adjustor VR	・For the right side balance adjustor. ・It is used only with LA tension pickup.
⑮	Left side zero adjustor VR	・For left side zero adjustor.
⑯	Right side zero adjustor VR	・For right side zero adjustor.
⑰	Left side scale adjustor VR	・For left side scale adjustor.
⑱	Right side scale adjustor VR	・For right side scale adjustor.
⑲	Left side detecting ON/OFF indicator lamp	・for indication the tension signal on/off on the left side. ・Combine indicates +15V DC power.
⑳	Right side detecting ON/OFF indicator lamp	・for indication the tension signal on/off on the right side. ・Combine indicates -15V DC power.
㉑	Left side detecting ON/OFF switch	・Use for the left select switch to the tension pickups.
㉒	Right side detecting ON/OFF switch	・Use for the right select switch to the tension pickups.
㉓	Total 1 output level adjustor VR	・For Total 1 output level adjustor.
㉔	Total 2 output level adjustor VR	・For Total 2 output level adjustor.

No.	NAME	FUNCTION
㉕	Total 3 / left side output level adjustor VR	・For Total 3 / left side output level adjustor.
㉖	Total 4 / right side output level adjustor VR	・For Total 4 / right side output level adjustor.

㉗ DSW1 DIP switches for various settings	Bit	Name	Means	ON	OFF	Original setting	
	1	LG･L	L side gain adj large	Hi	Lo	LA	OFF
						LSP	OFF
	2	LG･S	L side gain adj small	Hi	Lo	LA	ON
						LSP	OFF
	3	RG･L	R side gain adj large	Hi	Lo	LA	OFF
						LSP	OFF
	4	RG･S	R side gain adj small	Hi	Lo	LA	ON
						LSP	OFF
	5	B-S	Detection mode selector	Single	Twin	OFF	
	6	T-L1	Total3 / L output selector 1	Total3	Left	ON	
	7	T-L2	Total3 / L output selector 2	Left	Total3	OFF	
	8	T-R1	Total4 / R output selector 1	Total4	Right	ON	
	9	T-R2	Total4 / R output selector 2	Right	Total4	OFF	
	10	-	Unused			OFF	

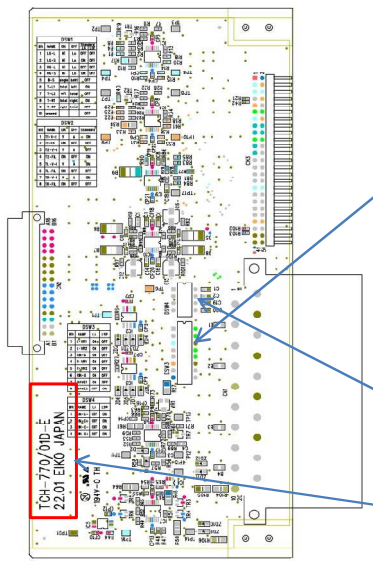
㉘ DSW2 DIP switches for filter setting	Bit	Name	Means	ON	OFF	Original setting
	1	T1･V-I	Amp. or volt. Output selector for Total 1	Volt	Amp	OFF
	2	T1･FIL	Filter on/off for Total 1	ON	OFF	ON
	3	T2･V-I	Amp. or volt. Output selector for Total 2	Volt	Amp	ON
	4	T2･FIL	Filter on/off for Total 2	ON	OFF	ON
	5	TL･V-I	Amp. or volt. Output selector for Total 3 / left side	Volt	Amp	ON
	6	TL･FIL	Filter on/off for Total 3 / left side	ON	OFF	OFF
	7	TR･V-I	Amp. or volt. Output selector for Total 4 / right side	Volt	Amp	ON
	8	TR･FIL	Filter on/off for Total 4 / right side	ON	OFF	OFF

㉙	External connection terminals	・For connecting external signal lines.
㉚	Connectable detector seal	・Up to Board Rev. TCH-770/01C-E, the connectable detectors are fixed to the type on the seal attached here. Board Rev. TCH-770/01D-E and later can be selected by DIP switches DSW3 and DSW4.

Substrate component surface

Contents differ depending on the Rev. number of the board

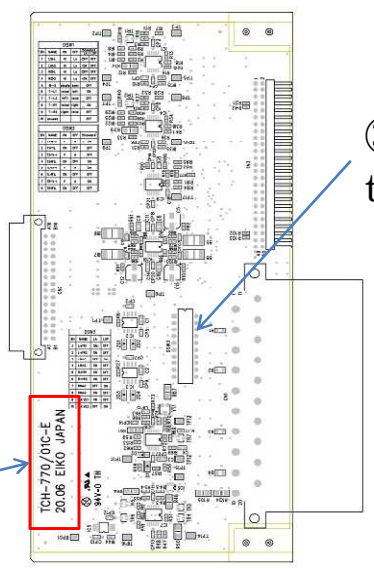
★For substrate Rev. TCH-770/01D-E



㉛DIP switches on the board DSW3

㉜DIP switches on the board DSW4

★For substrates up to Rev. TCH-770/01C-E



㉛DIP switches on the board DSW3

Board Rev. No.

DSW3 and DSW4 have different settings for different board revisions.

★For board Rev. TCH-770/01D-E ・・・Set according to the detector to be connected.

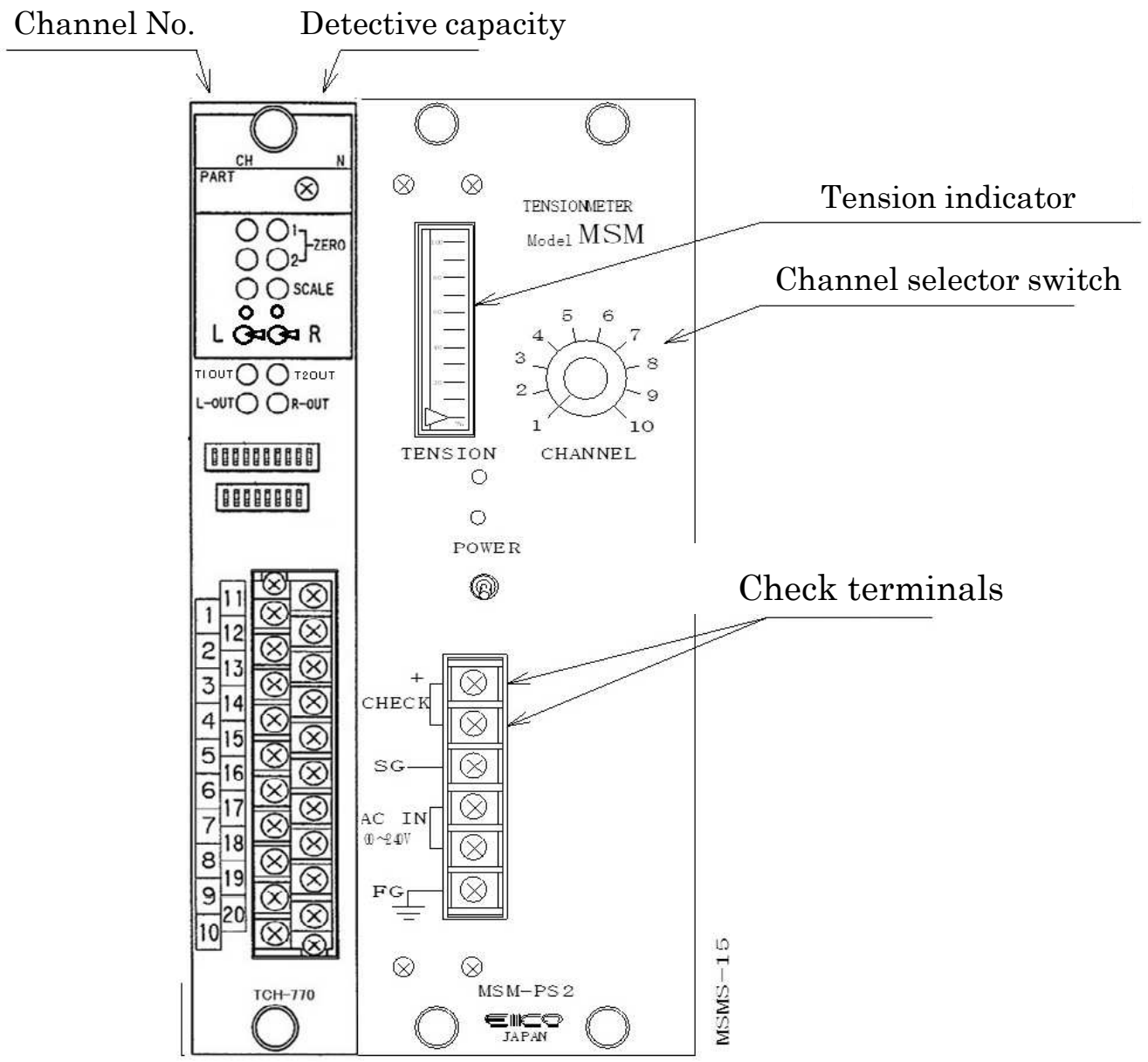
		Bit	Name	Means	ON	OFF	Original setting	
㉛	DSW3 DIP switches on the board	1	L･VR1	L side Balance VR enable/disable 1	enable	disable	LA	ON
							LSP	OFF
		2	L･VR2	L side Balance VR enable/disable 2	enable	disable	LA	ON
							LSP	OFF
		3	LIN･G	L side Input G small/large	small	large	LA	ON
							LSP	OFF
		4	R･VR1	R side Balance VR enable/disable 1	enable	disable	LA	ON
							LSP	OFF
		5	R･VR2	R side Balance VR enable/disable 2	enable	disable	LA	ON
							LSP	OFF
		6	RIN･G	R side Input G small/large	small	large	LA	ON
							LSP	OFF
		7	WAVE1	Applied waveform 1	AC	DC	LA	ON
							LSP	OFF
		8	WAVE2	Applied waveform 2	DC	AC	LA	OFF
							LSP	ON
㉜	DSW4 DIP switches on the board	Bit	Name	Means	ON	OFF	Original setting	
		1	LIN･C-	L side Input C- enable/disable	enable	disable	LA	OFF
							LSP	ON
		2	LIN･C+	L side Input C+ enable/disable	enable	disable	LA	OFF
							LSP	ON
		3	RIN･C-	R side Input C- enable/disable	enable	disable	LA	OFF
							LSP	ON
		4	RIN･C+	R side Input C+ enable/disable	enable	disable	LA	OFF
							LSP	ON

★For boards up to Rev. TCH-770/01C-E・・・The connectable detectors are fixed at the factory and cannot be changed by setting switch DSW3.

		Bit	Name	Means	ON	OFF	Original setting	
㉛	DSW3 DIP switches on the board	1	L･VR1	L side Balance VR enable/disable 1	enable	disable	LA	ON
							LSP	OFF
		2	L･VR2	L side Balance VR enable/disable 2	enable	disable	LA	ON
							LSP	OFF
		3	LIN･C	L side Input C enable/disable	enable	disable	LA	OFF
							LSP	ON
		4	LIN･G	L side Input G small/large	small	large	LA	ON
							LSP	OFF
		5	R･VR1	R side Balance VR enable/disable 1	enable	disable	LA	ON
							LSP	OFF
		6	R･VR2	R side Balance VR enable/disable 2	enable	disable	LA	ON
							LSP	OFF
		7	RIN･C	R side Input C enable/disable	enable	disable	LA	OFF
							LSP	ON
		8	RIN･G	R side Input G small/large	small	large	LA	ON
							LSP	OFF
		9	WAVE1	Applied waveform 1	AC	DC	LA	ON
							LSP	OFF
		10	WAVE2	Applied waveform 2	DC	AC	LA	OFF
							LSP	ON

5． EXPLANATION OF EACH PART

［1］Channel selector switch and internal meter



（1）The tension indicator shows the tension value of the channel selected by the channel selector switch.
(This corresponds to the slot position, not the card number.)
If you select a channel without the card, the indicator will not work.

（2）The tension indicator is displayed on a scale of 0 to 100%.
The channel number and detection capacity are written on the top of each channel, as shown in the figure.
The tension value should be converted and read using the written detection capacity as 100%.

Example: Detection capacity 300N
Meter indication 65%
In this case, the tension value is 300 x 0.65 = 195N

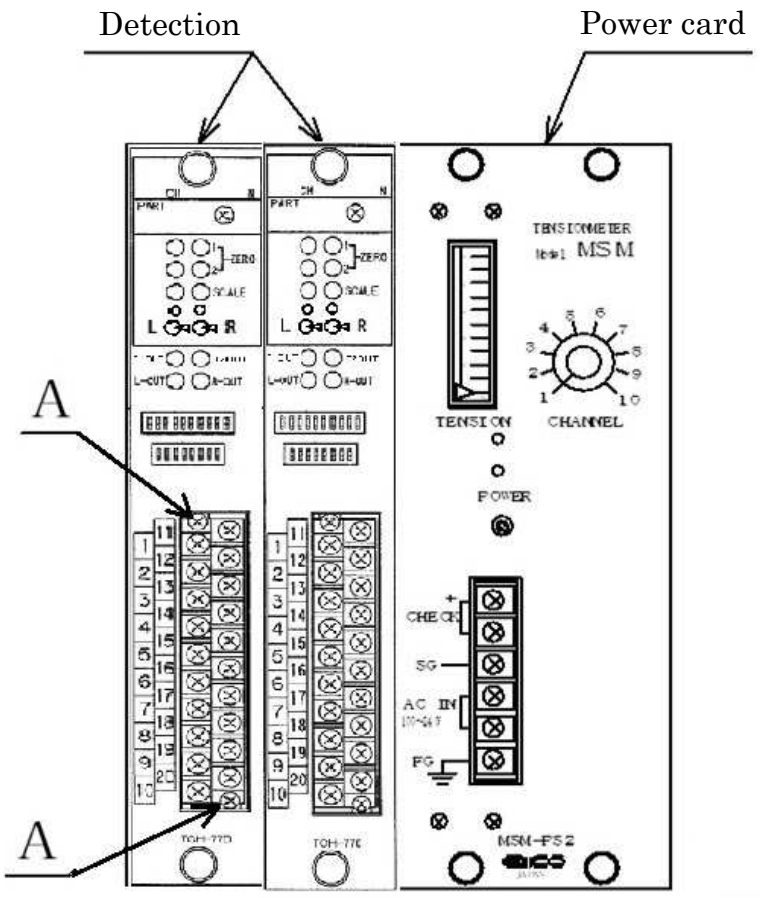
(note) If all channels have the same capacity, there is no problem, but if they are different, be careful not to mistake them for other channel capacities.

（3）The check terminals output the tension signal of the channel selected by the channel selector switch in the range of 0 to 5V.
When the internal meter indicates 100%, the output is 5.0V.

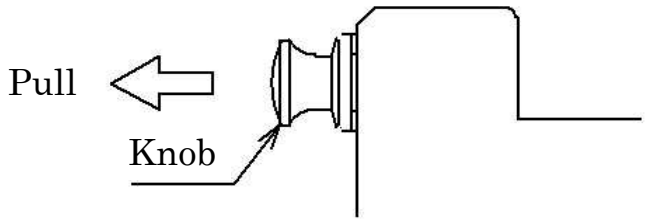
［２］How to remove the terminal block and card

（１）Each detection card can be removed together with the terminal block by loosening the two screws shown in A below, without removing the connected wires.
This is convenient when checking or replacing the detection card.

（２）The terminal block of the power card cannot be removed.
Turn off the power and disconnect each wire before removing the card.



（３）To remove a card, pull the knobs on the top and bottom of each card toward you.
To install the card, insert the card firmly and push the knob in to lock it in place.
Please turn off the power before inserting or removing the card.



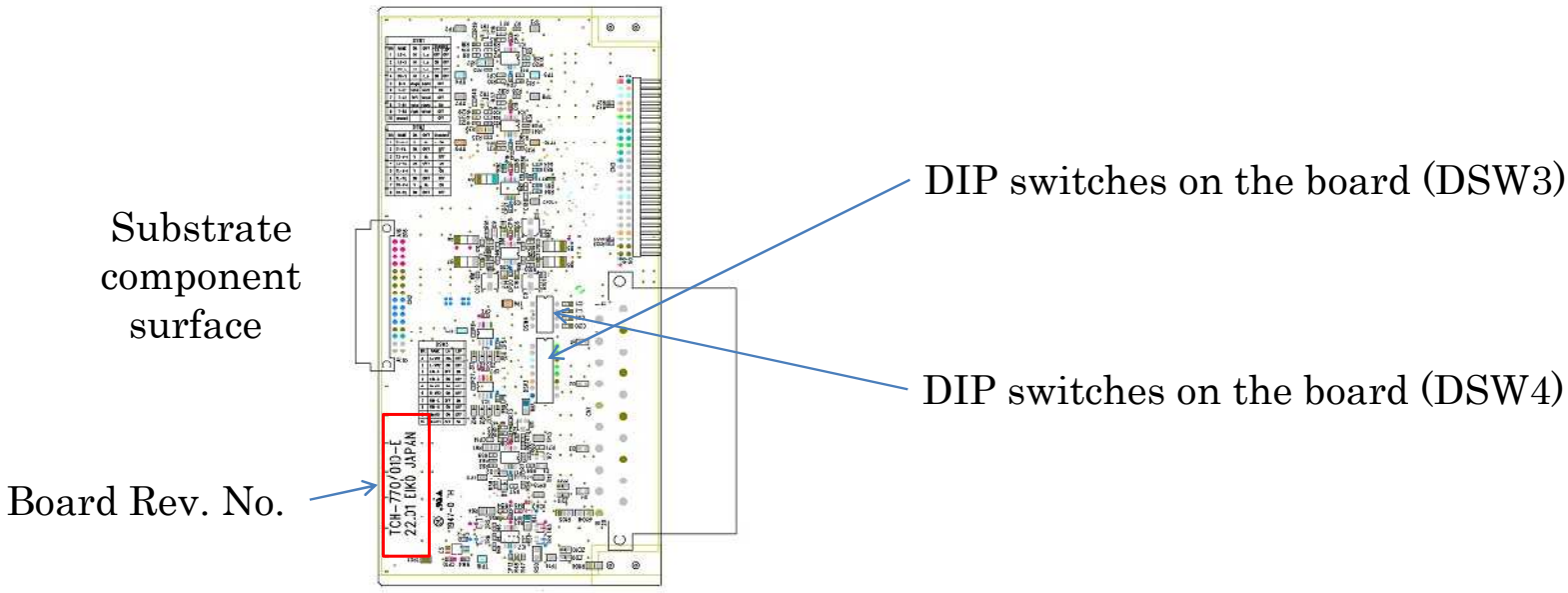
（４）If there is an empty channel (with a cover plate attached),
an additional detection　card can be installed.
The channel selector switch and tension indicator are connected to all channels in advance, so they can be used immediately.

［３］Setting the DIP switches on the board

Supported by substrate Rev. TCH-770/01D-E or later.

There are two types of tension pickups, one using a coil and the other using a strain gauge. Set the "DIP switches DSW3 and DSW4 on the board" according to the detector to be connected.
This function is supported by board Rev. TCH-770/01D-E or later.
The detector that can be connected to earlier Rev. boards is fixed at the factory, so please

Using a coil	LA type	ＬＡ－０、ＬＡ－ＩＦ、ＬＡ－ⅡＦ、ＬＡ－Ⅲ
	Other	ＳＴ－３
Using a strain gauge	LSP type	ＬＳＰ－００、ＬＳＰ－０１、ＬＳＰ－０５、ＬＳＰ－１０、 ＬＳＰ０１－Ｚ、ＬＳＰ０５－Ｚ、ＬＳＰ１０－Ｚ
	LS type (conventional)	ＬＳ－０、ＬＳ－１、 ＬＳ０－Ｚ、ＬＳ１－Ｚ
	Other	ＦＴ－１、ＦＴ－３



Set any of the settings according to the detector

	Bit	Name	Means	ON	OFF	LA type	LSP type
DSW3	1	L･VR1	L side Balance VR enable/disable 1	enable	disable	ON	OFF
	2	L･VR2	L side Balance VR enable/disable 2	enable	disable	ON	OFF
	3	LIN･G	L side Input G small/large	small	large	ON	OFF
	4	R･VR1	R side Balance VR enable/disable 1	enable	disable	ON	OFF
	5	R･VR2	R side Balance VR enable/disable 2	enable	disable	ON	OFF
	6	RIN･G	R side Input G small/large	small	large	ON	OFF
	7	WAVE1	Applied waveform 1	AC	DC	ON	OFF
	8	WAVE2	Applied waveform 2	DC	AC	OFF	ON

	Bit	Name	Means	ON	OFF	LA type	LSP type
DSW4	1	LIN･C-	L side Input C- enable/disable	enable	disable	OFF	ON
	2	LIN･C+	L side Input C+ enable/disable	enable	disable	OFF	ON
	3	RIN･C-	R side Input C- enable/disable	enable	disable	OFF	ON
	4	RIN･C+	R side Input C- enable/disable	enable	disable	OFF	ON

［4］Setting the DIP switches for various settings

（1）Amplifier gain setting

This is the setting for the amplification factor of the input signal from the tension pickup.
If the tension does not increase to the target tension even when the scale adjustment VR is turned all the way up, increase the gain setting.
The sensitivity can be increased from 1X to 7.9X.
When changing the gain, use the same setting for both the L and R sides.
The higher the magnification, the worse the accuracy of the various functions and the more likely it is that zero fluctuation will occur.

Bit	Name	Means	ON	OFF	LA	LSP
1	LG･L	L side gain adj large	Hi	Lo	OFF	OFF
2	LG･S	L side gain adj small	Hi	Lo	ON	OFF
3	RG･L	R side gain adj large	Hi	Lo	OFF	OFF
4	RG･S	R side gain adj small	Hi	Lo	ON	OFF

Bit No.		Gain setting			
L	R	1X	3.4X	5.6X	7.9X
1	3	OFF	OFF	ON	ON
2	4	OFF	ON	OFF	ON

LSP original setting　　LA original setting

（2）Tension output mode setting

Sets the assignment of the tension signal to be output from the external terminal block.
Total 3/left side output can output a left signal in addition to the total signal.
Total 4/right side output can output the right signal in addition to the total signal.
Change the two switches as a set, Bit 6 and 7, Bit 8 and 9.
The total signal can be output from 4 systems together with the Total 1 and 2.

Bit	Name	Means	ON	OFF	original setting
6	T-L1	Total3 / L output selector 1	Total3	Left	ON
7	T-L2	Total3 / L output selector 2	Left	Total3	OFF
8	T-R1	Total4 / R output selector 1	Total4	Right	ON
9	T-R2	Total4 / R output selector 2	Right	Total4	OFF

As an example
①When using one analog indicator and one output for control.
Total 1 is output to the analog indicator, and Total 2 is output for control.
Total 3 /left side output and Total 4 /right side output are not used.

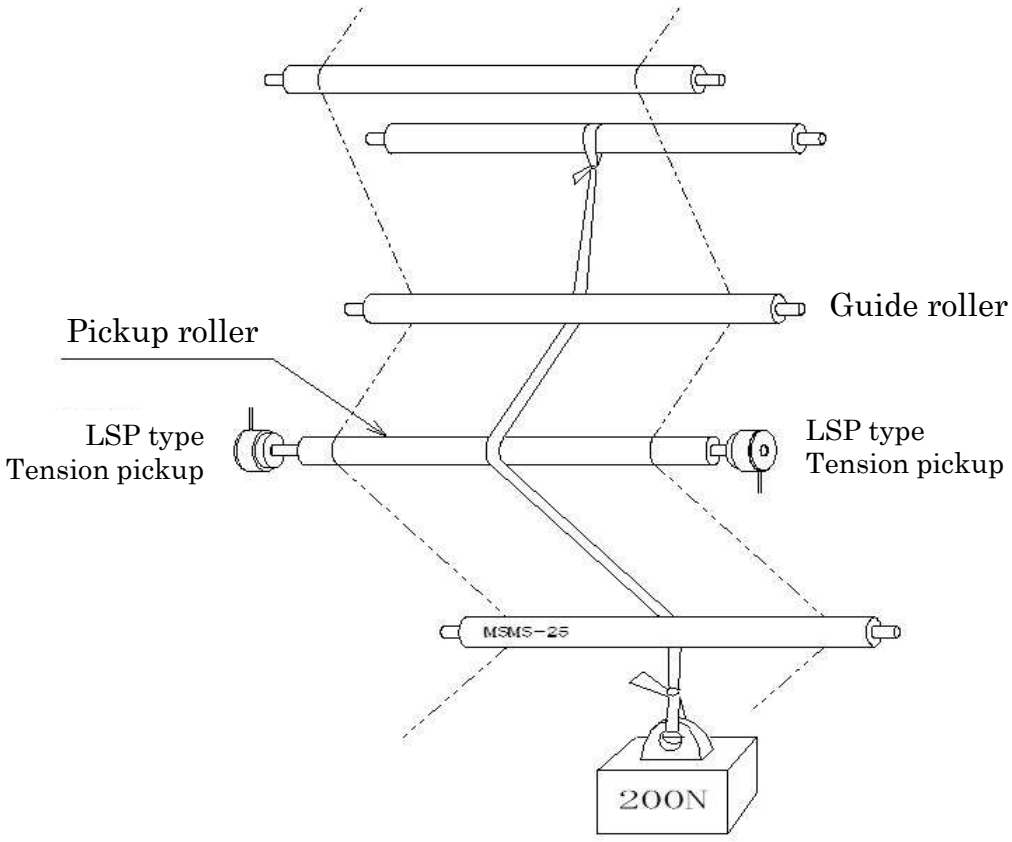
②When using four analog indicators.
Total 1, Total 2, Total 3 / left side output, Total 4 / right side output output to the analog indicator.

（３）Setting the pickup's detection mode

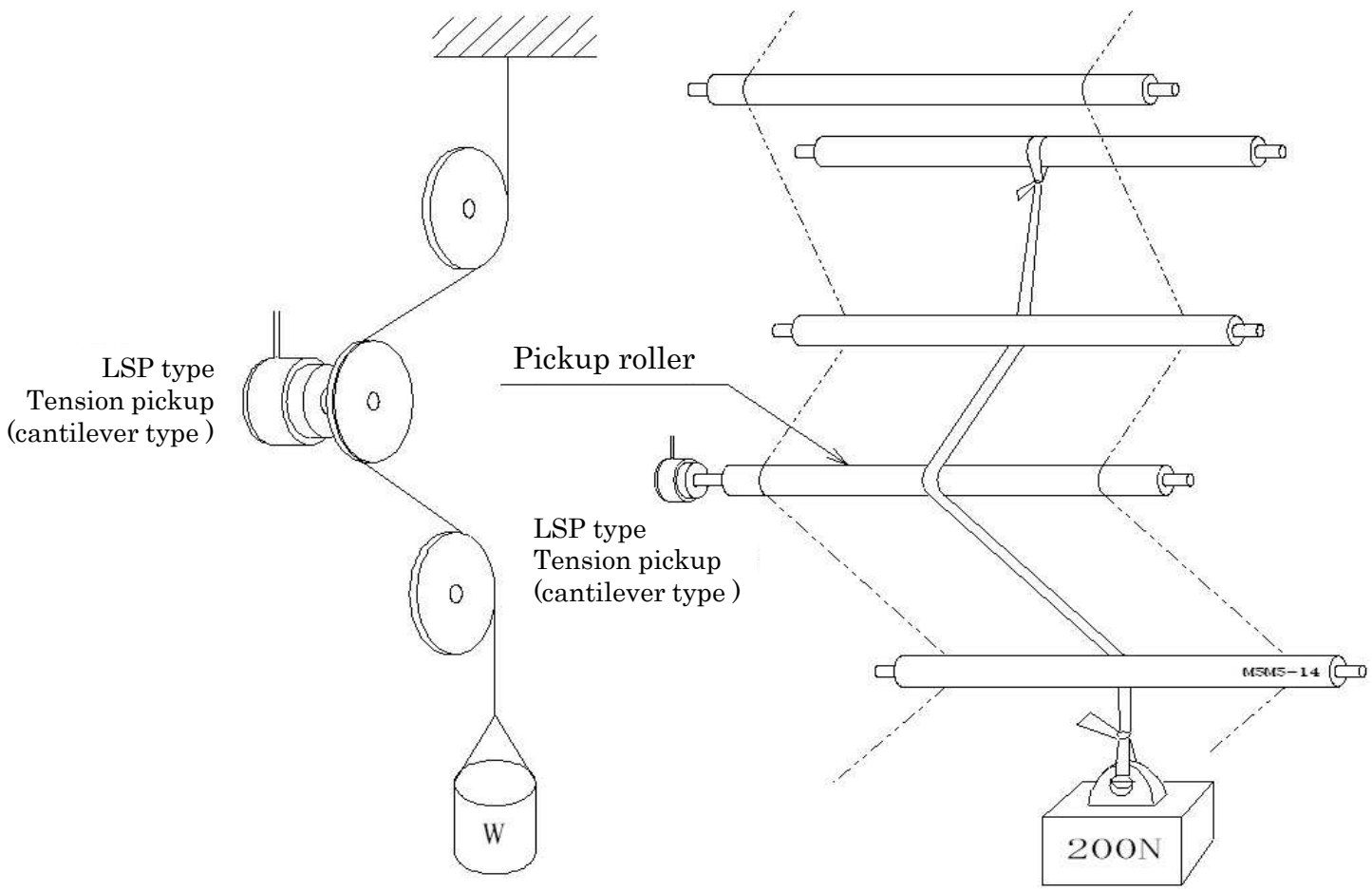
This is the setting for the detection mode of the tension pickup.
Turn OFF the Bit for both side hold and both side detection type (twin pickups),
and turn ON the Bit for both side hold and single detection type
or cantilever type (single pickup).

Bit	Name	Means	ON	OFF	original setting
5	B-S	Detection mode selector	Single	Twin	OFF

①Twin pickups：A configuration in which pickups are installed on both sides of the pickup roller and the added values of both are used.



②Single pickup：A configuration in which a pickup is attached to one side of the pickup roller.

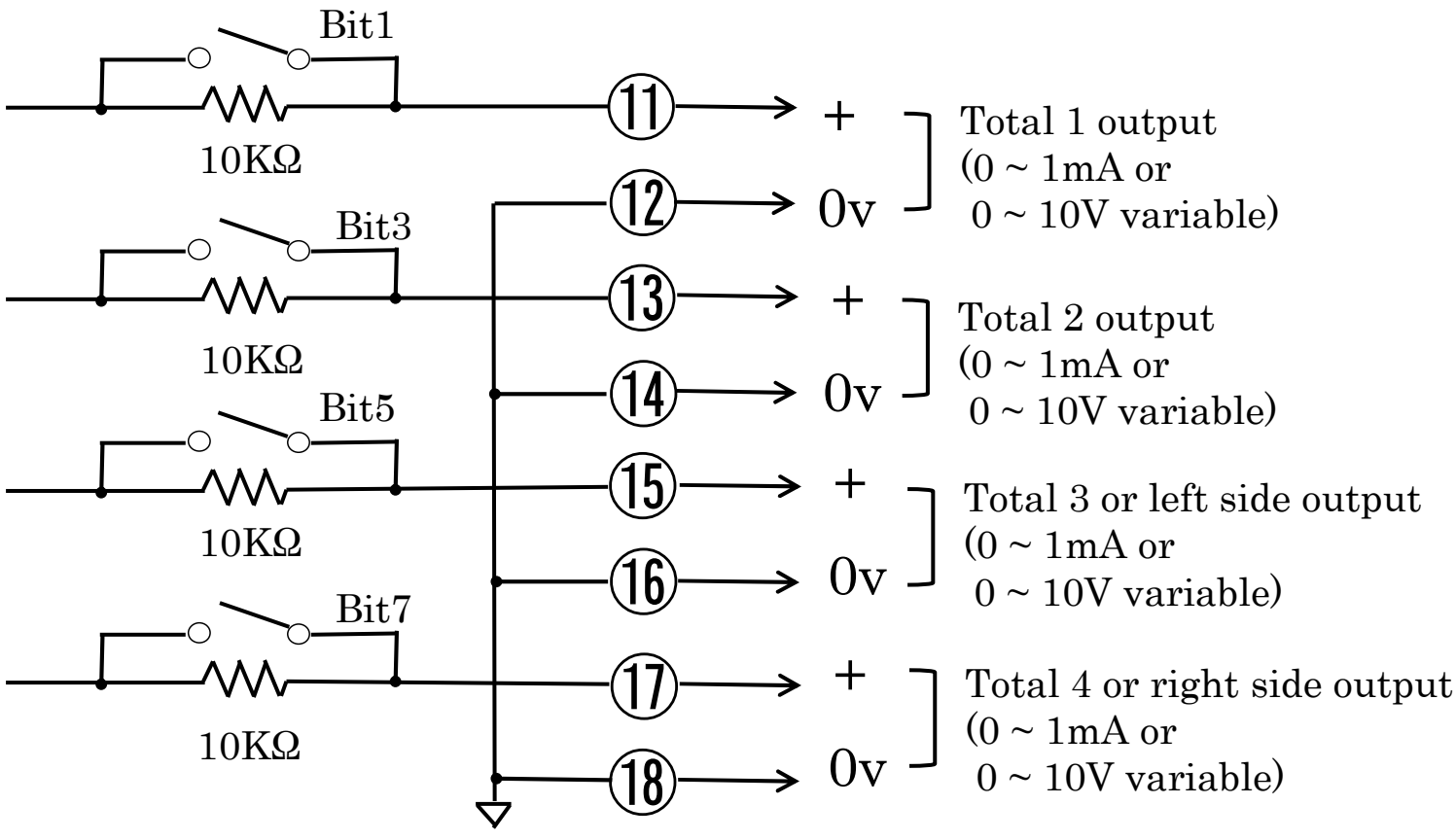


［５］Setting the DIP switches for the filter setting

（１）Voltage and current switching of tension output

Select whether to output signal as voltage or current from
the external terminal block.
Total 1, Total 2, Total 3 / left side output, and Total 4 / right output can
be selected for each.
When connecting an analog indicator, select the current output.
The current is converted with a 10KΩ resistor, and the maximum current
that can flow is 1mA.
When connecting a digital indicator or sequencer, select the voltage output.

Bit	Name	Means	ON	OFF	original setting
1	T1･V-I	Amp. or volt. Output selector for Total 1	Volt	Amp	OFF
3	T2･V-I	Amp. or volt. Output selector for Total 2	Volt	Amp	ON
5	LT･V-I	Amp. or volt. Output selector for Total 3 / left	Volt	Amp	ON
7	RT･V-I	Amp. or volt. Output selector for Total 4 / right	Volt	Amp	ON



（２）Filter switching for tension output

Select the filter to be added to the signal output from the external terminal block.
Total 1, Total 2, Total 3 / left side output, Total 4 / right side output can
be selected for each.
For analog indicators, the slower the response, the easier it is to read the value,
so add a filter.
When connecting a digital indicator or sequencer, add a filter as necessary.

Bit	Name	Means	ON	OFF	original setting
2	T1･FIL	Filter on/off for Total 1	ON	OFF	ON
4	T2･FIL	Filter on/off for Total 2	ON	OFF	ON
6	LT･FIL	Filter on/off for Total 3 / left side	ON	OFF	OFF
8	RT･FIL	Filter on/off for Total 4 / right side	ON	OFF	OFF

6 . TENSION PICKUP CALIBRATION

・After installing the tension detector and completing the wiring, adjust the pickup.
・A tester is required for adjustment.
・Make the same adjustments for all channels.
・To stabilize the circuit, wait at least 20 minutes after power-on before making any adjustments.
・Please refer to "4. Names and functions of each parts" for the numbers marked with ○ in the text.
・The adjustment points for the left side and the right side change depending on the tension detection mode.
In the case of twin pickups, both the left side and the right side need to be adjusted.
In the case of single pickup, either side needs to be adjusted.
For the tension pickup itself, please refer to the respective instruction manual.

（1）Balance adjustment ・・ Perform only for LA type, not necessary for LSP type.

・This is the process of balancing the bridge circuit to match the tension pickup.
This must be done when the pickup is newly installed or relocated.
Once adjusted, it does not need to be done again.
Make sure that no external force such as a sheet is applied to the tension pickup.
For this adjustment only, set the tester to the AC range.

【Left side balance adjustment】
・Connect a tester between No. [2] and No. [4] on the terminal block of the detection card.
・Turn the left side balance VR ⑬ to make the voltage between [2] and [4] closer to 0v.
If you turn the VR further, it will go away from 0v,
so adjust it to be as close to 0v as possible.

【Right side balance adjustment】
・Connect a tester between No. [7] and No. [9] on the terminal block of the detection card.
・Turn the right side balance VR ⑭to make the voltage between [7] and [9] closer to 0v.
If you turn the VR further, it will go away from 0v,
so adjust it to be as close to 0v as possible.

In the case of single pickup, adjust only the side to be used.

（2）Zero adjustment

・This is an adjustment to set the pickup to zero output when no tension is applied to it.
・Make sure that no external force such as a sheet is applied to the tension pickup.
・Select the channel No. to be adjusted with the channel selector switch ②.
・Connect a tester to the check terminal ⑥.
The positive lead will be the upper terminal and the negative lead will be the lower terminal.

【Left side zero adjustment】
・Set the left side ON/OFF switch ㉑ to ON and the right side ON/OFF switch ㉒ to OFF.
・Adjust the left side zero adjustment volume ⑮ so that the tester value is close to "0v".

【Right side zero adjustment】
・Also turn on the right side ON/OFF switch ㉒.
・Adjust the right side zero adjustment volume ⑯ so that the tester value is close to "0v".

In the case of single pickup, adjust only the side to be used.

（３）Scale adjustment

・Adjust the sensitivity of the tension pickup to meet the specifications.
Perform the scale adjustment after the zero adjustment has been completed.
Since the scale adjustment may cause the zero point to deviate,
it is recommended to adjust the zero and scale two or three times alternately
for more accurate adjustment.

【preparation】
・Use a sturdy tape or rope to hang the weight on the pickup roller.
Refer to the figure in "5. EXPLANATION OF EACH PART" for rope threading.
・The rope should be placed in the center of the roller, and the rollers
in front of and behind the pickup roller should be threaded so that
the sheet runs through them.
・The weight used should be the same level as the normal tension
for more accurate adjustment.
・If a weight cannot be used, use a spring balance or the like.
・Use the channel switch ② to select the channel No. to be adjusted.
・Connect a tester to the check terminal ⑥.
The positive lead will be the upper terminal.

【Left side scale adjustment】
・Set the left side ON/OFF switch ㉑ to ON and the right side ON/OFF switch ㉒ to OFF.
・Adjust the left side scale adjustment volume ⑰ so that the tester value is "2.5v".

【Right side scale adjustment】
・Also turn on the right side ON/OFF switch ㉒.
・Adjust the left side scale adjustment volume ⑱ so that the tester value is "5v".

In the case of single pickup, adjust only the side to be used.

（4）Output adjustment

・The tension signal is output as a voltage or current analog signal for the total, left side and right side signals respectively, and this output level is adjusted.

【preparation】
・Use the channel switch ② to select the channel No. to be adjusted.
・Connect a tester to the check terminal ⑥ of the power card (MSM-PS2).
The positive lead will be the upper terminal and the negative lead will be the lower terminal.
・Since the full scale state is set when the check terminal voltage is 5v, deliberately shift the zero point and set the check terminal voltage to 5v according to the following procedure.
Turn on both the left-side ON/OFF switch and the right-side ON/OFF switch.
Turn the left side zero adjustment volume ⑮ to set the tester voltage to 5.0v.

【Output adjustment】
・There are four output systems: Total 1, Total 2, Total 3 / left side output, and Total 4 / right selective output.
To select which signal to output, refer to "[4]Setting the DIP switches for various settings" in section 5.

・The four outputs can be selected from voltage and current outputs, and the filter characteristics can be selected from fast response and slow response.
When connecting an analog indicator, set it to current output and select the slow filter.
For this selection, please refer to "[5]Setting the DIP switch for the filter setting" in section 5.

・The output level of each of the four systems is adjusted by the volume.
Use the "Total 1 output level adjustor VR " for Total 1,
"Total 2 output level adjustor VR " for Total 2,
"Total 3 / left side output level adjustor VR " for Total 3 / left side,
and "Total 4 / right side output level adjustor VR " for Total 4 / right side.
In the case of analog indicator, adjust so that the meter indicates the full scale.
In the case of voltage output to a sequencer, adjust so that the required voltage is obtained.

・After completing the adjustment of the output, restore the zero point that was intentionally shifted.
Turn the left side zero adjustment volume ⑮ to set it to 0v.

7．MAINTENANCE

（1）Avoid exert a strange shock on the tension pickup without a tension force.
Never step on the pickup anyone.

（2）In case of exerted a heavy force on the tension pickup with a paper breaking or a film coiling, there is possibility of the zero point get out of order.
Sometimes check a zero point, if it's off and make adjust again.

（3）In the long run using, a sensibility (scale) gain may get off the point.
Make calibrate to the pickup, once or twice a year.

（4）In the very long run using, the dust has collect in the meter,
and sometimes it causes the operation trouble.
Make clean the inside by the air flashing, once a year or two years.

8． TROUBLE SHOOTING

（1）Power dose not supply.

・Is the power supply?(AC100~240V)
Ans.If it is not supplied, check the wiring, check the supply voltage.
Ans.If the power supply is normal, try unplugging the power card with the power supplied.

・Is the Power lamp lightens when you try to unplug the power card with the power supplied?
Ans.If it does not light up, the power card MSM-PS2 is faulty and needs to be replaced.
Ans.If it lights up, please put the power card back and unplug the detection cards one by one.

・Is the Power lamp lightens when you remove the detection card?
Ans. If the Power light comes on, the detection card you unplugged at that time
is faulty and needs to be replaced.
Ans. If the Power light does not come on after removing all the detection cards,
the power line may be shorted in the motherboard of the unit.

・The "Left side detecting ON/OFF indicator lamp" on the TCH-770 board serves as an indicator for the +15v power supply, and the "Right side detecting ON/OFF indicator lamp" serves as an indicator for the -15v power supply.
If the power supply is normal, the lamp will light up when the ON/OFF switch is turned on, but if the power supply has failed and there is no voltage output, the indicator lamp will not light up even if the ON/OFF switch is turned on.

（２） For LA type tension pickup

①Be impossible for the balance adjustment of the pickup.

・Even if the balance VR is turned, the voltage between terminals does not become near zero.
Ans. Is the tester set to the AC range?
It is not possible to measure in the DC range.

・The voltage between terminals does not change or does not approach zero even if the balance VR is turned.
Ans. There is a possibility that there is a mistake in the wiring, please check the wiring.

②Be impossible for the zero adjustment of the pickup.

・Be impossible for the zero adjustment.
Ans.Check the setting of the channel select SW, L and R side ON/OFF SW.

・The meter needle move by the zero VR, but can't the fit to the zero point.
Ans.Check the machine type, the roller weight, the mounted postures and the using locations, and confirm the agreement with these specifications.

③Be impossible for the scale adjustment of the pickup.

・Be impossible for the scale adjustment with zero adjustment completed.
Ans.Check the setting of the channel select SW, L and R side ON/OFF SW.

・Hang weight, and the meter are moving into the opposite direction.
Ans.Check about the mounted direction accord with the additional force direction.
Ans.If the wiring between No.2 and No.4 is reversed for the left side, or No.7 and No. 9 are reversed for the right side, the meter needle will move in the opposite direction.

・Hang weight, but the meter isn't moving.
Ans.Check for disconnection at No. 1 for the left side and No. 6 for the right side.

・The meter is moving, but does not adjusting.
Ans. Check if the model, roller weight, sheet angle, etc. are correct according to the specifications of the delivered product.
Ans. Scale adjustment may not be possible if the pickup is poorly mounted or twisted.
Ans. When the pickups usage is below in a lower limit, it's impossible for the scale adjustment rare, vary the gain setting.

④Judgment methods for in case of missing the wiring from the pickups.

・Remove the wires from the terminal board and measure the resistance between the two wires with a circuit tester. (3 wires, 3 ways)

・Of the resistance values measured, the maximum value is the combination of the red wire [1] and the white wire [2].
The remaining one is the black wire [3].

・Connect the black wire [3] to terminal block No.1 (or No.6).

・Connect the red wire [1] to terminal block No.2 (or No.7), and the white wire [2] to terminal block No.4 (or No.9).
At this point, you can connect the red wire [1] and the white wire [2] in reverse.

・Hang the weight in this state, and when the meter faces the - side, replace the red line [1] with the white line [2].

・Be sure to check the left side and the right side separately, and confirm that both meters swing in the positive direction when a load is applied.

（３） For LSP type tension pickup

①Wiring the Pickup.
・If wire A or C is disconnected, zero adjustment is possible, but the meter will not swing even if a load is applied.

・If wire B or D is disconnected, the meter will swing out.
Disconnection of B wire —— swing out to minus side
Disconnection of D wire —— swing out to positive side.

・If the B wire and D wire are switched, the meter will swing in the opposite direction.

②Applied voltage to the pickup
・How to check the applied voltage
Connect the negative side of the tester to terminal block No.12.
Connect the positive side of the tester to No.1 on the terminal block and measure the voltage.
Ans. If the voltage is +5.0V±0.2V, it is OK.
Connect the positive side of the tester to No. 3 on the terminal block and measure the voltage.
Ans. If -5.0V±0.2V, it is OK.
If the measured voltage deviates from the above, it is abnormal.
Ans. Replace the detector card.

③How to check the disconnection inside the pickup.
・Remove the terminal block of the tension detection board.

・Using a tester, measure the resistance between lines A and C.
If the resistance is within the range of the input resistance specified in the specifications of the detector, it is OK.

・Use a tester to measure the resistance between lines B and D.
If the resistance is within the range of the output resistance specified in the specifications of the detector, it is OK.

・If you want to check the wiring, remove it from the terminal block and check it in the same way.

④Life of strain gage.
・Depending on the usage conditions, the zero point may shift over a long period of time due to repeated loading or overload.
The life of the strain gage is defined as the point at which zero adjustment is no longer possible.
In this case, it is necessary to replace the detector.

⑤If the strain gage is disconnected due to overload, the meter will swing out.
・The pickup needs to be replaced.

⑥The operation of the tension detection circuit can be checked as follows.
・Short-circuit the wires between B and D (between No.2 and No.4 for L side, and between No.7 and No.9 for R side).
If zero adjustment can be made in this state, the detection circuit is normal.

⑦If you are unable to identify the wiring of the pickup.
・In the case of LSP type, the wiring cannot be identified by the method of measuring the resistance value.

⑧Installation of the pickup.
・If the mounting surface of the pickup is inaccurate or if the roller is not aligned properly, the pickup may be twisted, and zero/scale adjustment may not be possible or the meter may swing backwards. Also, the linearity of the output will be poor.

・You can determine if the detector is fouled in the following way.
First, check the R and L outputs separately. Remove the roller and check the R and L outputs.
If the output changes by more than the weight of the roller, there is a kink.

⑨When the roller is too heavy.
・ If the roller is so heavy that it exceeds the detection range of the detector, both zero and scale adjustment may not be possible.
The only solution is to change the detector model.

（４） Unusual tension indicator.

①Meter not indicates zero point at the power is off.
・Adjust the mechanical zero of the meter itself.

②Meter needle moving isn't smooth. (Moving as like catch on the way.)
・Needle occasionally clings to a cover inside by the static electricity,
and needle moving become wring.
Eliminate the static electricity, or replace a new meter.

③Needle move back and forth.
・This cause is the machinery vibration. Separate a meter from the machine,
and defend from the machinery vibration.

④Meter indication is change under the machine is stop.
・Is supposing that by the noise influence.
Use a shielded cable for the pickup cable, and separate from the power line.
Compare the connection and non-connection of the SG and FG terminals,
and select the one with the least change.

⑤ Meter needle move right and left at the machine is high speed operation.
・Pickups occasionally resonant with the pickup roller revolution.
(Especially on a high-speed machine)
In this case, on trail change the machine speed, and if the resonant is put down,
that is the resonance.
Be sure make the dynamic balance of the pickup roller.

⑥ Output to analog indicator.
・When voltage is applied to an ammeter, the needle swings out.
・It is possible to connect a voltmeter in current output mode, but if the impedance of
the voltmeter is small, the display will not increase even if "M" VR is turned.

（５） Tension became irregular when the seat is run.

① Is a paper roll center unbalanced? (An eccentric state)

② Is a rewinder shaft inconsistent turning?

③ Is the line speed stability?

④ Check a guide roller unbalanced, turning stability and the dynamic balance.

⑤ Is the paper shaft slip?

9．SPECIFICATION & DIMENSIONS

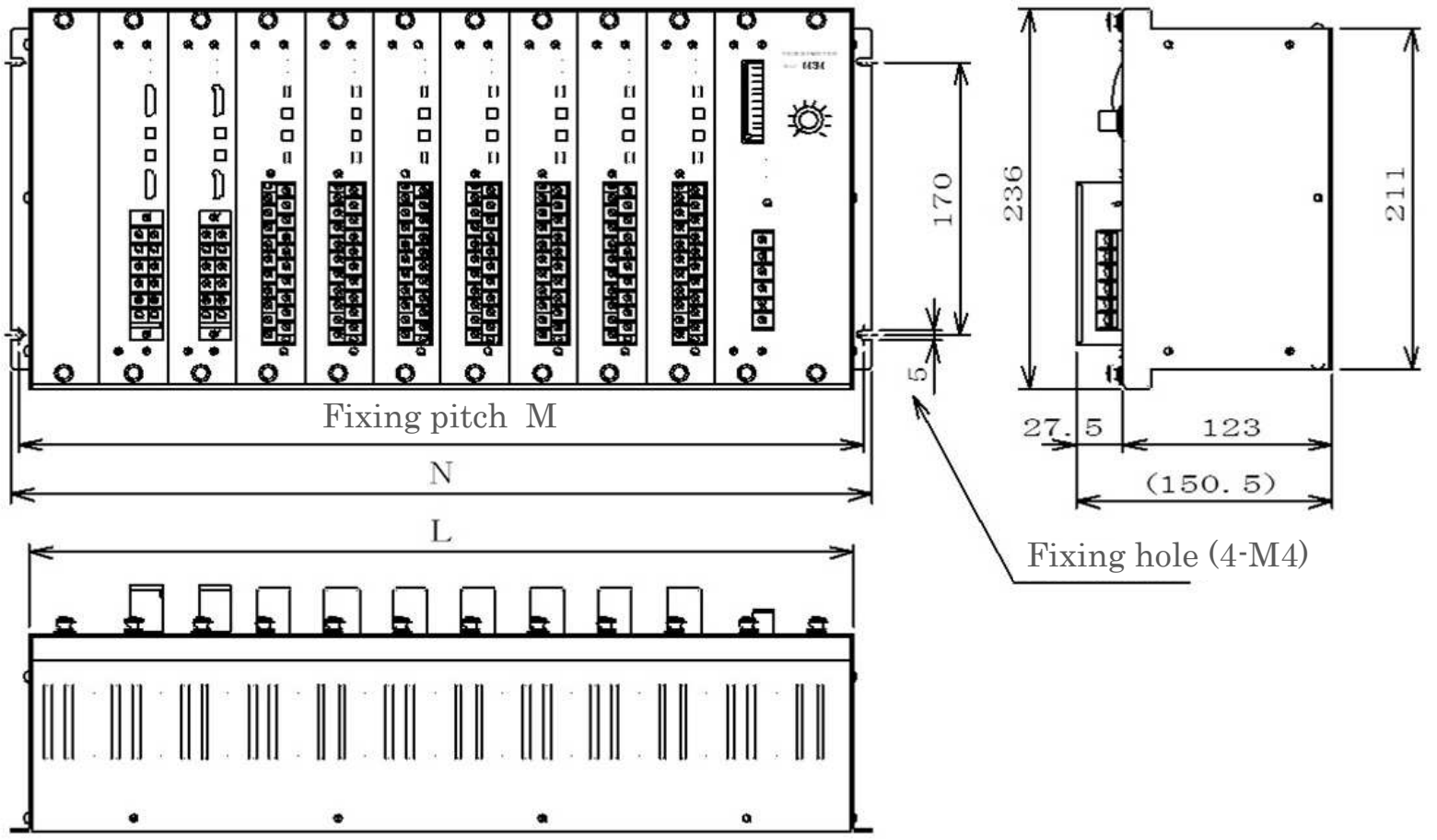
Tension meter　MSM　SPECIFICATIONS		
type representation	MSM□-○-△H Number of TCH-770 mounted Number of slots（2,4,6,8,10） MSMS・・・Chassis type MSMB・・・Box type	
POWER SOURCE	AC100～240V 40VA or less（10 CH）　50／60Hz	
ENVIRONMENTS	0～40℃ / temperature	
	80% below / humidity (Avoid dew)	
DIMENSIONS	This is different from the channel number.Refer to the figure of dimension.	
WEIGHT	about 5.7kg / chassis type 10 channels.	
BODY COLOR	MSMS (Chassis type)	Body : Hammer tone black Panel : Hairline silver (letter is black)
	MSMB　(Box type)	Follow the customer's specified.

Tension detection card TCH-770　SPECIFICATIONS (The original settings are designed to match those of the previous TCM-550 model.)		
OUTPUT	OUTPUT SPECIFICATION	ORIGINAL SETTING
Total 1 output	Voltage output: DC0 ～ +10V/FS Current output: DC0 ～ 1mA/FS	Current output 0.5mA/FS
	Filter ON/OFF switch ON (0.2Hz), OFF (7Hz)	ON (0.2Hz)
Total 2 output	Voltage output: DC0 ～ +10V/FS Current output: DC0 ～ 1mA/FS	Voltage output 5V/FS
	Filter ON/OFF switch ON (1.7Hz), OFF (7Hz)	ON (1.7Hz)
Total 3 / left side output	Total 3/Left side output switching	Total 3
	Voltage output: DC0 ～ +10V/FS Current output: DC0 ～ 1mA/FS	Voltage output 5V/FS
	Filter ON/OFF switch ON (0.2Hz), OFF (7Hz)	OFF (7Hz)
Total 4 / right side output	Total 4/Right side output switching	Total 4
	Voltage output: DC0 ～ +10V/FS Current output: DC0 ～ 1mA/FS	Voltage output 5V/FS
	Filter ON/OFF switch ON (0.2Hz), OFF (7Hz)	OFF (7Hz)

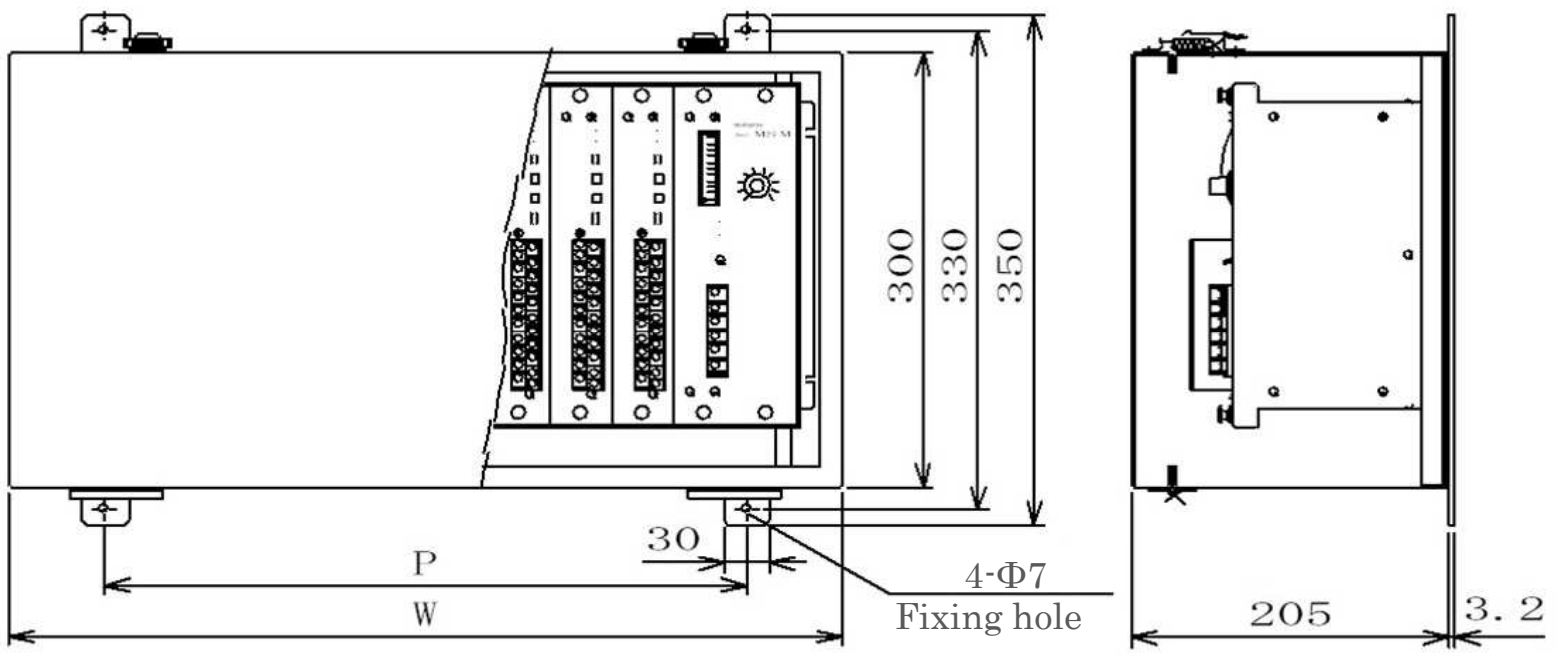
TCH-770 Characteristics		
ITEM	LSP type pickup included	LA type pickup included
Linearity	±0.1 %	±1.0 %
Reproducibility	±0.05 %	±0.1 %
Hysteresis	±0.1 %	±0.5 %
Temperature drift	±0.012 %/FS/℃	±0.05 %/FS/℃

DIMENSIONS

Chassis type MSMS-□



Box type MSMB-□



MSMS-05

Type	Chassis type			Box type	
Chassi	L	M	N	W	P
2ch	163.2	176	184	–	–
4ch	243.2	256	264	300	190
6ch	323.2	336	344	380	265
8ch	403.2	416	424	460	340
10ch	483.2	496	504	540	415