Tension Controller

Model C500P·F·W

Operation Manual

（The simple edition.）

This manual is intended to be used for the program version *V. 2.1 or older.

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EIKO SOKKI Co., Ltd.
SM-C5PFW(E)-Aa

Cautions for Use

We appreciate your patronage. Please read the following cautions prior to installation and use of this device.

(1) Be sure to use the power voltage specified in the System Specifications. In particular, voltage higher than as specified may cause fire, which is very dangerous. Make sure the right voltage is applied when wiring.

(2) Connect the power source to the designated terminal. Otherwise, it may cause the device to malfunction.

(3) Be sure to use D-type ground (old 3rd ground) for models with a ground terminal. Otherwise, simply touching the case may result in electric shock.

(4) Leave the wiring work to qualified electrical technicians.

(5) Models other than those labeled explosion-proof must not be used in an explosion-proof area.

(6)  mark is attached to the part of a device where power is connected. Touching the power connection may result in electric shock.

(7) Do not disassemble this device without a specific reason. Doing so may result in electric shock.

(8) Make sure that something easily burnable, water, or metal does not enter this device. Otherwise, such contamination may cause a malfunction.

(9) When this device is applied to a certain machine and if a malfunction of this device is expected to cause serious damage to humans and/or the facilities, be sure to install a safety device.

(10) In the event of an emergency like bad odors or smoke emitted from this device, immediately turn off the power and contact our service center.

EIKO SOKKI Co., Ltd.

Osaka Headquarters: 18-27, 1-chome, Minami-horie, Nishi Ward, Osaka 550-0015

Tel: (06) 6533-1801, Fax: (06) 6538-3278

Tokyo Sales Office: 1-28,Sudachou, Kanda, Chiyoda_ku, Tokyo 101-0041

Tel: (03) 5256-0055, Fax: (03) 5256-0056

Matsumoto Factory: Okubo factory park complex, 5652-41, Oaza Sasaga, Matsumoto City 399-0033

Tel: (0263) 25-7155, Fax: (0263) 27-3641

Matsumoto Rinkuu Factory: 4010-14, Aza Minamnishihara, Oaza Wada, Matsumoto City 390-1242

Tel: (0263) 40-2211, Fax: (0263) 40-2233

1. Introduction

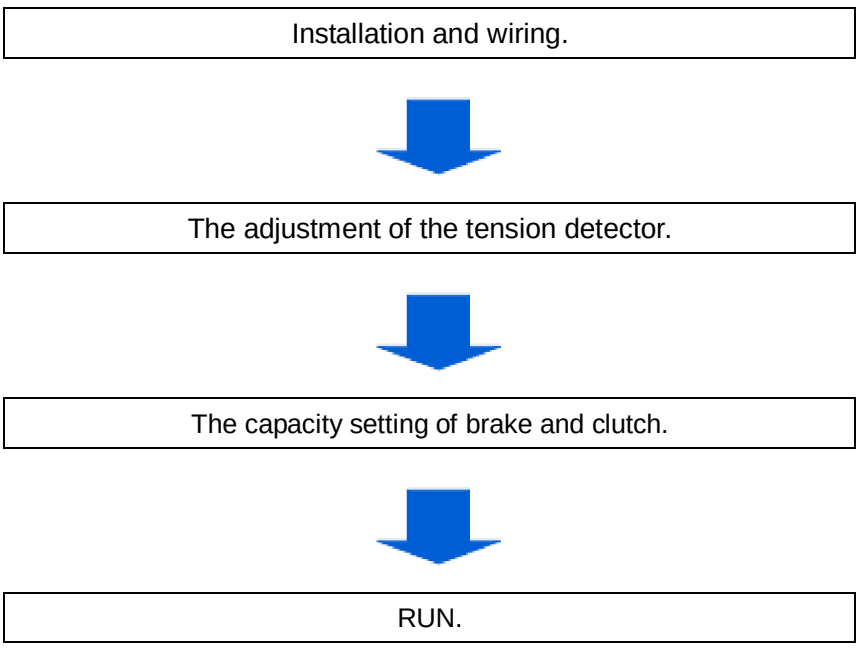
By changing the parameters of the program that runs on the same hardware, the C-500, you can form controllers fit for various machines and configurations. To identify each controller, the name [model] is set.
This manual simply explains the content on the model of the following in which the use frequency is high.

Model	Part to be applied
C500P	The unwinding control using the brake.
C500F	The In/out feed control using brake and clutch.
C500W	The rewinding control using the brake.

The standard composition of the tension detecting element minute has installed the LA type detector in the double end of the roll. 【Both-side holding, both-side detection.】
Please refer to "C500 manual SM-C500", when another model is used.

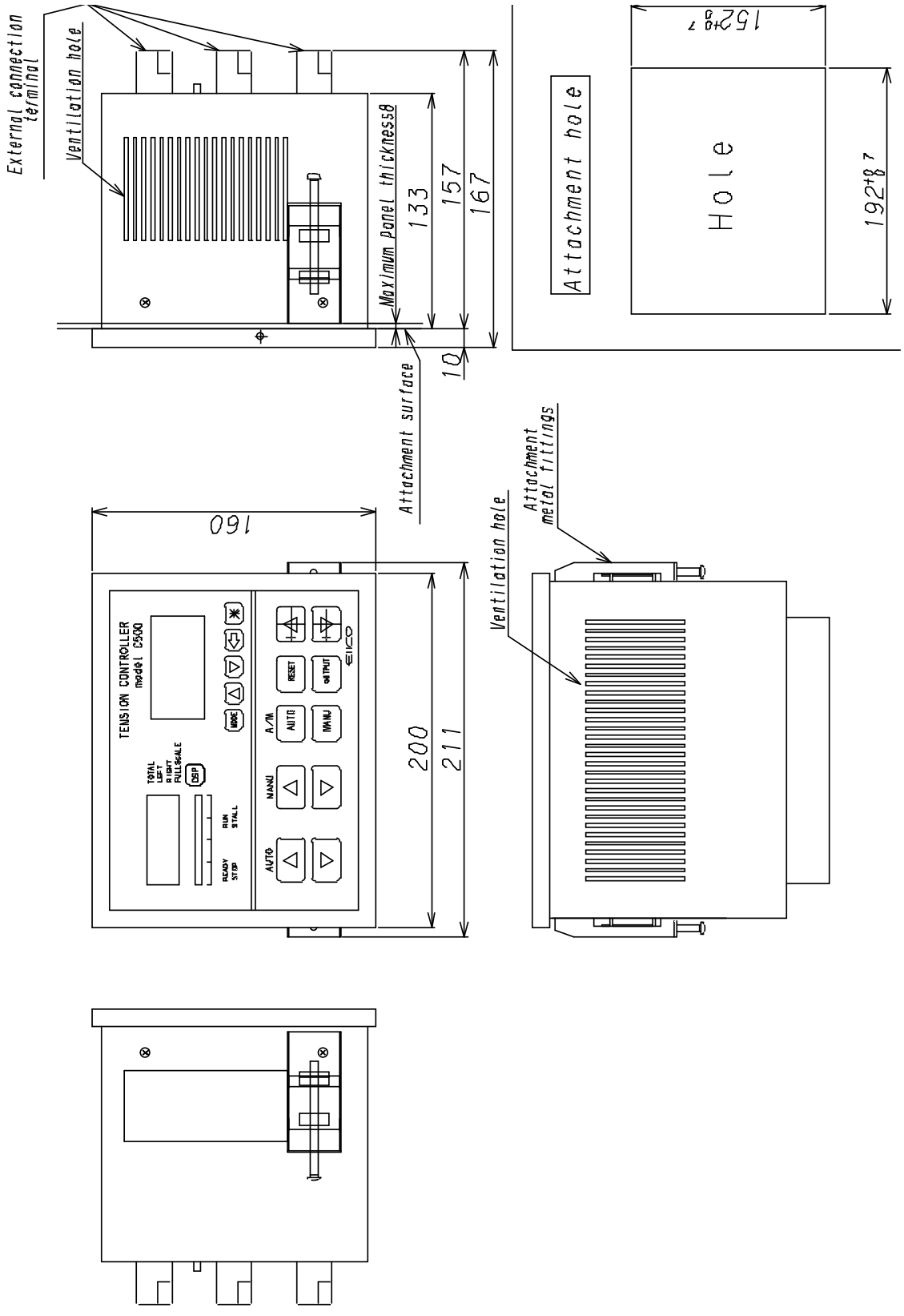
The work flow.

Based on the delivery article specification, the inside set value has been set in the factory shipment.
The sheet can be handled, if adjustment of the tension detector, capacity setting of the brake and capacity setting of the clutch are done.

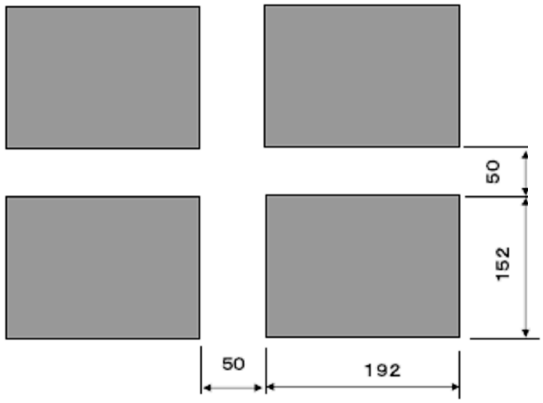


2. Installation

(1) External Dimension

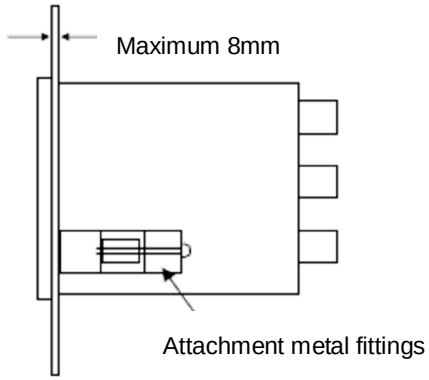


(2) Panel cut size



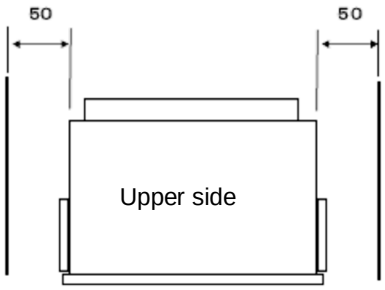
In case panels are placed side by side, make sure there are gaps both in the horizontal and vertical directions.

(3) Attachment



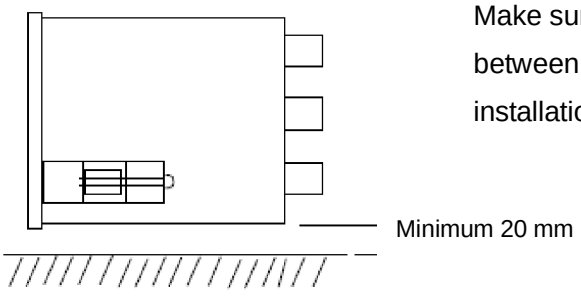
Attach a tension controller to a panel using attachment metal fittings that come with the kit.

(4) Side space



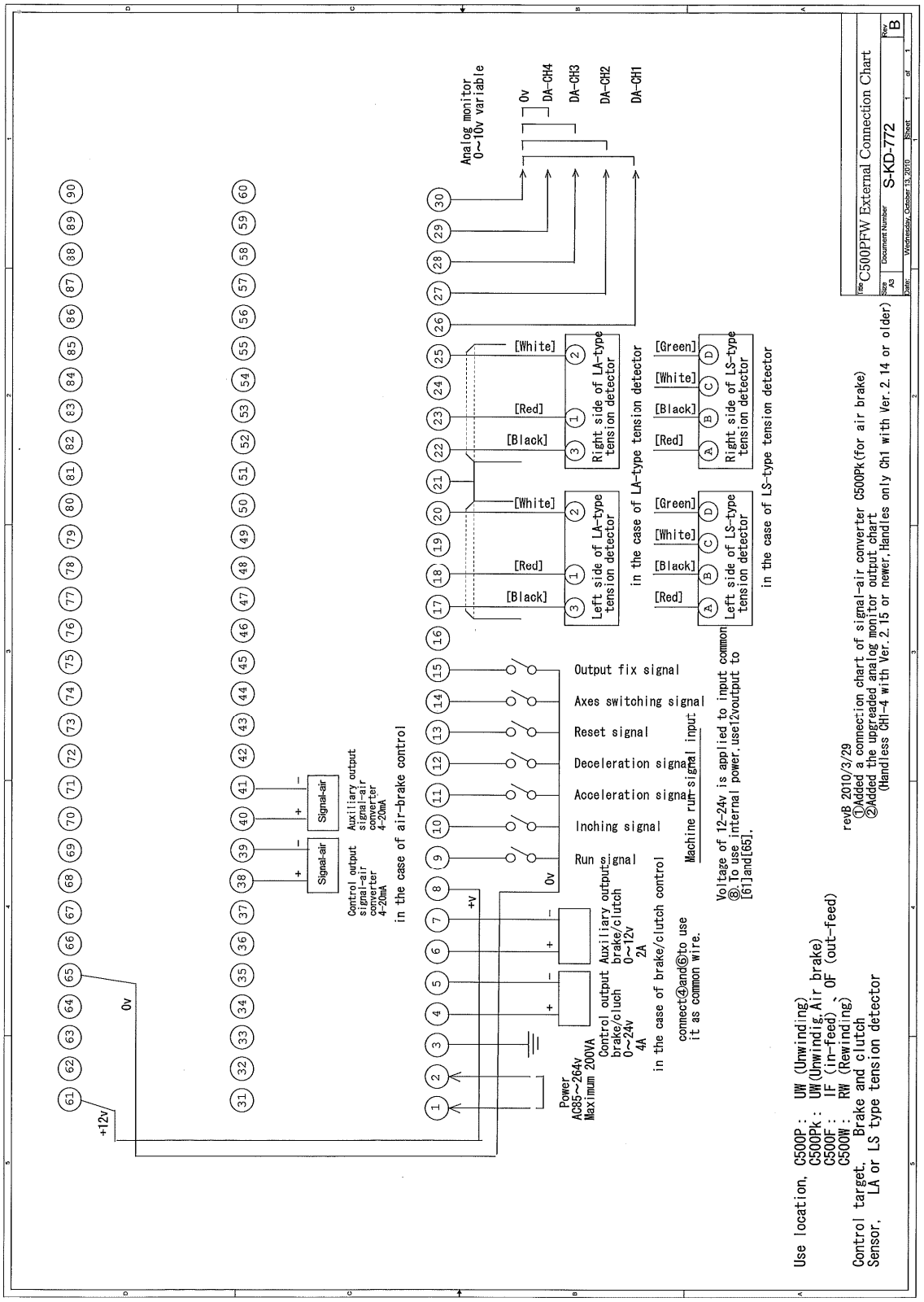
Make sure there are spaces for air path in both right and left sides.

(5) Place without attaching to panel



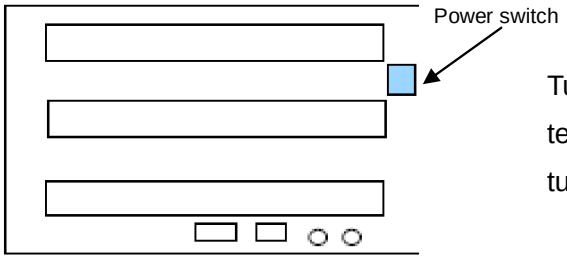
Make sure there is a space for ventilation of hot air between a bottom surface of the controller and installation surface.

3. Wiring


C500PFW External Connection Chart
S-KD-772
Rev B
Use location, C500P : UW (Unwinding)
C500Pk : UW(Unwindig,Air brake)
C500F : IF (in-feed), OF (out-feed)
C500W : RW (Rewinding)
Control target, Brake and clutch
Sensor, LA or LS type tension detector
revB 2010/3/29
①Added a connection chart of signal-air converter C500Pk(for air brake)
②Added the upgreaded analog monitor output chart
(Handless CH1-4 with Ver.2.15 or newer,Handles only CH1 with Ver.2.14 or older)
Analog monitor 0~10v variable
0v
DA-CH4
DA-CH3
DA-CH2
DA-CH1
[White]
[Red]
[Black]
[Green]
Right side of LA-type tension detector
Left side of LA-type tension detector
Right side of LS-type tension detector
Left side of LS-type tension detector
in the case of LA-type tension detector
in the case of LS-type tension detector
Output fix signal
Axes switching signal
Reset signal
Deceleration signal
Acceleration signal
Inching signal
Run signal
Machine run signal input
Voltage of 12-24v is applied to input common
⑧.To use internal power use12voutput to
[61]and[65].
Control output signal-air converter 4-20mA
Auxiliary output signal-air converter 4-20mA
Signal-air
in the case of air-brake control
Power AC85~264v Maximum 200VA
Control output Auxiliary outputs brake/cluch 0~12v 2A
brake/cluch 0~24v 4A
in the case of brake/clutch control
connect④and⑥to use it as common wire.
+12v
0v
+V

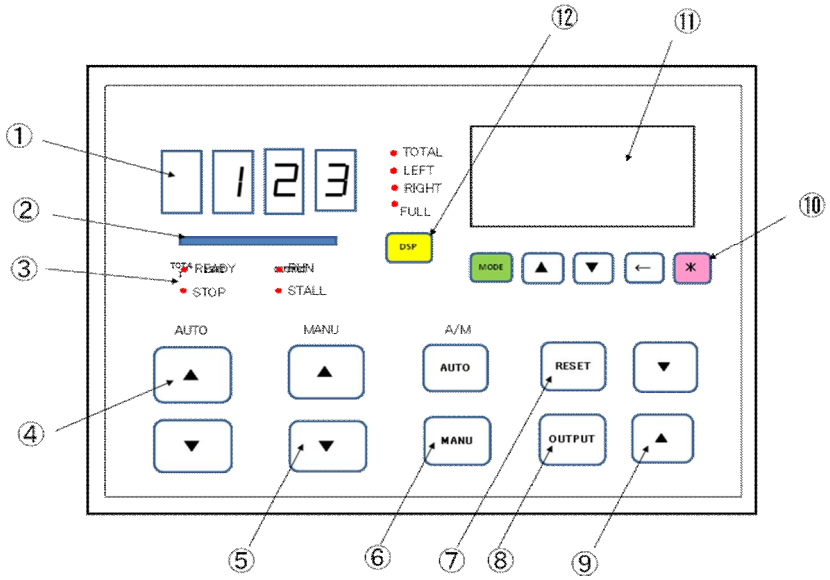
4. Adjustment

4-1. Power ON



Turn on the power switch located on the back of the tension controller. A lamp inside the switch knob will turn on.

4-2. Explanation of the panel



① Number display: Detected tension or the like is displayed.

② Bar display: Control output voltage or the like is displayed.

③ State display: Control state is displayed with lamps.
READY: Ready state, RUN: Running state, STOP: Stop state, STALL: Stall state,
All lamps off: free state

④ AUTO key: Increases or decreases the automatic tension set value.
The set value is displayed in ①, when the key was pushed.

⑤ MANU key: Increases or decreases the manual tension set value.

⑥ A/M key: Toggles between automatic control and manual control.

⑦ RESET key: Releases the temporary halt state and/or resets taper behavior.

⑧ OUTPUT key: Switches ON /OFF of control output, Turning off the output causes the output voltage to become zero for both control output and auxiliary output.

⑨ Multipurpose key: With C500W, this increases or decreases the taper set value.
The set value is temporarily displayed in ①, when the key was pushed.

⑩ Setting key: It is used for the change of the set value.

⑪ LCD display: It is used for the change of the set value.

⑫ DSP key: Changes the content in the number display.

TOTAL: Total tension display

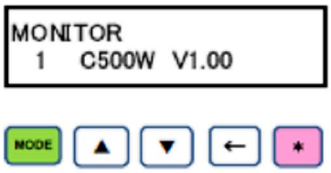
LEFT: Left tension display

Right: Right tension display

FULL SCALE: Full-scale display of detector

4-3. Change direction of the set value

(1) Display sign when the power is turned on.



Use an LCD display and the setting keys on the panel for adjustment. When the power is turned on, the screen number [1] monitor is displayed. The C500 is followed by some letters that show the current status. Also, the program version of the system will be displayed.

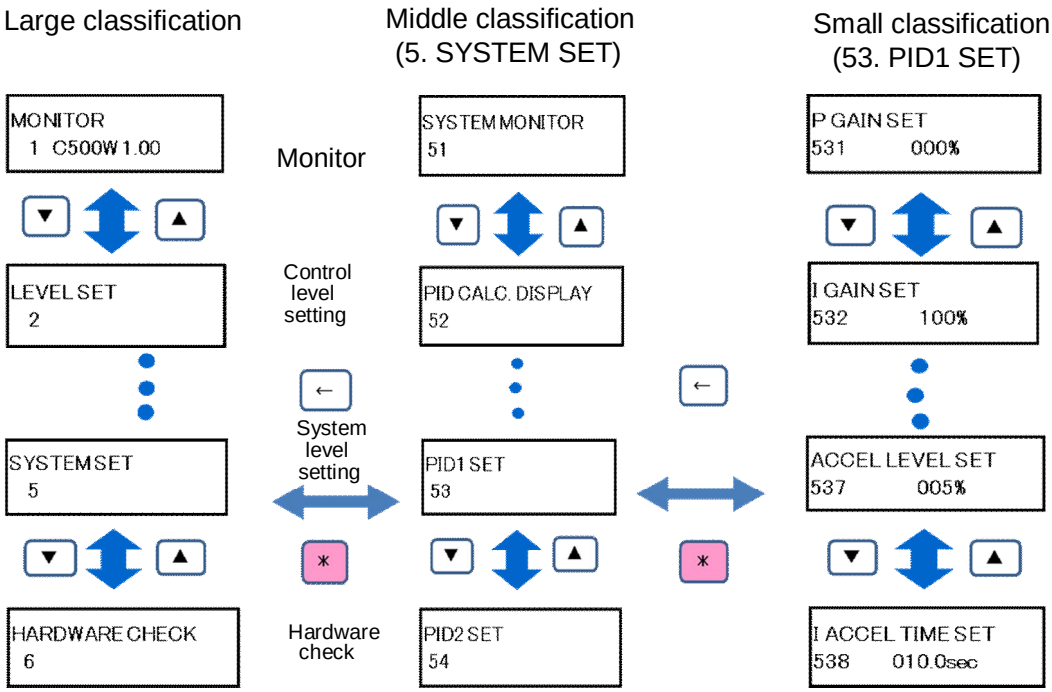
(2) Screen configuration

There are three major classifications on the screen, large, middle, and small.

One item of a large classification contains a middle classification that contains a small classification. Each screen is identified by the screen number.

Each screen inside the classification can be chosen by the [▲][▼] keys.

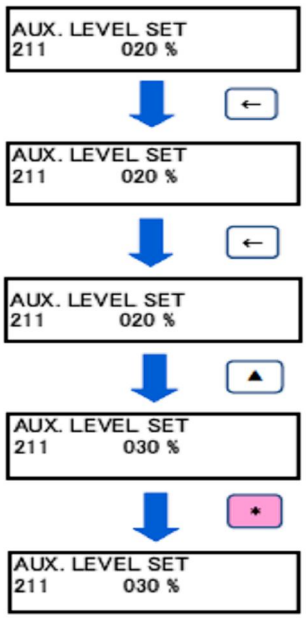
Transfer between classifications can be done by the [←][*] keys.



(3) How to change the set value

The change is possible by following procedures for the value of the setting item.

Example of auxiliary output level setting



Open a screen of example of auxiliary output level setting.

Press the [←] key to flash the 1st digit for setting change.

Press the [←] key again to flash the 2nd digit.

Press the [▲] key once to increase the 2nd digit number by one.

Use the [←] [▲][▼] keys to choose a value you wish to use.

Press the [*] key to enter the changed value.

4-4. Adjustment of tension detector

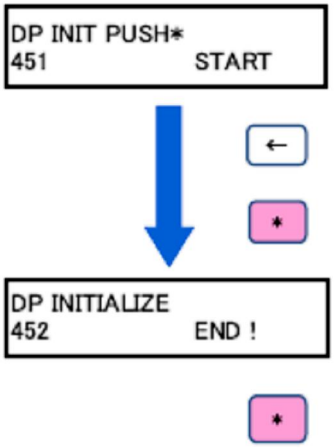
(1) The initializing of the electronic volume.

The LA type detector has installed rough zero adjustment volume in order to greatly shift the zero.

Prior to the fine zero tuning, implement the rough zero adjustment so that the tension value settles near zero point.

First, initialize the electronic volume to match the zero point to the central location.

Adjustment item	Screen display content	
Electronic volume initialization	451	DP INIT PUSH*
	452	DP INITIALIZE



Open Electronic Volume Initialization.

Press the [←] key to order an initialization.

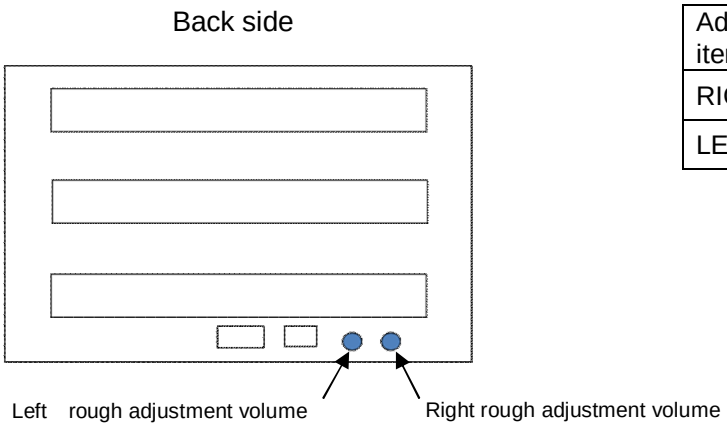
Press the [*] key to start the initialization.

[END!] is displayed upon completion of the initialization.

Press the [*] key to return.

(2) Rough zero adjustment

Turn a rough adjustment volume for the right side and left side each to make tension displays [112] and [113] come near the zero point.



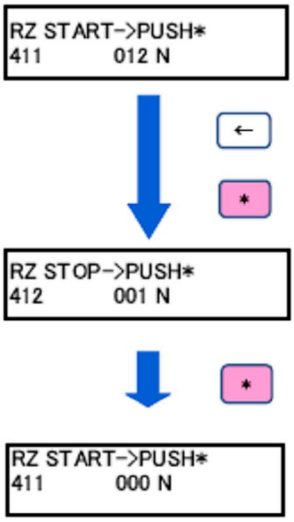
Adjustment item	Screen display content	
RIGHT TENSION	112	RIGHT TENSION
LEFT TENSION	113	LEFT TENSION

(3) Zero adjustment

Implement the zero adjustment in such a way no tension is applied to a detector.

Adjustment item	Screen display content	
Right zero adjustment	411	RZ START->PUSH*
	412	RZ STOP->PUSH*
Left zero adjustment	421	LZ START->PUSH*
	422	LZ STOP->PUSH*

In the case of zero adjustment on the right side



Open a zero adjustment screen on the right side.

Press the [←] key to order zero adjustment, then a value flashes.

Press the [*] key to start zero adjustment.

The displayed value is steadily getting to zero.

After confirming the zero display, press the [*] key to end.

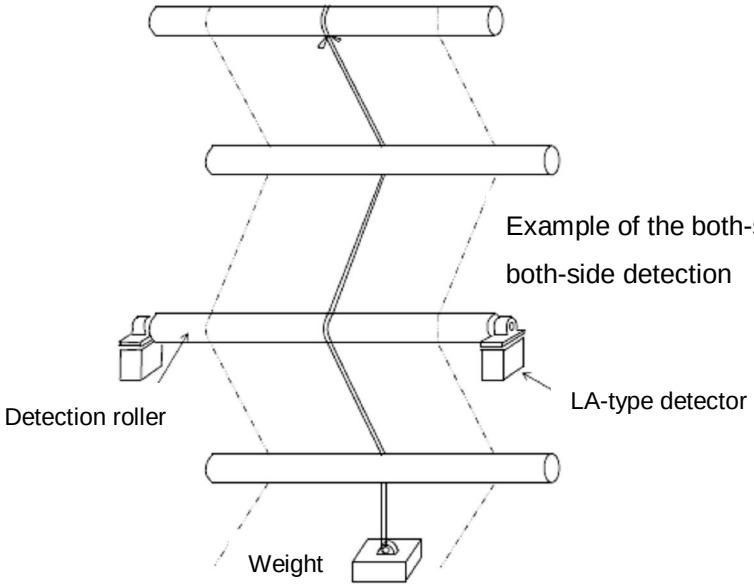
(4) Apply a weight

Apply a weight to a tension detection roller using a strong tape or rope.

Make sure the weight is applied to the tension detection roller and its front and back rollers with the same path as the sheet.

It is necessary that the middle roller smoothly rotates so that there may be no resistance.

Choose an appropriate weight so that the tension will be almost the same as the usual tension. If a weight cannot be used, use a spring balance instead.



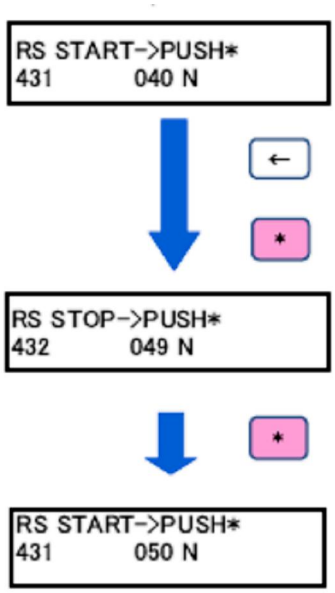
(5) Scale adjustment

Here, you set the weight of the ñweightò to be suspended in [461] AUTO SCALE LEVEL.

Adjustment item	Screen display content	
Right scale adjustment	431	RS START->PUSH*
	432	RS STOP->PUSH*
Left scale adjustment	441	LS START->PUSH*
	442	LS STOP->PUSH*
AUTO SCALE LEVEL	461	AUTO SCALE LEVEL

Example of the right side

Scale adjustment Target Value=50



Open a scale adjustment screen on the right side.

Press the [←] key to order scale adjustment, then a value flashes.

Press the [*] key to start scale adjustment.

The displayed value is steadily getting to a target value.

After confirming the target value, press the [*] key to end scale adjustment.

[Target tension value of scale adjustment]

In case of both-side holding and both-side detection, added load equally depends on right and left of the roll.

With the aim of half value of the weight which was set in [461] AUTO SCALE LEVEL, the tension display changes.

Example: When the weight of 200 N (20 kg) is applied in the both-side holding and both-side detection, the target value will be 100 N.

[In case the target value is not attained]

In scale adjustment, if the tension display approaches the target but does not reach it, the cause must be insufficient amplifier gain. Increase by one step of the setting of gain toggling switch [579].

Inversely, if the tension display does not decrease to the target, it means the amplifier gain is too high. Decrease by one step of the setting of gain toggling switch [579].

Changing the setting of gain toggling switch causes the zero point to digress much. In that case, restart from the zero adjustment.

The gain toggling switch setting 00,11,22,33, the gain rises at the order.

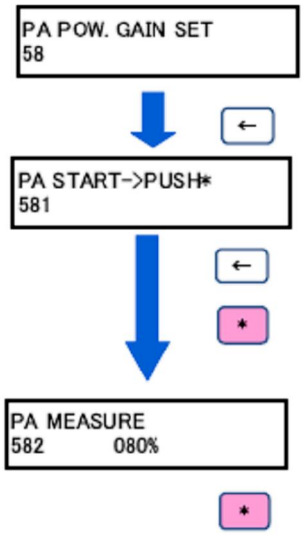
The standard setting in case of LA type detector is 11.

4-5. Measuring load capacity of brake and clutch

The system automatically calculates the current needed for the brake and clutch and sets the load capacity.

(1) Control output side

Adjustment should be done while the load is connected to the output terminal.



Press the [←] key to open a control output adjustment screen.

Press the [←] key again to order the implementation of scale adjustment. A cursor starts to blink inside a value.

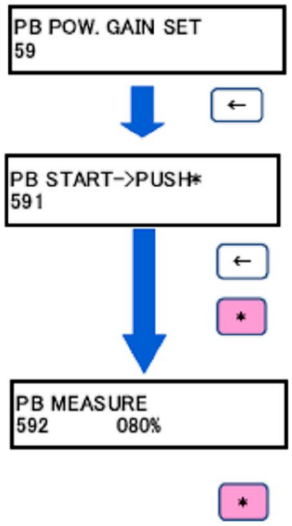
Press the [*] key to start measurement.

Measurement of load capacity automatically starts and the value inside the screen steadily increases. Upon completion of adjustment, the change in value stops.

Press the [*] key to register the results and return the screen to middle classification.

(2) Auxiliary output side

The adjustment only in using auxiliary output.



Press the [←] key to open a control output adjustment screen.

Press the [←] key again to order the implementation of scale adjustment. A cursor starts to blink inside a value.

Press the [*] key to start measurement.

Measurement of load capacity automatically starts and the value inside the screen steadily increases. Upon completion of adjustment, the change in value stops.

Press the [*] key to register the results and return the screen to middle classification.

If the automatic measurement will not go smoothly, do it manually.

Set 100% for the load of 24 V and 4 A, and 50% for 24 V and 2 A.

Related setting items

[583] PA GAIN SET Manual setting (%) of load capacity on the control output side

[593] PB GAIN SET Manual setting (%) of load capacity on the auxiliary output side

5. Run

5-1. Unwinding control.

MANUAL LEVEL set in MANU KEY is output under sheet stop.

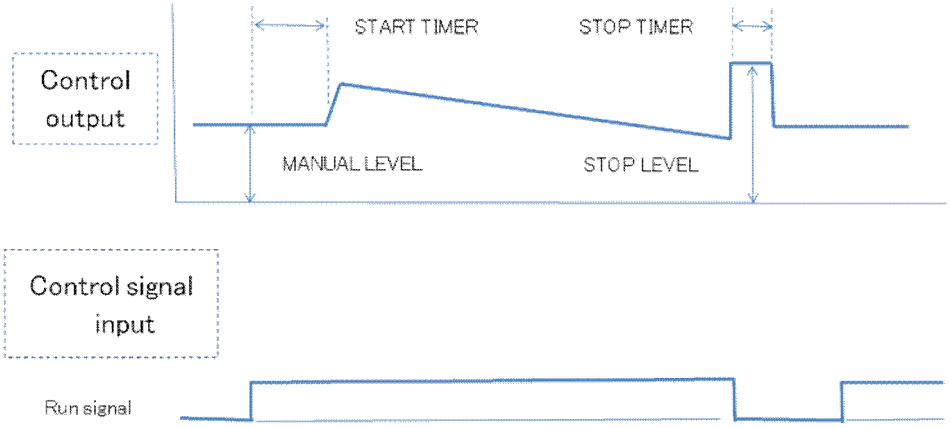
The machine run signals are input almost simultaneously with the start of the machine and the sheet running. After START TIMER runs out, the power output level is regulated automatically so that the tension may become desired value.

Run signals run out simultaneously with the stoppage of sheet run by stopping the machine and STOP LEVEL is output during STOP TIMER. After STOP TIMER runs out, an output returns in MANUAL LEVEL set in MANU KEY.

[213]STOP LEVEL SET: It is the level which stops the sheet by giving temporary force in the stop of the sheet running. (%)

[311]START TIMER SET: It is the latency that it stabilizes the sheet running. (sec)

[312]STOP TIMER SET: It is the time which outputs the stop level in the stop of the sheet running. (sec)



5-2. Feed control.

Simultaneously, both of clutch and brake are used in the control of the feed roll.

In the in-feed control, the brake is connected to control output, and the clutch is connected to auxiliary output.

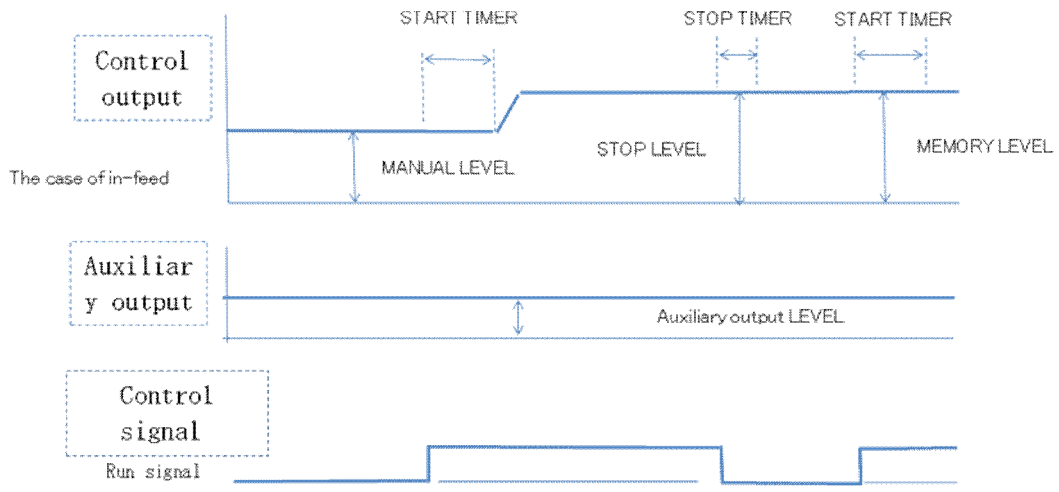
In the out-feed control, the clutch is connected to control output, and the brake is connected to auxiliary output.

Auxiliary output is used in order to decide the usable and lowest tension.

[211]AUX.LEVEL SET: Setting of auxiliary output level (%)

Using memory function which maintains the control output, when the run signals run out, the tension fluctuation of sheet running has been reduced from sheet stopping.

[214]MEMORY (STALL): Level of output by continuing after run signals run out. (%)



5-3. Rewinding control.

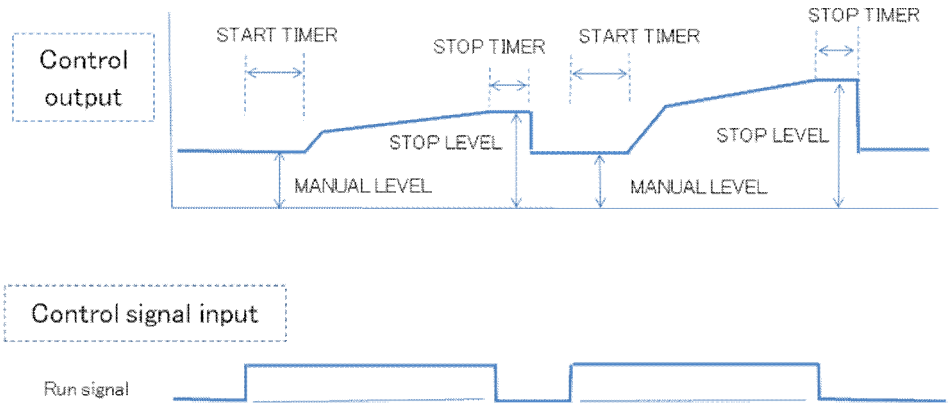
Since READY LEVEL is being output even when the sheet is not running, the sheet is always tense while a switch for powder clutch is on.

When the run signals are input matching the sheet run, the automatic control enters in motion during START TIMER after START LEVEL is output.

When the run signals are cut matching the sheet run, STOP LEVEL starts to be output.

Normally, STOP LEVEL is set to 100% to curb a change in tension.

After STOP TIMER runs out, the tense sheet comes to a halt by READY LEVEL.

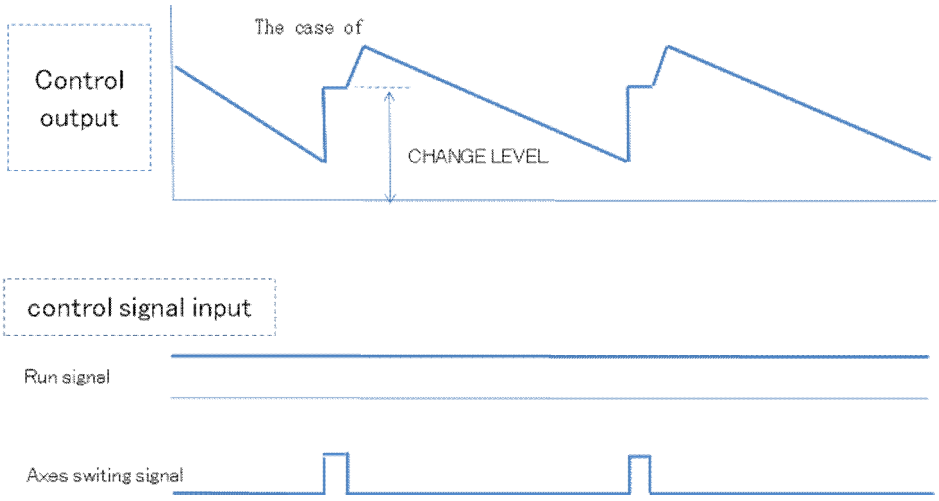


5-4. Axis switching.

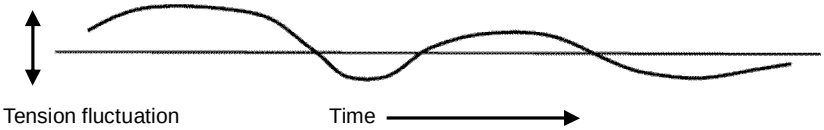
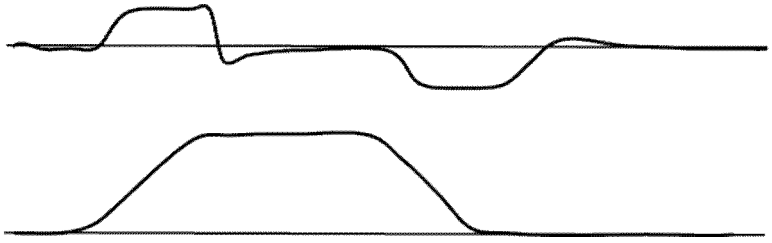
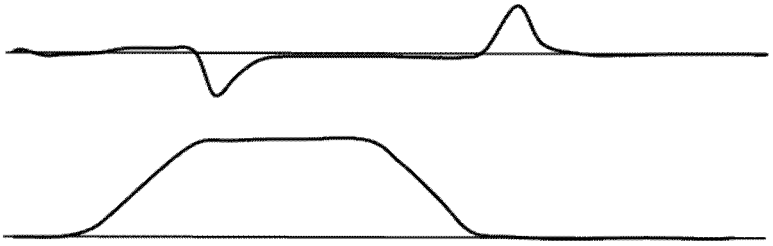
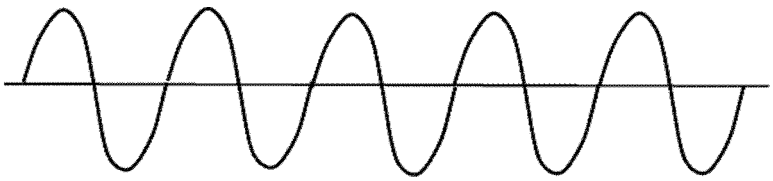
In the 2-axis composition, the system continues the run switching both axes without stopping the sheet.

When switching axes, the change of the diameter from the old axes to the new axes is big. Therefore, CHANGE LEVEL is output in the axis switching signals, and the automatic control is changed again from the level.

[216]CHANGE LEVEL SET: The level output in the axis switching signals on. (%)



5-5. Phenomenon and adjustment of the tension fluctuation.

The phenomenon in the tension fluctuation.	The method of the adjustment.
①The case in which it fluctuates with the idleness in the long period. Since the control does not overtake it, it fluctuates in the slow period.  	[533] I TIME SET By making small of the set value, the response is quickened.
②The case it regularly fluctuates in the long period. It is a sufficiently long period compared to the following ⑤. 	[533] I TIME SET By increasing of the set value, the response is slowed.
③The case in which tension fluctuation in the accelerating deceleration is big and in which the response in the setting change is slow. The tension oscillates it under the accelerating deceleration. 	[538] I ACCSEL TIME SET By making small of the set value, the response is quickened.
④ The case in which tension fluctuation after the accelerating deceleration is big. The tension oscillates it after the accelerating deceleration. 	[538] I ACCSEL TIME SET By increasing of the set value, the response is slowed.
⑤The case in which it regularly fluctuates (hunting) in the short period. 	[531] PGAIN SET It is set at ZERO, when it is not ZERO. [533]I TIME SET By increasing of the set value, the response is slowed.

6. Table of Setting

These are general setting values for each model.
After testing them, leave a memo that shows any difference from the following values.

Model: C500 Program version Ver.

The setting in a gray area in Table will not affect operation.

NO	Name	Content (unit)	Stipulated value by model			Memo of difference
			C500 P,Pk	C500 F	C500 W	
211	AUX. LEVEL SET	Auxiliary output level set (%)	25	←	←	
212	START LEVEL SET	Start level set (%)	25	←	←	
213	STOP LEVEL SET	Stop level set (%)	200	100	100	
214	MEMORY(STALL) SET	Memory level set (%)	120	←	←	
215	INCHI.(IDOL) SET	Inching level set(%)	10	←	←	
216	CHANGE LEVEL SET	Axis switching level set (%)	30	←	←	
217	READY LEVEL SET	Ready level set (%)	25	←	←	
311	START TIMER SET	Start timer set (sec)	2.0	←	←	
312	STOP TIMER SET	Stop timer set (sec)	0.1	←	←	
461	AUTO SCALE LEVEL	Automatic scale adjustment target tension	FS	←	←	
531	P GAIN SET	Proportional element gain set (%)	0	←	←	
532	I GAIN SET	Integral element gain set (%)	100	←	←	
533	I TIME SET	Integral time set (sec)	300.0	←	←	
534	D GAIN SET	Differential gain set (%)	0	←	←	
535	D TIME SET	Differential time set (sec)	0.1	←	←	
536	ERROR GAIN SET	Deviation element gain set (%)	100	←	←	
537	ACCSEL LEVEL SET	Acceleration level set (%)	10	←	←	
538	I ACCEL TIME SET	Integral time set at acceleration(sec)	10.0	←	←	
541	OUTPUT BIAS SET	Output bias set (%)	0	←	←	
542	DEAD ZOON SET	Dead zone set (FS±N%)	0.5	←	←	
543	INC. I TIME SET	Integral time set at acceleration correction (sec)	10.0	←	←	
544	DEC I. TIME SET	Integral time set at deceleration correction (sec)	10.0	←	←	
545	MIRROR TIME SET	Change time set for automatic tension set value (sec)	10.0	←	←	
551	AUTO TENSION SET	Automatic tension level set (by FS)	FS/2	←	←	
552	MAN TENSION SET	Manual tension level set (%)	25	←	←	

553	A/M CONTROL SET	Control selection (0: automatic control, 1: manual control)	0	←	←	
554	TAPER LEVEL SET	Taper level set (%)	10	←	←	
555	MIN. CHANGE SET	Axis switching minimum level (%)	63	←	←	
556	PRESS PRISET	No use at C500P,F,W	0	80	←	
557	PRESS TAPER	No use at C500P,F,W	0	50	←	
561	BAR DISP. MODE	Bar display content set	3	←	←	
562	NUMBER DISP. MODE	Value display content set	0	←	←	
563	SENSOR MODE	Detection style set for tension detector	0	←	←	
564	MEMORY CONT. MODE	Memory control use (0: No, 1: Yes)	0	1	0	
565	OUTPUT STYLE	Control output method selection by actuator	P:0 Pk:1	0	0	
566	UNIT RESET!!	Initialize all set contents	0	←	←	
567	SECTION MODE	Select section to be used	0	1	2	
568	MAN KEY OPE MODE	MANU key operation selection	4	←	←	
569	EXT8PIN MODE SET	Role of external terminal stand 15 pin	2	←	←	
56A	AMT 0：KEY,1-4：AD	Sets the setting fields on panel by external analog signals	0	←	←	
56B	PANEL DATA SAVE	Selects panel setting values writing timing to EEPROM	0	←	←	
571	TP CAP. FORM SET	Tension fractions	0	←	←	
572	TP CAPACITY	Tension detector full scale, abbreviated as FS	FS	←	←	
573	TEN. OUTPUT CHECK	Checks tension analog output voltage (%)	0	←	←	
574	AVE. CYCLE SET	Tension display averaged cycles (CYCLE)	90	←	←	
575	TP OUT AVE.CYCLE	Tension analog output reply (CYCLE)	10	←	←	
576	TENSION UNIT SET	Tension display unit (0: N, 1: x10 N, 2: KN)	0	←	←	
577	DACH4321 OUTSET	Selects content of analog output to CH1-4	0760	←	←	
578	DA CH4321 SCALE	Analog output level (V)	10.00	←	←	
579	TP GAIN SWITCH	Tension amp gain switching	11	←	←	
57A	TP LALS SELECT	Type of tension detector (0: LA , 1: LS)	0	←	←	
57B	DANCER MOVE TIME	No use at C500P,F,W	10	←	←	
57C	E/A SCALE SET	No use at C500P,F,W	99.9	←	←	
583	PA GAIN SET	Manual setting of load capacity of control output side (%)	100	←	←	
593	PB GAIN SET	Manual setting of load capacity of auxiliary output side (%)	100	←	←	

5A1	LINE PULSE	No use at C500P,F,W	5000	←	←	
5A2	DIA AVE. CYCLE	No use at C500P,F,W	10	←	←	
5A3	Z SIG COUNT	No use at C500P,F,W	1	←	←	
5A4	Z SIG CHECK	No use at C500P,F,W	1	←	←	
5A5	VALID DIA LEVEL	No use at C500P,F,W	10	←	←	
5A6	MAX DIA SET	No use at C500P,F,W	1200	←	←	
5A7	MIN. DIA SET	No use at C500P,F,W	100	←	←	
5A8	CORNAR DIA SET	No use at C500P,F,W	300	←	←	
5A9	CORNAR TAP. SET	No use at C500P,F,W	100.0	←	←	
5AA	MAX DIA TAP. SET	No use at C500P,F,W	70.0	←	←	
5B1	V/T FS GAIN	No use at C500P,F,W	10.0	←	←	
5B2	V/T ZS GAIN	No use at C500P,F,W	10.0	←	←	
5B3	DRIVER SCALE	No use at C500P,F,W	100.0	←	←	
5B4	MAX LINE SPEED	No use at C500P,F,W	200.0	←	←	
5B5	SPEED AVE. COUNT	No use at C500P,F,W	10	←	←	
5B6	ACC. DEC. SPEED	No use at C500P,F,W	5.0	←	←	
5B7	LINE STYLE SET	No use at C500P,F,W	0	←	←	
5B8	DREW SCALE SET	No use at C500P,F,W	2	←	←	
623	RIGHT ZERO DP	Electronic volume location for right zero adjustment (div)	128	←	←	
624	LEFT ZERO DP	Electronic volume location for left zero adjustment (div)	128	←	←	
625	RIGHT SCALE DP	Electronic volume location for right scale adjustment (div)	175	←	←	
626	LEFT SCALE DP	Electronic volume location for left scale adjustment (div)	175	←	←	
627	RIGHT ZERO OFF.	Offset for right zero adjustment (div)	0	←	←	
628	LEFT ZERO OFF.	Offset for left zero adjustment (div)	0	←	←	
629	RIGHT SCALE OFF.	Offset for right scale adjustment (div)	0	←	←	
62A	LEFT SCALE OFF.	Offset for left scale adjustment (div)	0	←	←	
632	SS SIGNAL	Run signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
633	INCHING SIGNAL	Inching signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
634	INC. SPEED SIGNAL	Acceleration correction signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
635	DEC. SPEED SIGNAL	Deceleration correction signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	

636	RESET SIGNAL	Reset signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
637	CHANGE SIGNAL	Axis switching signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
638	EXT8PIN SIGNAL	15^{th} terminal signal state display and forcible set (0: OFF, 1: ON, 2: external input)	2	←	←	
639	DI8 SIGNAL	Spare	2	←	←	
652	DANCER ZERO DP	No use at C500P,F,W	128	←	←	
653	DANCER SCALE DP	No use at C500P,F,W	128	←	←	
672	SERVO ON SIGNAL	Servo ON signal and forcible set (0: OFF, 1: ON, 2: Internal)	2	←	←	
673	DO2 SIGNAL	Spare	2	←	←	
674	DO3 SIGNAL	Spare	2	←	←	
675	DO4 SIGNAL	Spare	2	←	←	
676	DO5 SIGNAL	Spare	2	←	←	
677	DO6 SIGNAL	Spare	2	←	←	
678	DO7 SIGNAL	Spare	2	←	←	
679	DO8 SIGNAL	Spare	2	←	←	