

# **Tension Controller**

## **Model C500**

### **Operation Manual**

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-C500(E)-Ea

## 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 3<sup>rd</sup> 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.

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# 1. Introduction

## 1-1. Overview

The Tension Controller C500 is designed to control the running tension while a sheet-type fabricated material, such as paper, cloth, fiber, film rubber, or metal, is being driven.

### <Characteristics>

- Controls the parts of unwinding, feed, rewinding that use the brake, clutch, signal-air converter, and motor
- The Tension Detector can be connected to both the LS and LA series.
- Handles not only control via the tension pickup but also the dancer control
- Flexible control is possible due to the function of detecting the line speed and the winding diameter.
- Plentiful I/O: power output (0-24 V maximum 4 A), 4-20 mA output, analog/digital output, pulse output, analog/digital input, pulse input



Compatibility with traditional models:

C-500 is designed as a superior model compatible with the traditional C200, C100, C20, ESP-TS, and ESP-V.

Detectors, brakes, and clutches used for the LA series can still be connected.

Behaviors of run signals and axis switching signals are unchanged.

## 1-2. Procedures of use

1. Select the purpose of use (model) with reference to the example of configuration.  
Refer to [2. Examples of Configuration].



2. Implement [installation] and [wiring] depending on the model.  
Refer to [3. Installation] and [4. Wiring].



3. Implement the [Setting and Adjustment] depending on the model.  
Refer to [5. Adjustment]



4. Adjust the control constant while flowing the basic material.  
Refer to [6. Run].



5. Actually produce.  
Refer to [7. Operation].

## 2. Examples of Configuration

### 2-1. Examples of configuration and model

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.

Select the [model] with reference to examples of the configuration.

Model	Part to be applied	Actuator	Sensor
C500P	Unwinding	Brake	Tension detector
C500Pk	Unwinding	Signal-air converter	Tension detector
C500F	In/out feed	Brake, clutch	Tension detector
C500W	Rewinding Current taper	Clutch	Tension detector
C500Wd	Rewinding Pulse winding diameter detection	Clutch	Tension detector, Line sensor, Rotation sensor
C500Wp	Rewinding Potentiometer winding diameter detection	Clutch	Tension detector Potentiometer for winding diameter detection
C500Ri	In feed	Motor	Tension detector Line sensor
C500Ro	Out feed		
C500Di	In feed	Motor	Dancer potentiometer, Line sensor
C500Do	Out feed		

## 2-2. Unwinding (Brake)

Model: C500P, C500Pk

### 1. One-axis unwinding

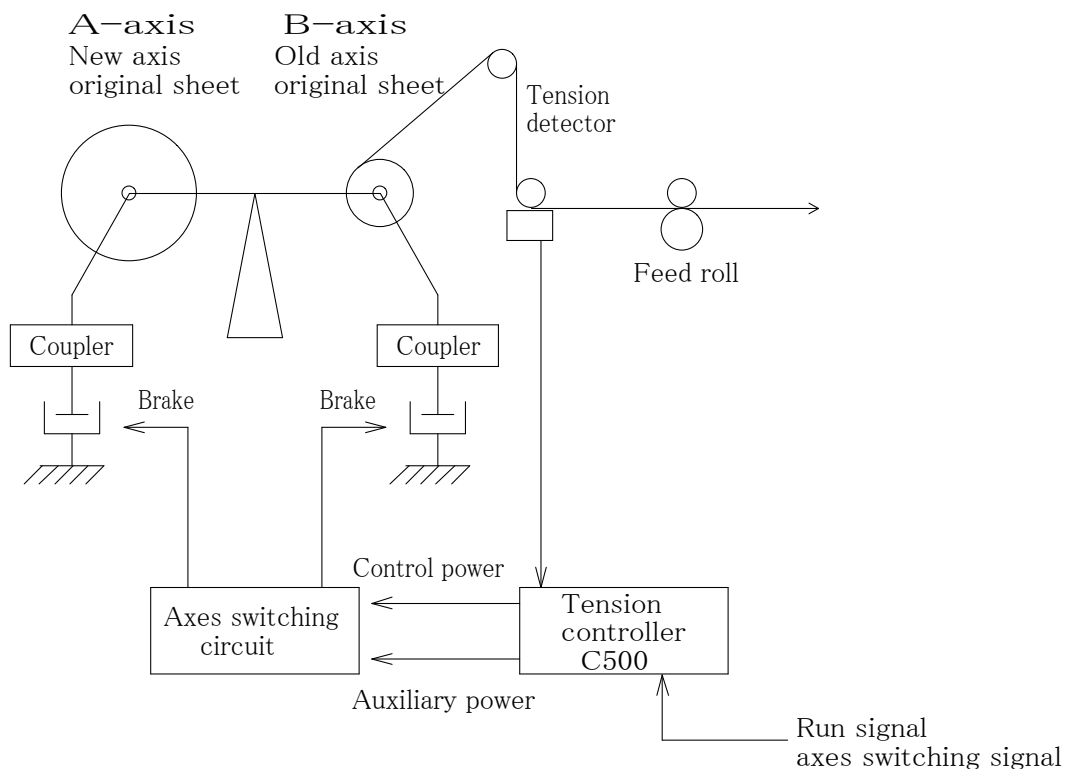
By installing a powder brake onto an unwinding axis and changing the brake torque by control power, the tension is controlled. To stabilize the tension when the line is stopped while delivering an original sheet and then restarted, the halfway stoppage feature is installed.

### 2. Two-axis unwinding

In the case of two-axis unwinding, each of them is fitted with a brake, and each brake is activated by selecting a control axis with an axis-switching circuit. A continual run is done by automatically switching the A- or B-axis. On this occasion, the original sheet diameter of the new axis grows 2-10 times as large as that of the old axis. Therefore, when the axes are switched, there occurs a big difference in control power to retain the set tension, causing a big change in the tension if that control behavior continues. The axis-switching feature is installed to curb this change. Also, it is possible to immediately halt the old axis by giving the auxiliary power to the old axis simultaneously with the axes switch.

### 3. Measure by air brake Model: C500P-K

By installing an air brake onto an unwinding axis and changing the brake torque by control power, the tension is controlled. By installing a signal-air converter between the air brake and the controller, the tension is controlled with current output of 4-20mA.



## 2-3. Feed (Brake + clutch)

Model: C500F

### 1. In-feed

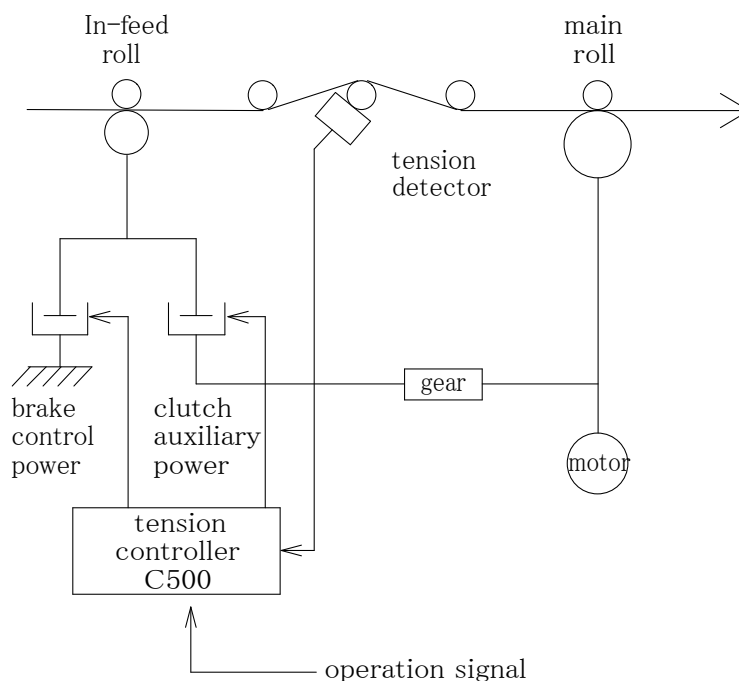
This method enables an operator to increase or decrease inward the outward tension of the in-feed roll. By installing a powder brake and powder clutch onto the in-feed roll, the input axis of the clutch can operate faster than the line moves. The control power of the controller is applied to the brake and the auxiliary power to the clutch.

As a whole control operation, the speed element is applied intermittently by the clutch to the running sheet, and the tension is controlled by changing the torque by the brake.

### 2. Out-feed

By installing a powder clutch and powder brake onto the out-feed roll, the input axis of the clutch can operate faster than the line moves. The control power of the controller is applied to the clutch and the auxiliary power to the brake. As a whole control operation, the brake is applied intermittently to the running sheet, and the tension is controlled by changing the speed element by the clutch.

[Example of in-feed]



## 2-4. Rewinding (Clutch)

Model: C500W, C500Wd, C500Wp

### 1. One-axis rewinding

By installing a powder clutch onto the rewinding axis, the input axis is driven.

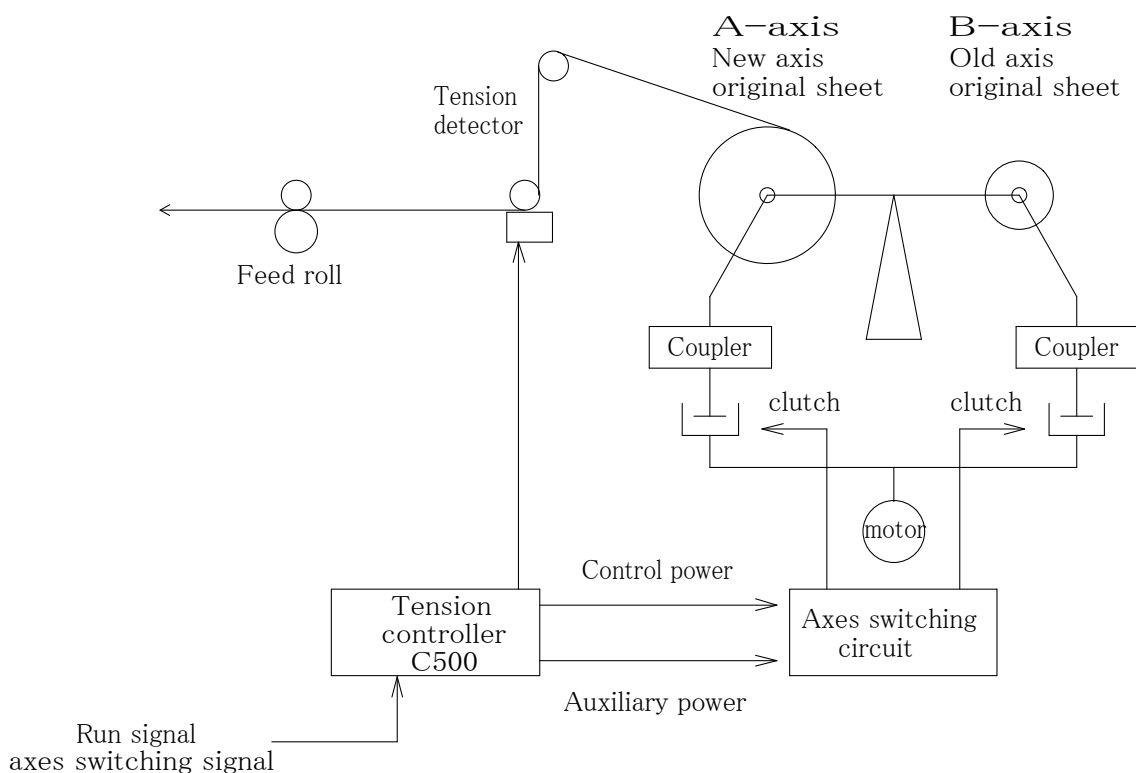
The rewinding tension is controlled by changing the coupling torque of the powder clutch by the control power from the controller. With the minimum rewinding diameter (paper tube diameter), the drive speed of the input axis must be higher than that of the line.

### 2. Two-axis rewinding

By installing a powder clutch onto each of the A-axis and B-axis, the input axis is driven. The control power and auxiliary power from the controller are applied to the clutch through the axes-switching circuit. When the preliminary run signal inside the axes-switching circuit is turned on before cutting the rewinding axis, the auxiliary power is applied to the clutch of the new axis side, causing the new axis to start a preliminary run. Then, the axis switching signal changes the preliminary power to the control power for the new axis and the rewinding is done by the tension control operation. The control power is not applied to the old axis, which is awaiting the auxiliary power for the next preliminary run.

### 3. Taper tension

There are two types of rewinding for tension control. One is the constant tension rewinding that winds in sheets with constant tension regardless of changes in the rewinding diameter. The other one is the taper tension rewinding that decreases tension with the increase in diameter. By setting the taper setter, the operation is possible with any taper degree.





(1) Electric current taper method    Model: C500W

A taper method uses an electric current return method, which memorizes the control power when the winding started and applies the taper depending on the increase in the control power.

(2) Pulse wind diameter detecting-type taper method    Model: C500Wd

Detects the rewinding diameter using line pulses and signals of the axis rotation sensor

(3) Potentiometer wind diameter detecting-type taper method    Model: C500Wp

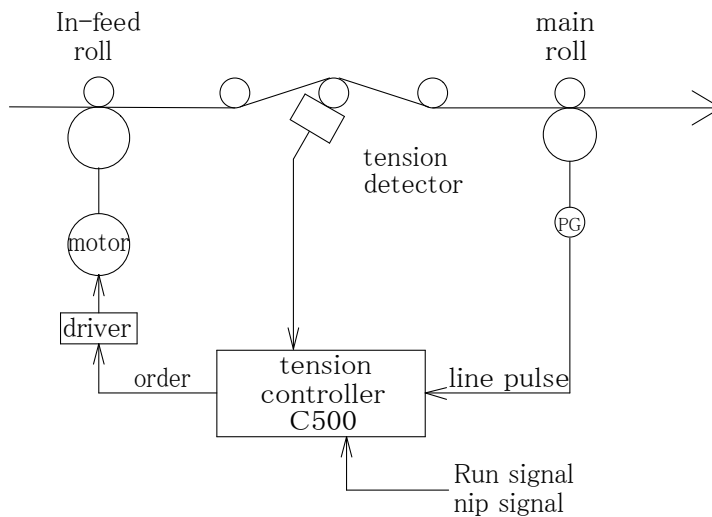
Detects the wind diameter using potentiometer signals

## 2-5. Feed (Motor + tension)

Model: C500R, In-feed: C500Ri, Out-feed: C500Ro

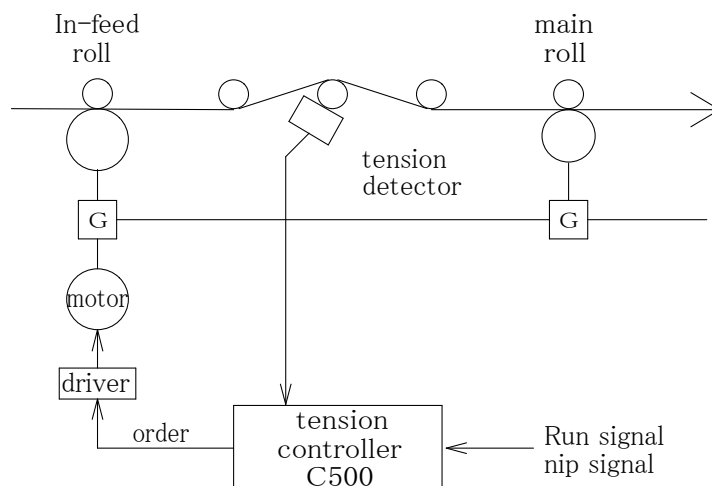
### (1) Motor alone driving method

This is the V/T control method that adds the tension control speed to the line speed. The line speed is detected using either signals of an encoder attached to a shaft or pulses produced by the driver of the main motor.



### (2) Differential driving method

This is a method to change the speed of the feed roll connected to the main roll using differential gears and a pilot motor.



## 2-6. Feed (Motor + dancer)

Model: C500D, In-feed: C500Di, Out-feed: C500Do

1. This is the V/D control method that adds the dancer control speed to the line speed.

The line speed is detected using either signals of an encoder attached to a shaft or pulses produced by a driver of main motor. In-feed accelerates the roll speed when the dancer is tense. Out-feed decelerates the roll speed when the dancer is tense.

2. Order to the signal-air converter for dancer can be issued.

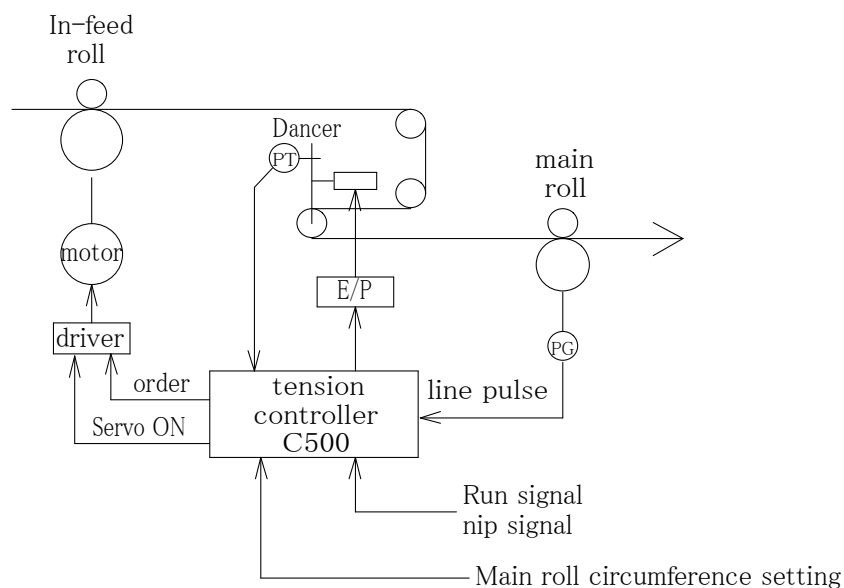
When the target tension is set from the AUTO key on the panel, the order that corresponds to it will be added to the signal-air converter.

3. Main roll circumference can be set.

Gravure printing machines whose main roll circumference can vary can be taken care of.

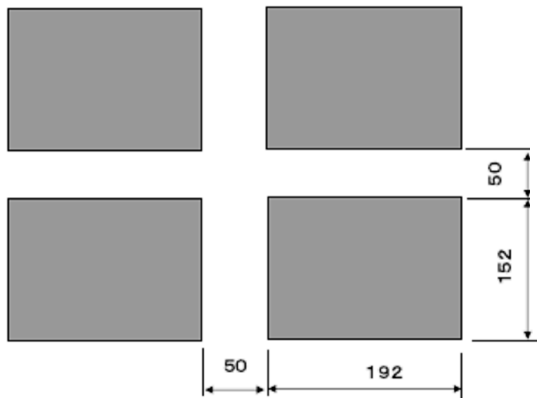
The main roll circumference can be set not only by a key operation from the panel but also by external analog signals.

4. Servo ON signals of the driver can be output.



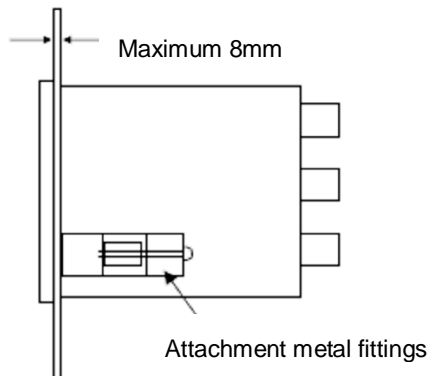
### 3. Installation

#### (1) Panel cut size



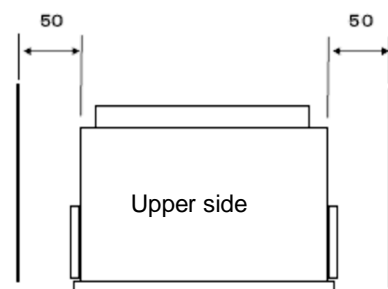
In case panels are placed side by side, make sure there are gaps both in the horizontal and vertical directions.

#### (2) Attachment



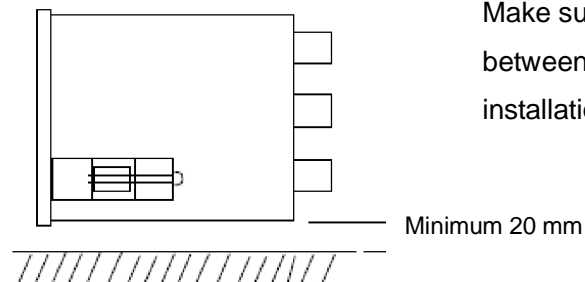
Attach a tension controller to a panel using attachment metal fittings that come with the kit.

#### (3) Side space



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

#### (4) 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.

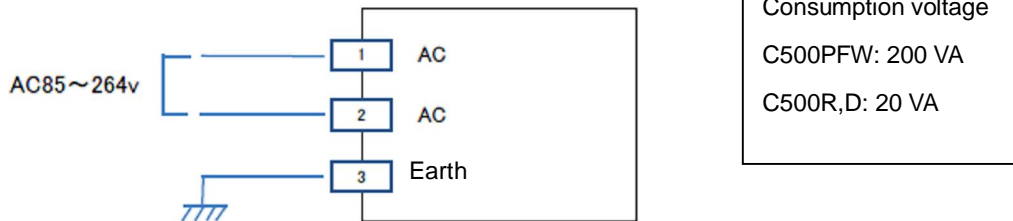
## 4. Wiring

### 4-1. Explanation of wiring

For wiring, use M3 solderless terminals. The screwing torque is 0.5-0.8 N · m.

Screw them firmly.

#### (1) Power source



Be sure to ground an earth wire of the power source.

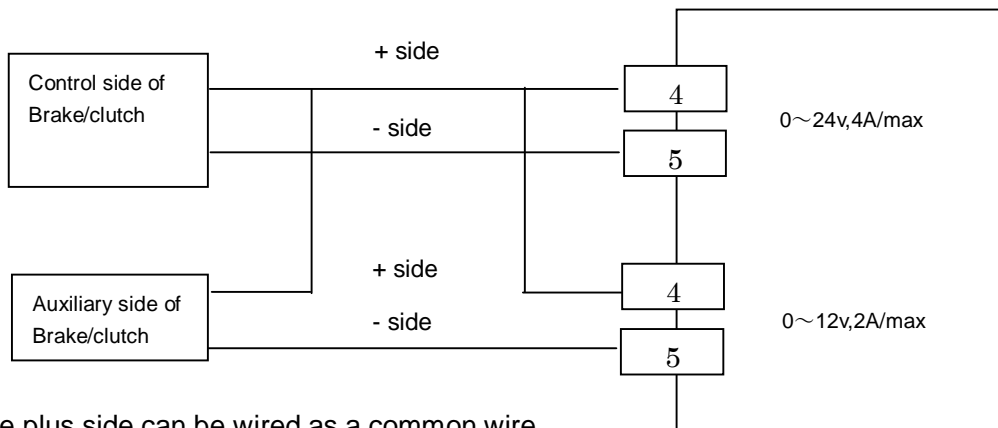
Earth

#### (2) Brake and clutch

Connect brake and clutch.

The control output side can be connected to the other side of voltage range of 0-24 V and electric current of 0-4 A.

The auxiliary output side can be connected to the other side of voltage range of 0-12 V and electric current of 0-2 A.

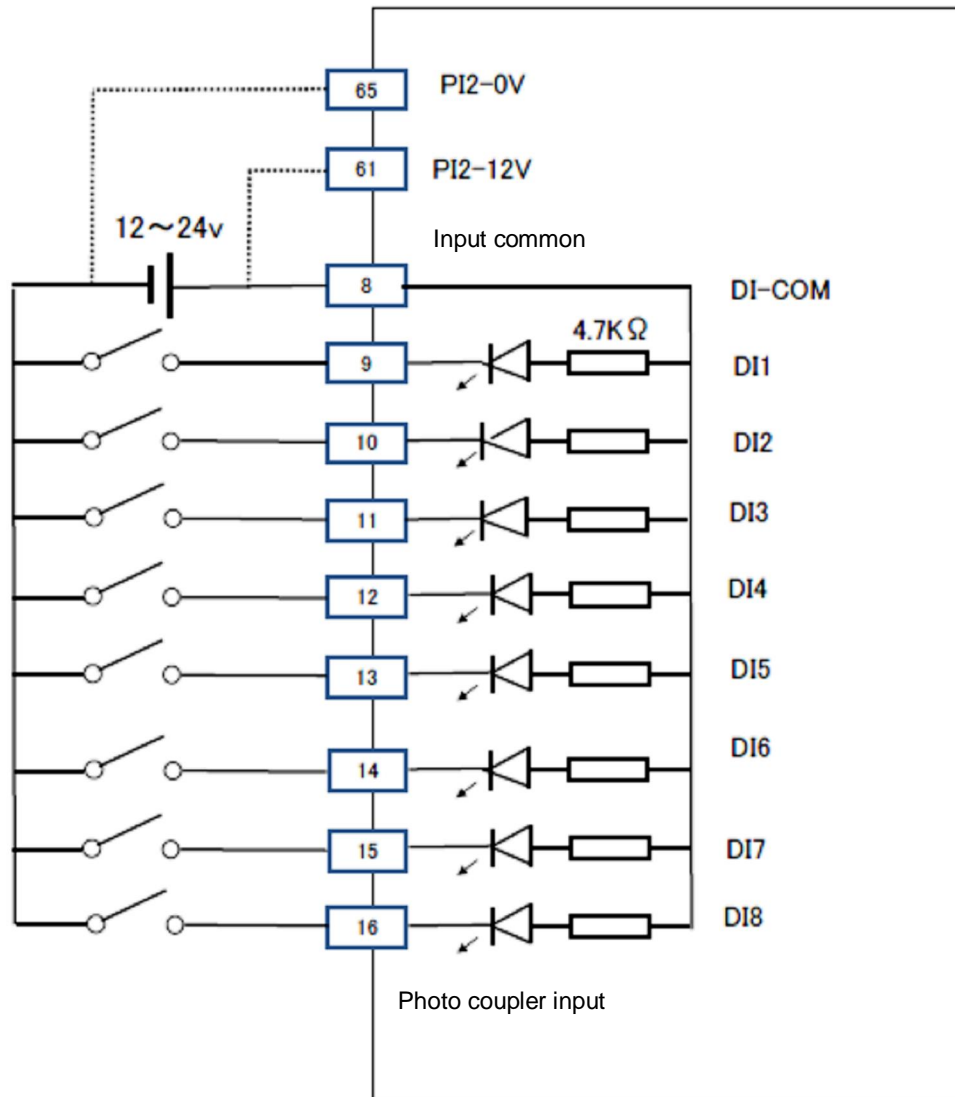


The plus side can be wired as a common wire.

### (3) Control signal input

The external power of 12-24 V is required for signal input.

If it is not available, you may use the 12 V power from terminals [61] and [65].



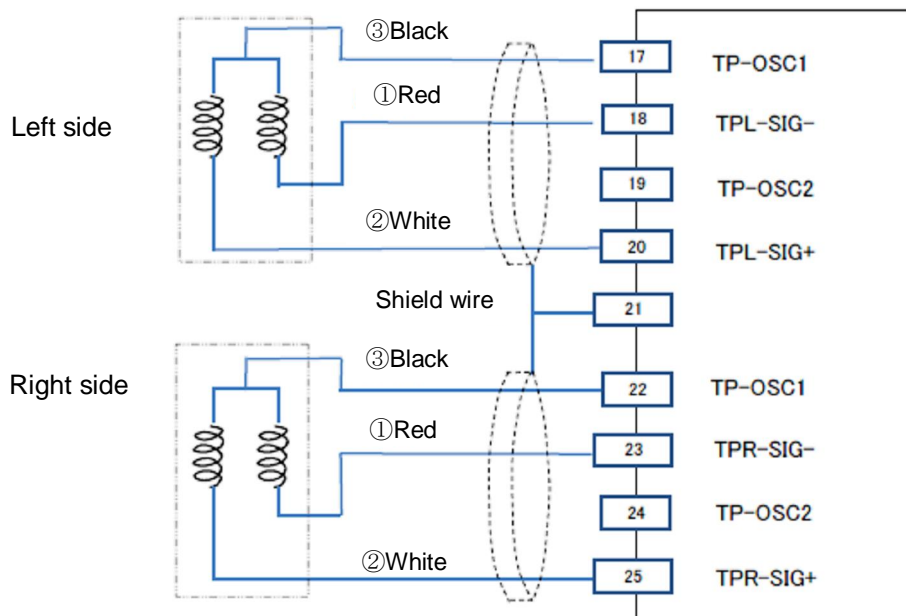
#### (4) Tension detector

##### (i) Connection of tension detector

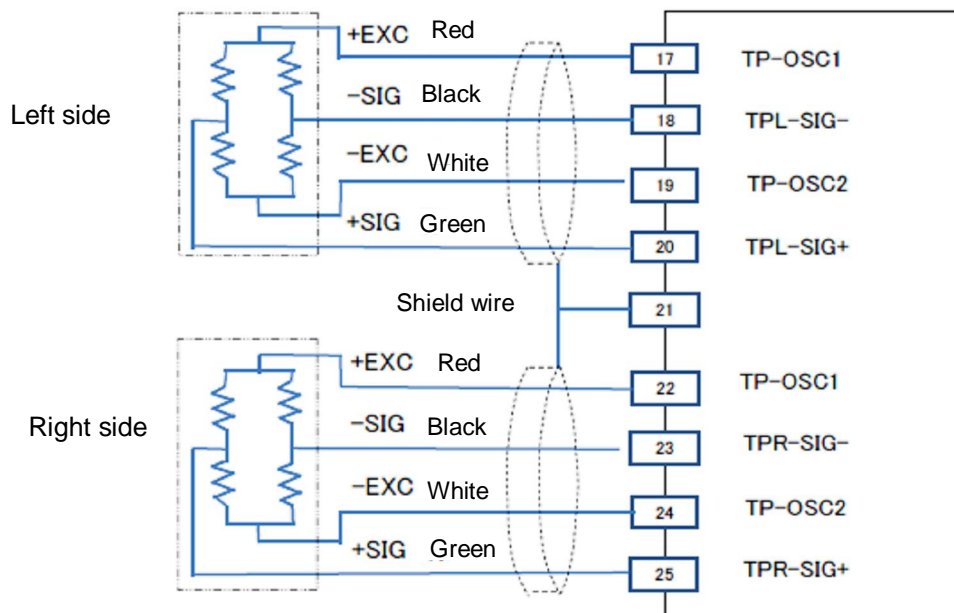
Caution!

The order of the former line color red, white and black is now different.

##### ● LA-type detector



##### ● LS-type detector



For the wiring with the tension detector, the 3-core shielding wire is used for the LA type and the 4-core shielding wire for the LS type. The shielding part is connected to the 21<sup>st</sup> terminal. In case the wiring distance from a detector exceeds 50 m, contact us.

A set of switch SW1 may be necessary depending on the type of tension detector.

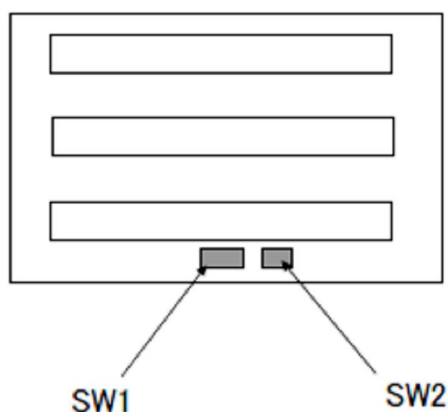
## (ii) Selection switch of tension detector SW1 (Bit 1-4)

On the lower side of the back panel, there is a switch to be switched depending on a type of tension detector. Turn it to OFF side for the LS type and to ON side for the LA type.

Use the same setting for both LEFT and RIGHT.

	LEFT		RIGHT	
BIT	1	2	3	4
ON	LA		LA	
OFF	LS		LS	

Back side



## (iii) Use an external tension meter SW1 (Bit 5-6)

Bit 5 and 6 of SW1 are used when an external tension meter is used.

Usually, a switch is turned ON as an internal tension amplifier is used.

Turn it OFF when tension signals are input from outside.

	LEFT	
BIT	5	6
ON	inside	
OFF	outside	

Regarding tension signals from outside, the left side is connected to CH5 of analog signal input and the right side to CH6.

In case only total signals, both sides are connected to each of CH5 and CH6 in parallel.

Signal level is 5 V/fs.

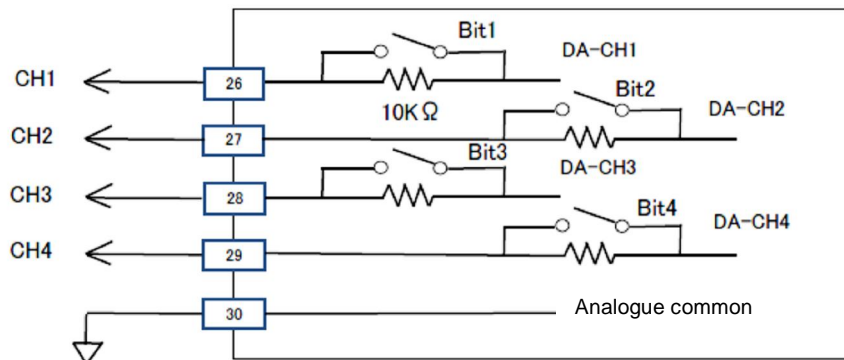


## (5) Analog output

### (i) Output to switch between voltage and current SW2 (Bit 1-4)

Within analog outputs, voltage output or current output can be selected for CH1CH4.

The current output is output via resistance.



Analog common

Either voltage or current can be selected by SW2 on the back panel.

Turn the switch ON to use the voltage output and OFF to use the current output.

	CH1	CH2	CH3	CH4
BIT	1	2	3	4
ON	Voltage	Voltage	Voltage	Voltage
OFF	Current	Current	Current	Current

### (ii) Voltage output

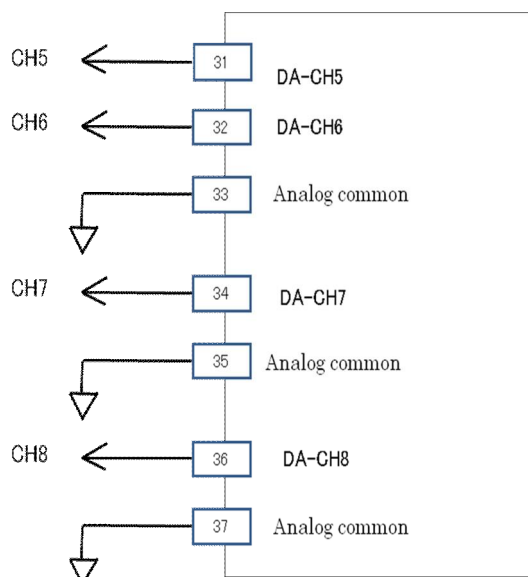
Voltage signals are output to CH58.

CH5 and CH6 use the same order as the output of 4-20mA.

CH7 and CH8 use the same order as the output of brake & clutch.

This can be used as a monitor of output order.

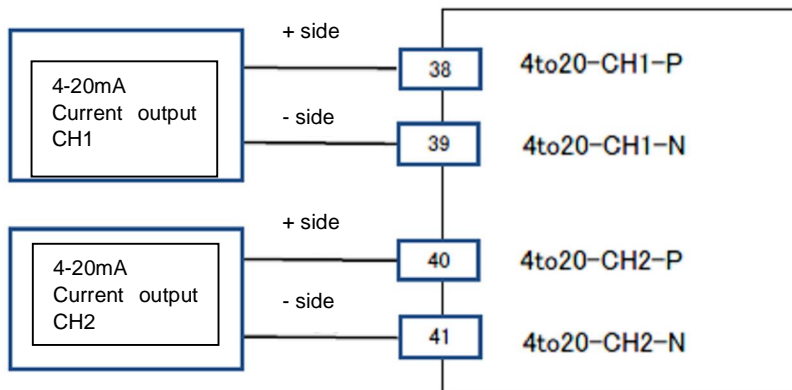
In case the 4-20 mA output or brake & clutch output is not used, this can be used as voltage output for other uses.



### (iii) 4-20 mA output

The output of 4-20 mA is used for two channels.

The order voltage is common with CH5 and CH6 of analog output.



Note: The minus side is not directly connected to analog common.

### (6) Analog input

Eight channels (CH1-CH8) are available for analog input.

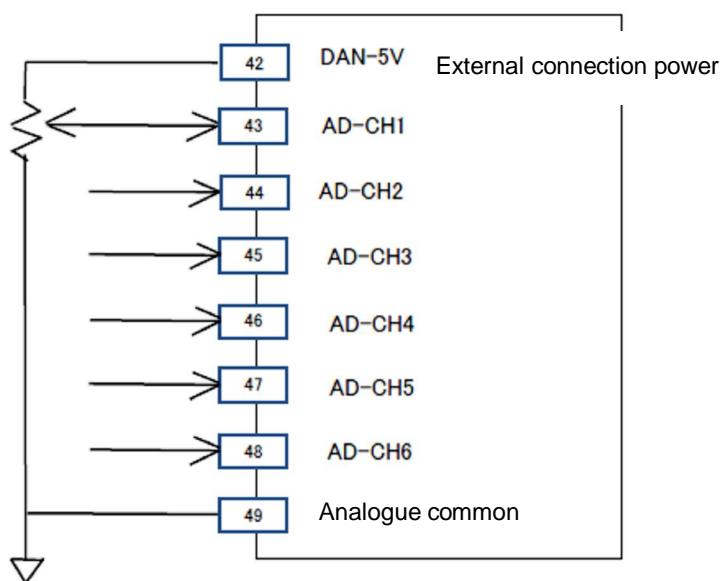
Input impedance is 100 k

Ch7 and CH8 are used to take in tension signals.

Five-V voltage is output from [42] as external connection power. It can be used when a volume is externally attached. The minimum resistance of a volume to be used is 2 k

External connection power

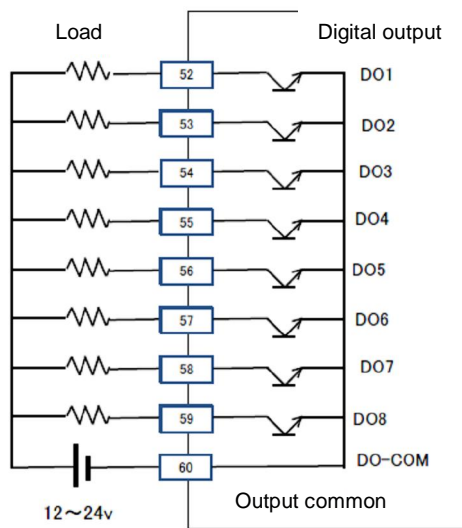
Analog common



### (7) Digital output

Eight points are available for digital output.

Loads to be driven are a maximum 100 mA and a maximum 24 V.

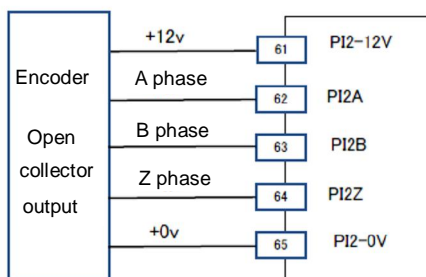


### (8) Pulse input (open collector type)

Connect an encoder with open collector specifications to a tension controller.

For the sensor, +12 V is output but the maximum current capacity is 80 mA.

In case the consumption current exceeds 80 mA, prepare external power.

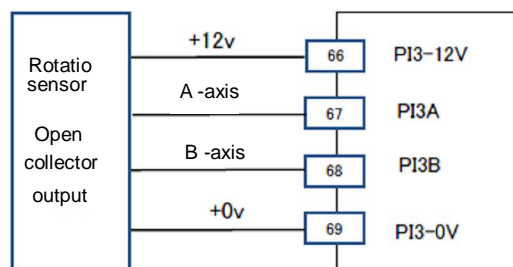


### (9) Rotation sensor input (open collector type)

Connect a rotation sensor with open collector specifications to a tension controller.

For the sensor, +12 V is output but the maximum current capacity is 80 mA.

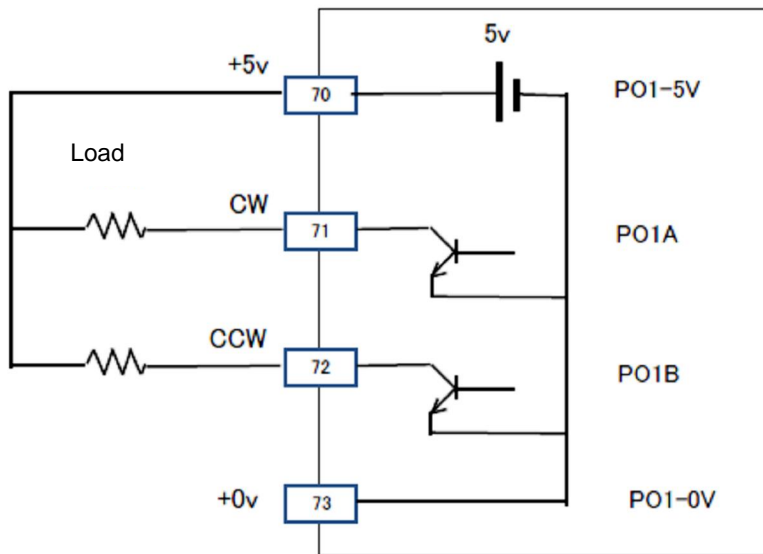
In case the consumption current exceeds 80 mA, prepare external power.



### (10) Pulse output

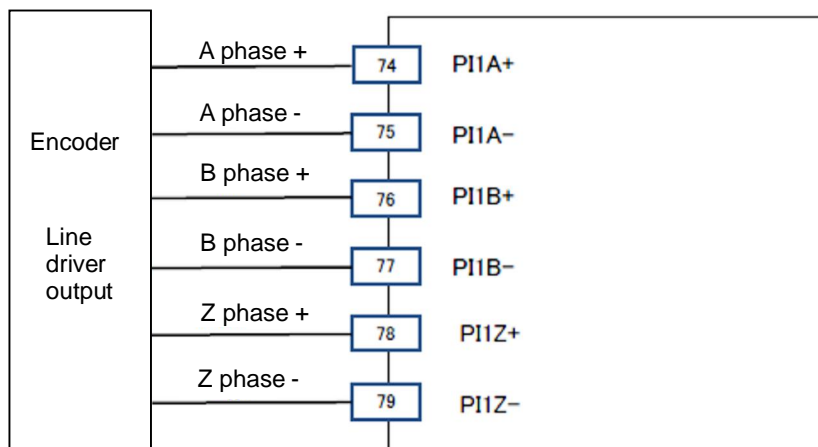
One channel is available for pulse output with open collector specifications.

The load current to be driven is a maximum 10 mA and the voltage to be applied is 5 V.



### (11) Pulse input (line driver type)

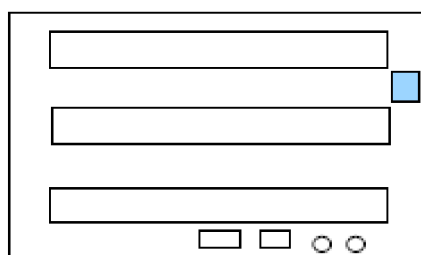
Connect an encoder with line driver specifications to a tension controller.



## 5. Adjustment

### 5-1. How to operate a panel

#### (1) Power ON

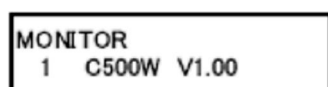


Power switch

Turn on the power switch located on the back of the tension controller. A lamp inside the switch knob will turn on. This switch is used for maintenance work. As this tension controller is supposed to be used in combination with a panel, there is no switch to be used daily.

#### (2) Toggling of display sign

##### (i) 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.

##### (ii) Screen configuration

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

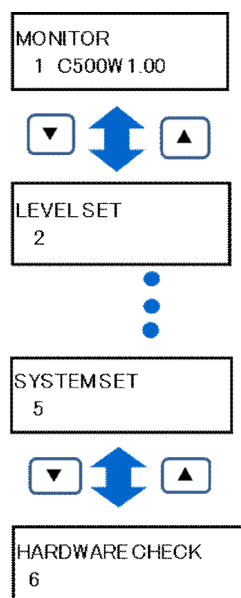
One item of a large classification contains a middle classification that contains a small classification.

Each screen is identified by the screen number.

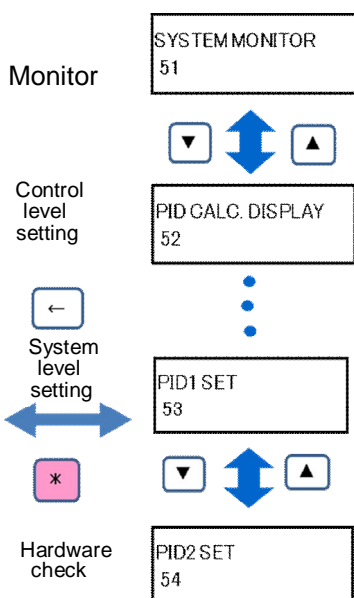
Each screen inside the classification can be chosen by the [▲][▼] keys.

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

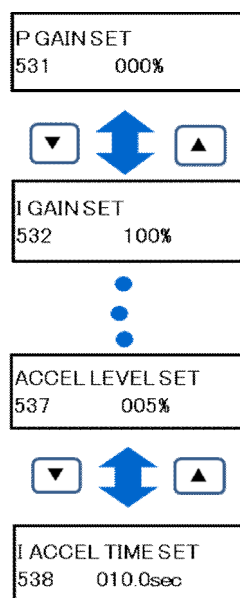
##### Large classification



##### Middle classification (5. SYSTEM SET)



##### Small classification (53. PID1 SET)

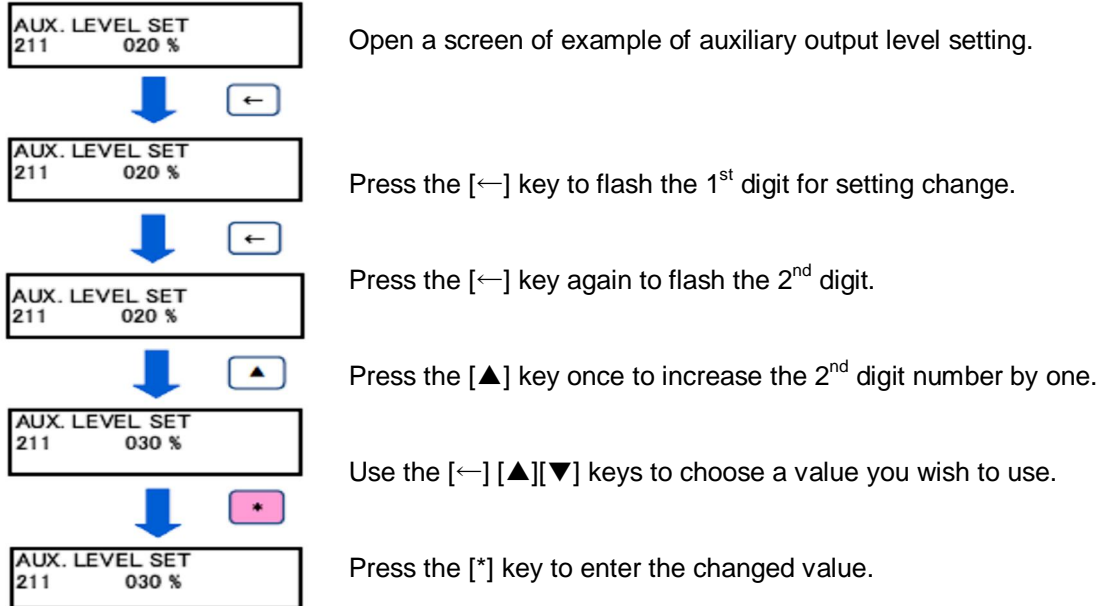


### (3) How to change the set value

A screen is largely divided into the setting items, display items and operation items.

Values in the setting items can be changed by the following procedures.

Example of auxiliary output level setting



The setting involves not only items to be input from LCD display but also items that are adjusted by daily operation on the panel.

- (i) Automatic tension set value 0 By AUTO key operation
- (ii) Manual tension set value 0 0 .By MANUAL key operation
- (iii) Switching between automatic control and manual control 0 .By A/M key operation
- (iv) Switching control output 0 0 ..By OUTPUT key operation
- (v) Taper set value or the like 0 0 0 By multiple-purpose key operation

Select a timing to register these set values (This varies with version). [3]

For Ver. 1.1\* or older, select a timing by setting the 2<sup>nd</sup> digit in [568] MAN KEY OPE MODE.

- 2<sup>nd</sup> digit is 0: Automatically registered at the timing of the operation signal goes from ON to OFF.
- 2<sup>nd</sup> digit is 1: Register by pressing [\*] key on the panel.

For Ver.2.1\* or newer, select a timing by setting [56B] PANEL DATA SAVE.

- 0: Automatically registered at the timing of the operation signal goes from ON to OFF.
- 1: Register by pressing [\*] key on the panel.

Usually, the automatic registration by the change in operation signal is convenient.

In case you do not wish to use the feature of automatic registration, register by [\*] key.

## 5-2. Setting and adjustment by [model] [3]

### (1) Setting

You set parameters depending on model.

General setting values for each model are listed in [9.Table of Setting]. Use them as reference.

CAUTION!

%566]UNIT ESET!!+is available to initialize all the set values.

To make a big change like changing the [model] of the tension controller, initialize first to eliminate the effects of the former model, then set the new parameters.

### (2) Adjustment locations by model [4]

Conduct adjustment after setting.

Adjustment locations vary with model. Adjust locations with reference to the table below.

Model	Tension Detector	Brake capacity	Line speed detection	Axis rotation sensor	Dancer	Motor order	Signal to air
C500P	○	○	×	×	×	×	×
C500Pk	○	×	×	×	×	×	○
C500F	○	○	×	×	×	×	×
C500W	○	○	×	×	×	×	×
C500Wd	○	○	○	○	×	×	×
C500Wp	○	○	×	×	○	×	×
C500Ri	○	×	○	×	×	○	×
C500Ro	○	×	○	×	×	○	×
C500Di	×	×	○	×	○	○	○
C500Do	×	×	○	×	○	○	○

### 5-3. Adjustment of tension detector

#### (1) Setting example

In the case of both-side holding specifications by LA-1F

Tension detector: LA1F, Full scale: 300 N, Use style: Both-side holding, both-side detection

Tension output: Use for control [4], output voltage 5 V/fs, Auto scale load: 200 N

Operation items for calibration

For calibration, the zero adjustment and scale adjustment should be done for both the right side and left side each.

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*
Right scale adjustment	431	RS START->PUSH*
	432	RS STOP->PUSH*
Left scale adjustment	441	LS START->PUSH*
	442	LS STOP->PUSH*
Electronic volume initialization	451	DP INIT PUSH*
	452	DP INITIALIZE

[461] Auto scale capacity = 200

[563] Use style = 0 (Both-side holding, both-side detection)

[571] Fraction = 0 (\*\*\*)

[572] Full scale = 300 (N)

[576] Display unit = 0 (N)

[577] Analog output content = 0 (total tension)

[578] Analog output level = 50 (%)

[579] Gain switching = 11 (standard value of LA type)

[57A] Detector type = 0 (LA type)

[SW1] All bit ON (LA type)

[SW2] All bit ON (voltage output)



## Explanation of the setting items [2]

### [461] AUTO SCALE LEVEL

Sets the weight of %weight+suspended for auto scale adjustment.

### [563] SENSOR MODE (0: Both-side holding, both-side, 1: Both-side holding one side L, 2: Both-side holding one side R, 3: One-side holding R, 4: One-side holding L)

Sets the detection style of tension detector.

### [571] TP CAP. FORM SET (0:\*\*\*, 1:\*\*.\*, 2:\*.\*\*)

Sets the fraction display location in the tension display.

### [572] TP CAPACITY

Sets the full scale of the tension detector.

### [573] TEN. OUTPUT CHECK

Item to check the behavior of the analog output terminal.

When the value equivalent to full scale is set, the voltage of 0-10V is output from DA-CH1, CH2, CH3, and CH4.

### [574] AVE.CYCLE SET (CYCLE)

Sets the reply of tension display with the averaged frequency.

### [575] TP OUT AVE. CYCLE (cycle)

Sets the reply with transfer average frequency when tension is output as analog.

### [576] TENSION UNIT SET (0: N, 1: x10 N, 2: KN)

Unit of tension display.

### [577] DACH4321 OUTSET (0: tension average, 1: tension set value, 2: set taper tension, 3: pressured output, 4: tension raw signal, 5: dancer raw signal, 6: left average, 7: right average)

Selects items to output analog signals to DA-CH1CH4.

4<sup>th</sup> digit: CH4, 3<sup>rd</sup> digit: CH3, 2<sup>nd</sup> digit: CH2, 1<sup>st</sup> digit: CH1

### [578] DA CH4321 SCALE (%)

Output level when tension is output as analog.

One hundred percent corresponds to 10 V/fs. Output to CH1CH4 with the same scale.

### [579] TP GAIN SWITCH (0: x1, 1: x3.4, 2: x5.6, 3: x7.9)

Switch to toggle tension amplifier gain.

With two-digit value, 2<sup>nd</sup> digit is left side and 1<sup>st</sup> digit right side.

Standard value for the LA type is 11, and 00 for the LS type.

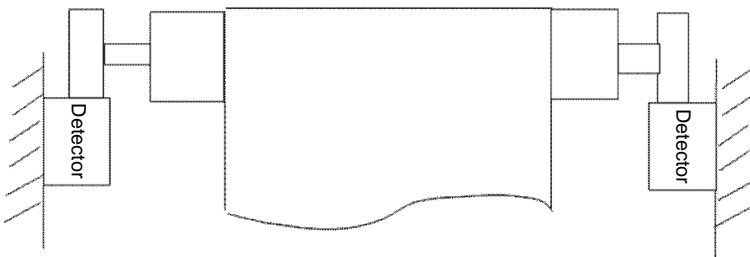
### [574] TP LALS SELECT (0: LA type, 1: LS type)

Sets the type of tension detector to be used.

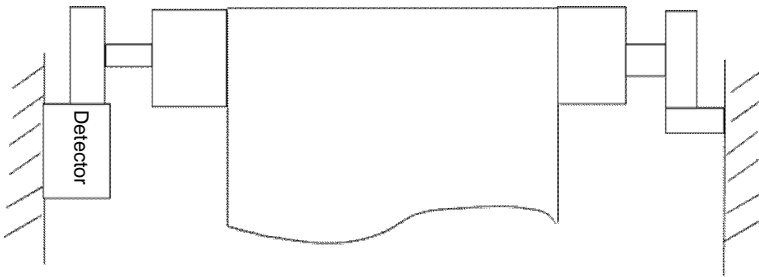
[Detection style]

Chooses a style (method) to attach a detector to a tension detection roll.

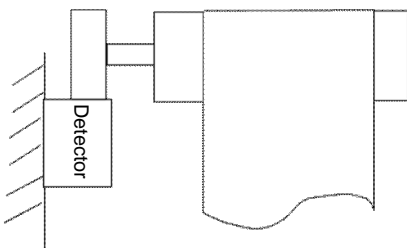
- 0: Both-side holding, both-side detection   Style to attach detectors to both sides of both-holding detection roll.
- 1: Both-side holding, one-side detection (R)   Style to attach a detector only to the right side of both-holding detection roll.
- 2: Both-side holding, one-side detection (L)   Style to attach a detector to only the left side of both-holding detection roll.
- 3: One-side holding detection (R)   Style to use only the right side of one-side detection roll.
- 4: One-side holding detection (L)   Style to use only the left side of one-side detection roll.



Both-sides



one-side  
either right or left side can be  
used.



Single  
either right or left side can be  
used.

[Tension display]

Tension is displayed using a three-digit number display meter.

In case the full scale of the tension detector is 999, the display accuracy is 1/999.

Generally, as the display accuracy is increased, fluctuation of the minimum digit becomes larger. Thus, it is not practical. In case the full scale exceeds 300, set the full scale as 10% of it.

For example: 500 N → 50 x 10 N ÷ .. Set 50.

Reply is to be set in [574] AVE.CYCLE SET.

[Tension analog output]

The tension signal is output from DA-CH-1-CH4 individually by Total, Left, and Right.

The output content is to be set by the item of [577] DA-CH4321 OUTSET.

For example: In case Total is output from CH1, Left from CH2, and Right from CH3, set 0760 in [577] item.

The output scale is common for all channels and is set by [578] DA CH4321 SCALE.

Reply is adjusted by [575] TP OUT AVE.CYCLE.

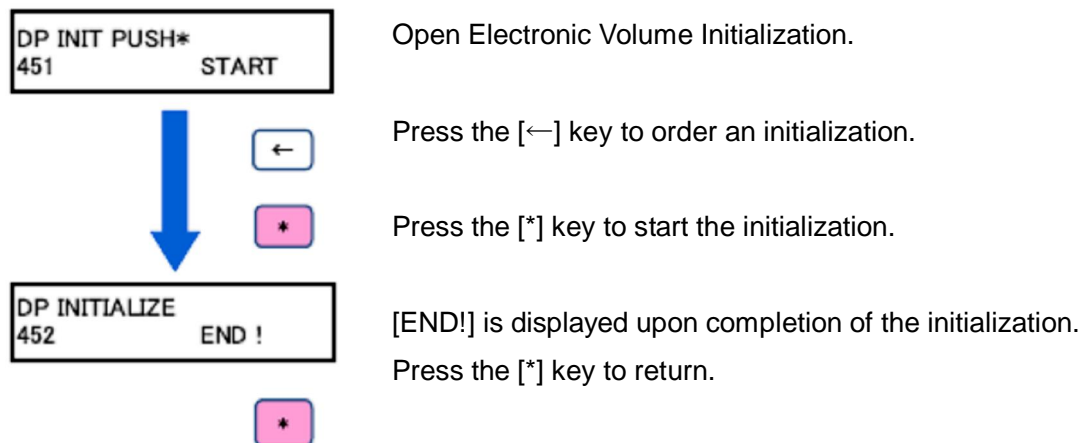
DA-CH1-CH4 can be used for current output by the switch SW2.

## (2) Rough zero adjustment

Rough zero adjustment is needed only when the LA-type tension detector is used.  
That is not needed for the LS type.

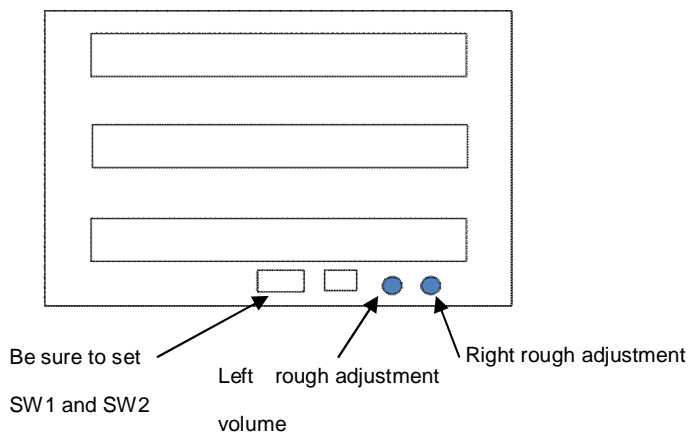
The rough zero adjustment volume is available so that the zero point can be moved to a large extent. Prior to the fine zero tuning, implement the rough zero adjustment so that the tension value settles near zero point.

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



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.

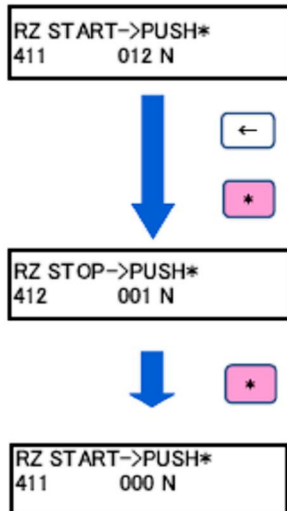
Back side



### (3) Zero adjustment

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

In the case of zero adjustment  
on the right side



Open a zero adjustment screen on the right side.

Press the [ $\leftarrow$ ] 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.

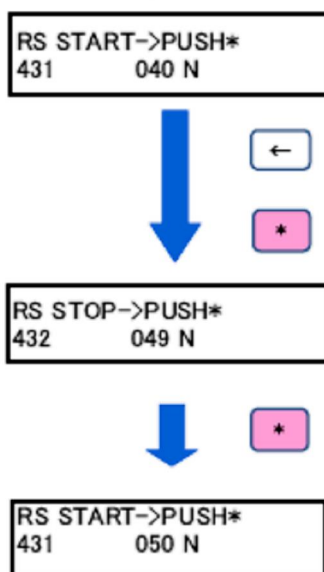
### (4) Scale adjustment

Adjust a scale after the zero adjustment is complete.

Here, you set the weight of the %weight+to be suspended in [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 [ $\leftarrow$ ] key to order scale adjustment, then a value flashes.

Press the [\*] key to start scale adjustment.

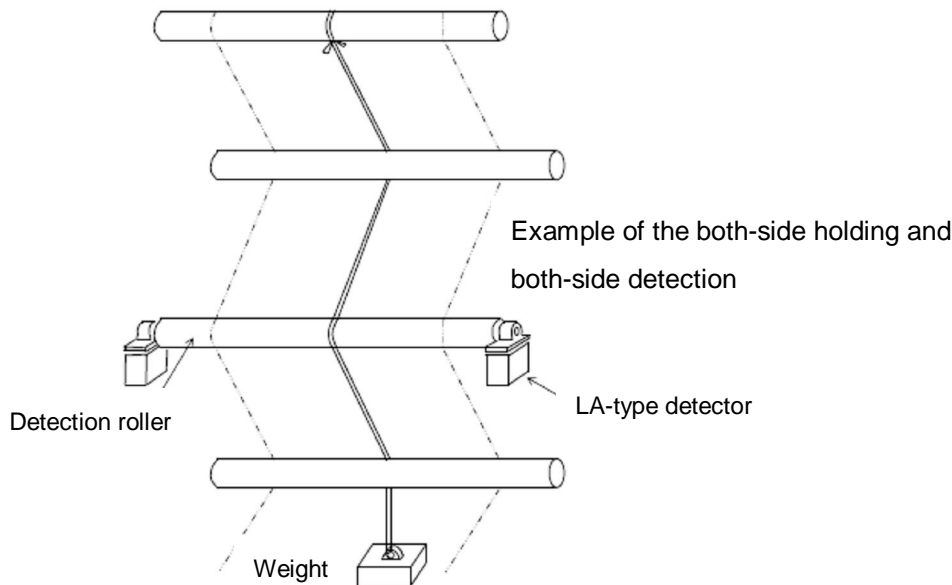
The displayed value is steadily getting to a target value.

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

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.

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.



Tension detection roller

[Target value of scale adjustment]

A target value of scale adjustment will be determined by the set value of [461] AUTO SCALE LEVEL and the detector use style.

Both-side holding and both-side detection: Half of [461] value

Both-side holding and one-side detection: Half of [461] value

One-side detection: [461] value

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].

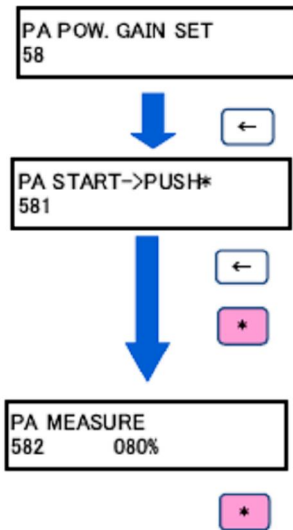
Changing the setting of gain toggling switch causes the zero point to digress much. In that case, restart from the zero adjustment.

## 5-4. 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.

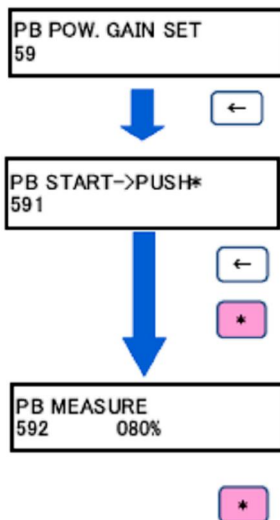
Press the [←] key again to order the implementation of scale adjustment. A cursor starts to blink inside a value.

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



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

## 5-5. Adjustment of line speed detection

This setting is necessary when line speed is used for control.

1. Enter in [5A1] LINE PULSE the number of input pulses that occur while the line proceeds 1 m.
2. Set in [5B7] LINE STYLE SET the encoder specifications.
  - 1<sup>st</sup> digit: Enter **0**+ when only A phase is used and **1**+ when both A and B phases are used.
  - 2<sup>nd</sup> digit: Enter **0**+ for open collector specifications and **1**+ for line driver specifications.Be careful that the connection numbers of external terminal stands are different.
3. Set in [5B4] MAX LINE SPEED the machine's maximum line speed.
4. By moving the line, confirm the speed displayed in [117] LINE SPEED is close to the real speed.
5. By changing the value of [5B5] SPEED AVE.COUNT, line speed averaged cycles (cycle), you can stabilize the display.

## 5-6. Adjustment of axis rotation sensor

This setting is necessary when rotation pulses are used for control.

The system supports the following methods to detect rotations of the axis.

- A method that turns on and off a sensor once for one rotation of the axis using an adjacent sensor.
  - In case an axis has gears, a method that increases accuracy by having an adjacent sensor detect gears.
  - A method of attaching an encoder (type of small number of pulses) to an axis.
1. Enter in [5A3] Z SIG COUNT the input pulses that occur while an axis rotates once.
  2. Set in [5A4] Z SIG CHECK a method to check pulses.
    - Enter **1**+ for a method in which signals are on for long periods like the adjacent sensor.
    - Enter **0**+ for a method in which signals are on for short periods like the encoder.
  3. Enter in [5A5] VALID DIA LEVEL the effective difference between this time and the previous time.
  4. By revolving the axis, confirm that the diameter displayed in [515] REAL DIA is close to the real one.  
Also, confirm that the averaged diameter displayed in [118] AVERAGE DIA is stable. The width of fluctuation varies depending on the averaged cycles displayed in [5A2] DIA AVE CYCLE. Make the number of averaging cycles as small as possible to make the diameter closer to the real one.

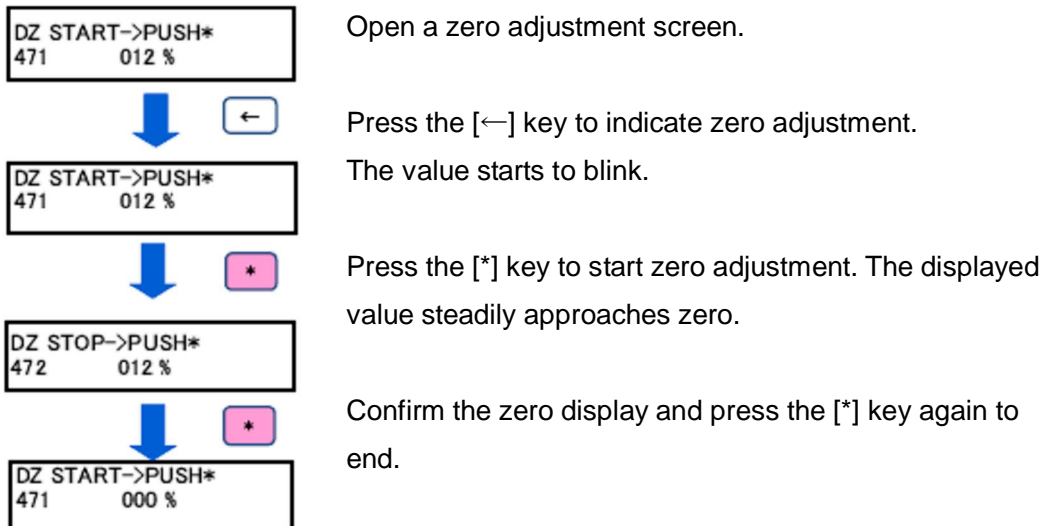


## 5-7. Adjustment of dancer

Dancer adjustment is needed when [567] SECTION MODE is set for C500Wp, C500Di or C500Do.

### (1) Zero adjustment

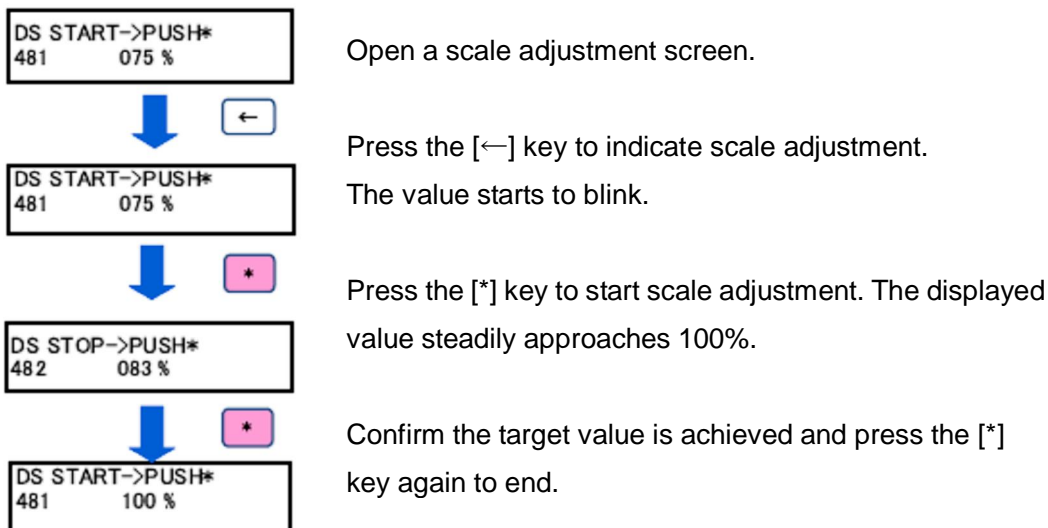
Zero adjustment should be done while the dancer is most loosened.



Start scale adjustment after zero adjustment is complete.

### (2) Scale adjustment

Scale adjustment should be done while the dancer is most tense



### Related setting items

Values of electronic volume can be confirmed in articles [652] and [653].

[652] DANCER ZERO DP, electronic volume for dancer zero adjustment (div)

[653] DANCER SCALE DP, electronic volume for dancer scale adjustment (div)

## 5-8. Adjustment of motor order voltage

Order voltage needs to be adjusted before using a motor.

1. Confirm the motor rotation speed at the maximum machine speed.

When a machine is running at the maximum speed of 100 m/min, the motor is supposed to rotate at 1914 rpm.

2. Confirm the motor's rated rotation.

From the driver's specifications, the order voltage when the motor is revolving at 2000 rpm should be 10 V.

3. Calculate the motor order voltage.

The order voltage at the machine's maximum speed is,  $1914 \text{ (rpm)} / 2000 \text{ (rpm)} \times 10 \text{ (V)} = 9.57 \text{ (V)}$ .

Since [5B3] DRIVER SCALE is 100% at 10 V, set 96%.

4. Confirm it by flowing the basic material.

To confirm this, adjustment of line speed detection must be complete.

Make sure the motor rotates responding to the detected line speed.

Related setting items

[5B3] DRIVER SCALE, driver input at maximum speed [10 V is 100%] (%)

## 5-9. Confirmation of digital input/output signals

You can confirm the status of external control signals by the display of [631]DI CHK 87654321. You can forcibly change the status of control signals.

(0: forcible OFF, 1: forcible ON, 2: external input status)

[632]SS SIGNAL: operation signal

[633]INCHING SIGNAL: inching signal

[634]INC. SPEED SIGNAL: increasing corrective signal

[635]DEC. SPEED SIGNAL: decreasing corrective signal

[636]RESET SIGNAL: reset signal

[637]CHANGE SIGNAL: axis-changing signal

[638]EXT8PIN SIGNAL: 15<sup>th</sup> terminal signal

[639]DI8 SIGNAL: spare

You can confirm the status of output control signals by [671]OUT CHK 87654321. [3]

You can change forcibly the status of control signals.

(0: forcible OFF, 1: forcible ON, 2: internal input status)

[672]SERVO ON SIGNAL: servo On signal, [673]DO2 SIGNAL-[679]DO8 SIGNAL

## 5-10. Adjustment of output to signal-air converter for dancer [3]

Dancer control C500Di and C500Do allow you to set the output to the signal-air converter for dancer by the AUTO key on the panel. Enter the maximum tension value in [572]TP CAPACITY. Calculate the current value necessary to apply the maximum tension from the cylinder diameter and enter the value in [57C]E/A SCALE SET.

Example of setting:

With the in-feed tension of 300 N/FS, enter 300 in [572]TP CAPACITY.

When the air pressure necessary to produce the tension of 300 N is 50% of the output pressure of the signal-air converter, enter 50.0 in [57C]E/A SCALE.

Then, set 300 N by the Auto key on the panel to apply  $(20-4)/2 + 4 = 12$  mA, which is equivalent to 50%, to the signal-air converter.

## 5-11. Change values set on panel by analog signal [3]

You can change the settings by external analog signals instead of keys of AUTO, MANU, and TAPER on the panel.

Set functions by three-digit values of [56A]AMT 0 : KEY, 1-4 : AD.

AUTO key is assigned to the 3<sup>rd</sup> digit, MANU key to the 2<sup>nd</sup> digit, and TAPER key to the 1<sup>st</sup> digit. Set a value of 0-4 to each digit.

0: Setting on the panel key

1: AD CH1

2: AD CH2

3: AD CH3

4: AD CH4

This function can be used in any control mode of C500P-C500Do.

In the case of dancer control, the input from a potentiometer is fixed to AD CH1.

Example of setting:

Circumference of main roll can be set by TAPER key on the panel.

0 is equivalent to 0 mm and 999 to 999 mm.

To take in the circumference of the main roll by analog signals, enter ~~%~~ in the 1<sup>st</sup> digit of article [56A] and connect the setting volume to AD CH4.

## 6. Run

### 6-1. Common contents

#### (1) PID adjustment items

1. The following items are available for PID adjustment of C500P, C500F and C500W.

[531]P GAIN SET: setting of proportional element gain (%)

[532]I GAIN SET: setting of integral element gain (%)

[533]I TIME SET: setting of integral time (sec)

[534]D GAIN SET: setting of differential gain (%)

[535]D TIME SET: setting of differential time (sec)

[536]ERROR GAIN SET: setting of deviation element gain (%)

[537]ACCEL LEVEL SET: setting of acceleration level (%)

[538]I ACCEL TIME SET: setting of integral time at acceleration (sec)

[541]OUTPUT BIAS SET: setting of output bias (%)

[542]DEAD ZONE SET: setting of dead zone ( $FS \pm N\%$ )

[543]INC. I TIME SET: setting of integral time at increasing speed correction (sec)

[544]DEC. I TIME SET: setting of integral time at decreasing speed correction (sec)

2. In addition, the following items are available for C500R and C500D.

[5B1]V/T FS GAIN: control gain at the maximum speed (%)

[5B2]V/T ZS GAIN: control gain at the minimum speed (%)

[5B6]ACC.DEC.SPEED: increase or decrease value where increase or decrease correction starts to function

#### (2) Others

[568]MANU KEY OPE MODE

Selection of MANU key functions varies with the model.

With C500F and C500W, the MANU key enables adjustment of auxiliary output.

With other models, the MANU key makes START level the same as the READY level.

## 6-2. Unwinding C500P

### (1) Unwinding normal run

READY LEVEL applies the proper braking to the original sheet when a machine comes to a halt. The machine run signals are input almost simultaneously with the start of the machine and the sheet running. After START TIMER runs out, the system switches to automatic control. START TIMER is intended to prevent the excessive control output at start and should be set at 2-5 seconds. Run signals run out simultaneously with the stoppage of sheet run by stopping the machine and STOP LEVEL (stop brake output) is output during STOP TIMER. Then, the control output returns to READY LEVEL. STOP LEVEL is intended to prevent the overrun that occurs due to inertia of the original sheet's axis. It is a value obtained by multiplying the control level by the STOP LEVEL set value immediately before the run signals run out. By inputting signals depending on the increase or decrease in the line speed, you can change the control reply.

### Related setting items

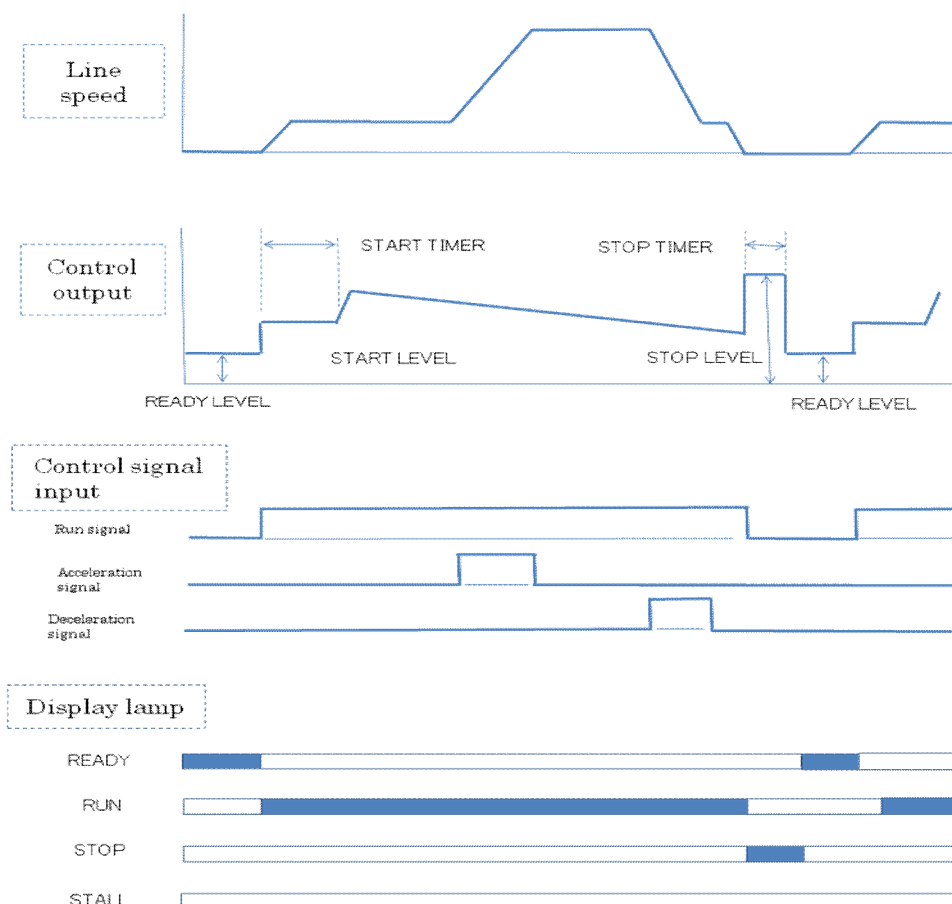
[212]START LEVEL SET: setting of start level (%)

[213]STOP LEVEL SET: setting of stop level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)



## (2) Stop and run during unwinding

This function is used when you need to stop the line during rewinding out the original sheet and then restart the line. When the run signals run out, STOP LEVEL is output only during STOP TIMER. After STOP TIMER runs out, the system returns to the memory control.

The value obtained by multiplying the control level by the MEMORY LEVEL set value immediately before the run signals run out is output as the memory level.

The memory level is used to stabilize the tension at the restart after temporary halt.

The system returns to the ready status when the reset signals come in while memory is being controlled or by pressing RESET key on the panel.

### Related setting items

[564]MEMORY CONT MODE: use of memory control (0: No, 1: Yes)

[212]START LEVEL SET: setting of start level (%)

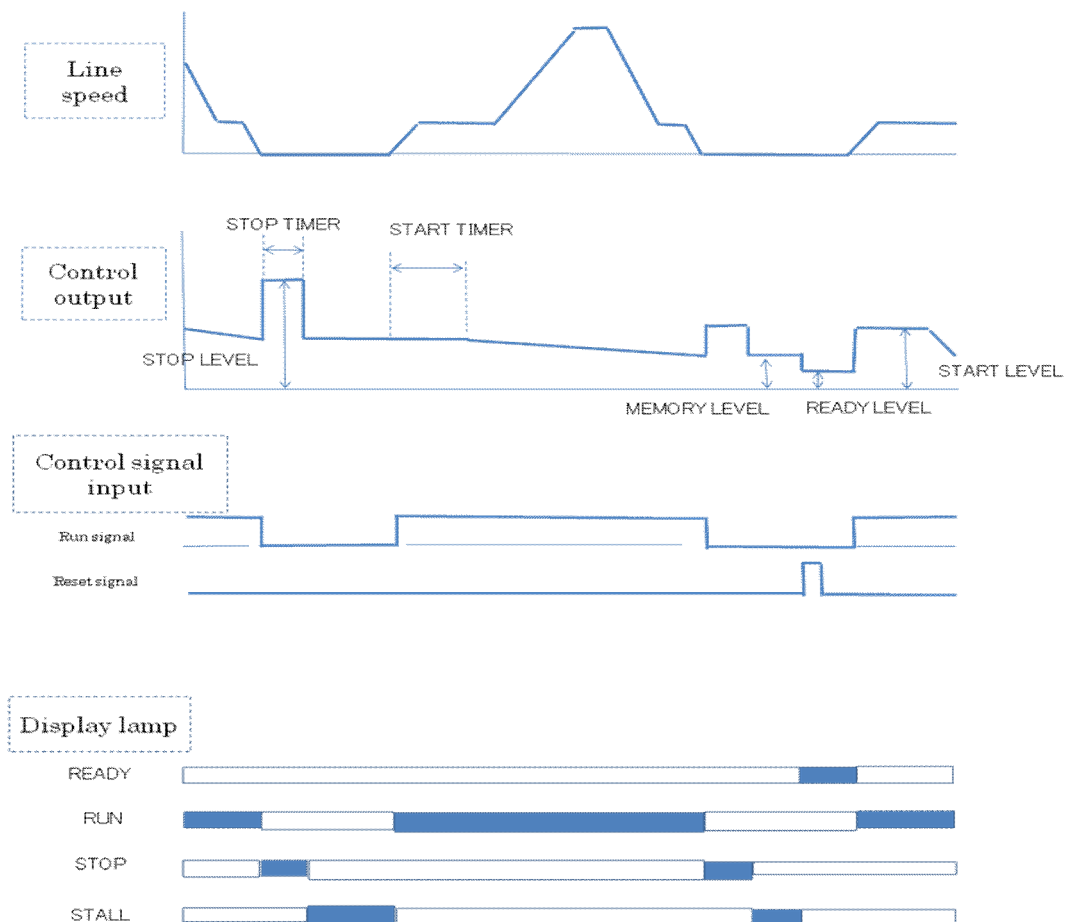
[213]STOP LEVEL SET: setting of stop level (%)

[214]MEMORY (STALL) SET: setting of memory level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)



### (3) Unwinding inching run

This function is used to move the sheet inch by inch after the machine halt or to smooth the wrinkles of the sheet. When the inching signals are input, the control level set in the INCHING LEVEL setting field is output. When the inching signals run out, STOP LEVEL is output during the set time of STOP TIMER and then the control output returns to the READY LEVEL set value. When the inching signals are input during STOP LEVEL output, the INCHING LEVEL set value is immediately output.

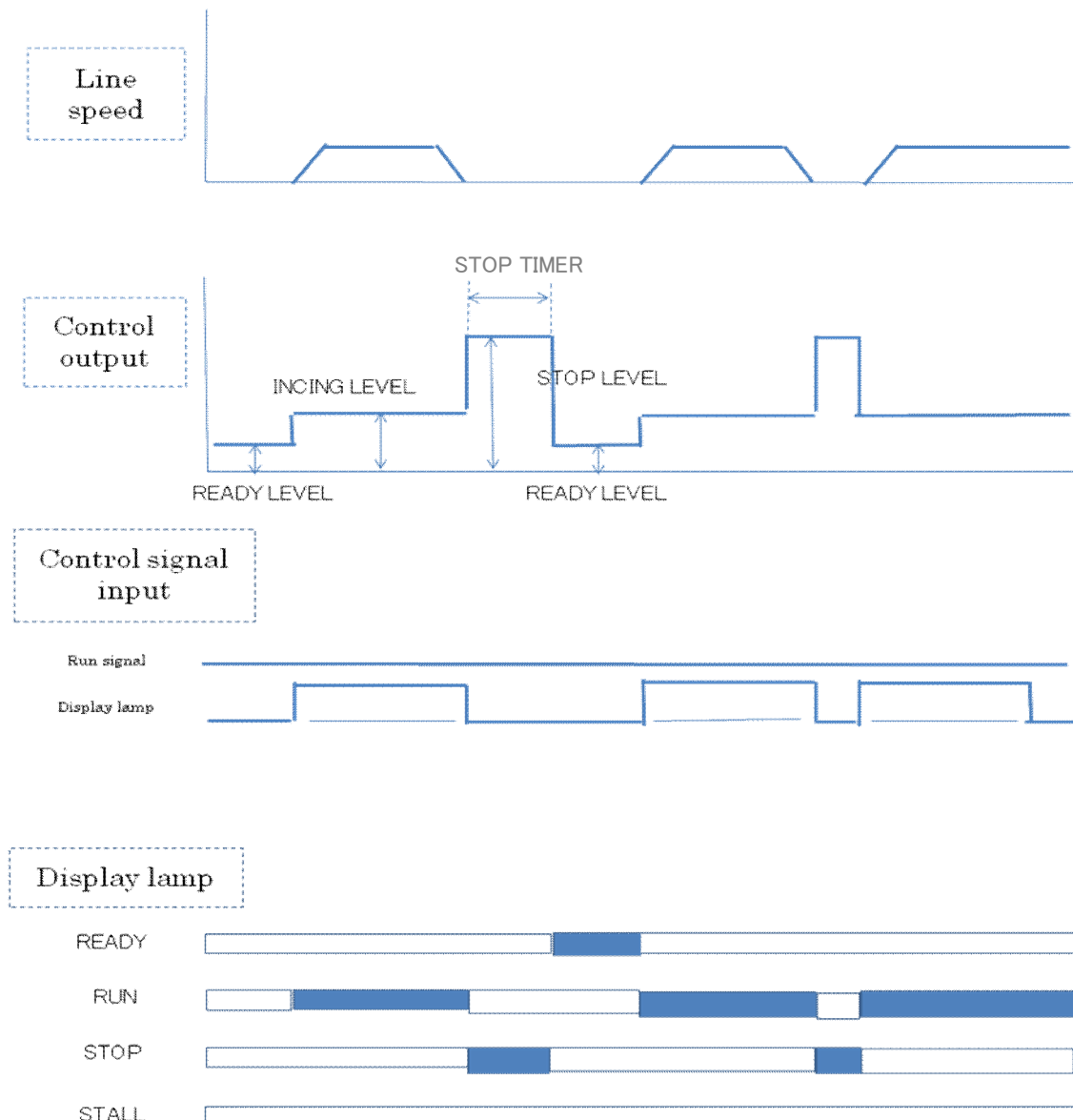
#### Related setting items

[213]STOP LEVEL SET: setting of stop level (%)

[215]INCHI.(IDOL) SET: setting of inching level (%)

[217]READY LEVEL SET: setting of ready level (%)

[312]STOP TIMER SET: setting of stop timer (sec)



#### (4) Unwinding axis switching run

In the 2-axis unwinding, the system continues the run switching both axes without stopping the sheet. When switching axes, a diameter of the new axis quickly grows bigger than the old axis and a big increase in the control output is needed to keep the tension constant.

The normal control causes a big change in tension. When the axis switching signals are input to stabilize the tension by curbing this change, the axis switching correction by the CHANGE LEVEL setting is automatically applied. Also, it is possible to abruptly halt the old axis by applying the auxiliary output to it simultaneously with axes switching.

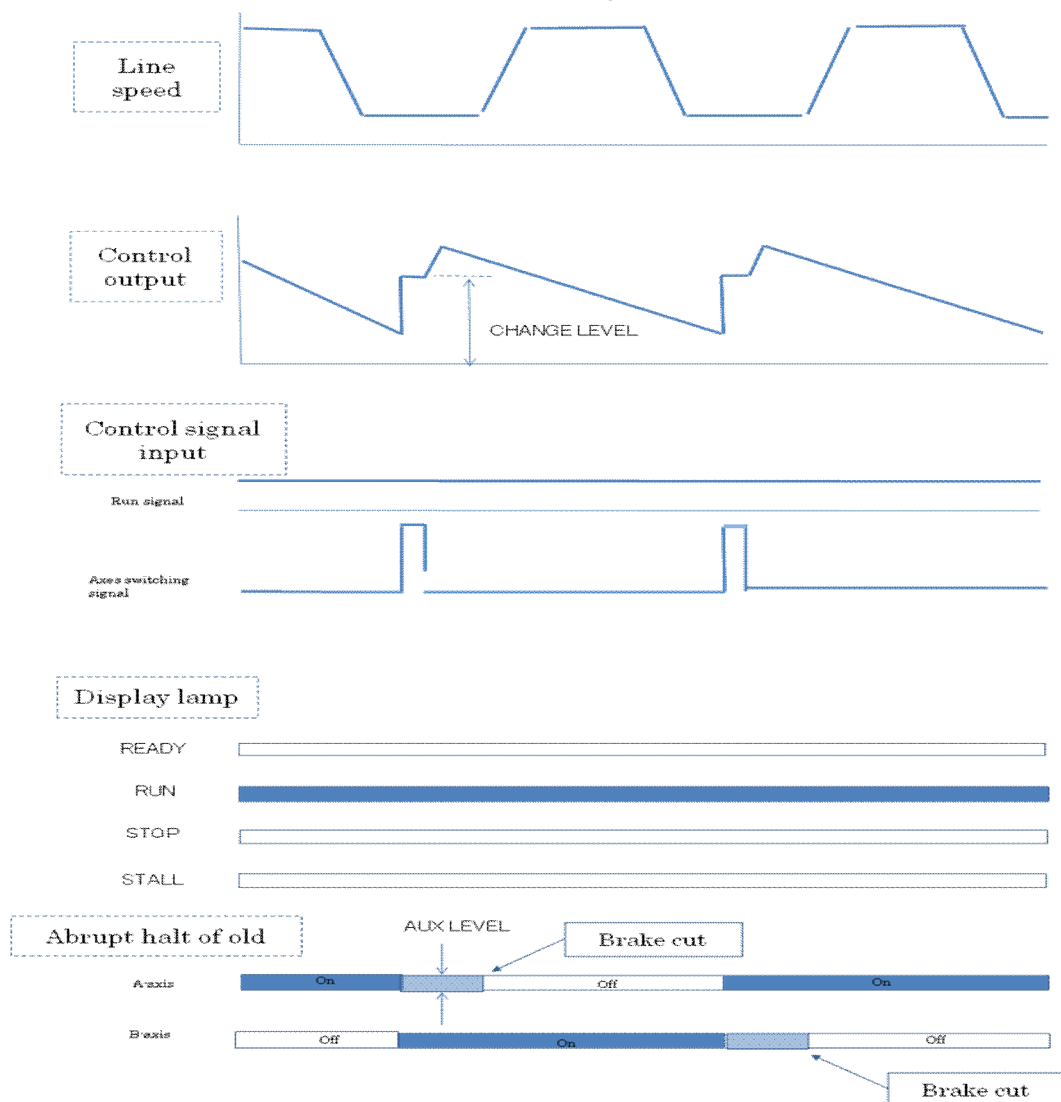
The axes switching level can be increased or decreased depending on the automatic tension setting value. The minimum axes switching level is set so that a certain level of axes switching level can be output even if the automatic tension setting is small.

#### Related setting items

[216]CHANGE LEVEL SET: setting of SET axis switching level (%)

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

[555]MIN. CHANGE SET: minimum level of axes switching (%)





### 6-3. Feed (PB + PC) C500F

#### (1) Normal run

The feed roll control is not subject to a change in control output level due to the change in diameter. Therefore, as it does not need a stop brake, the setting of STOP LEVEL should be 100% to curb a big change in the control level. Only the run signals should be used as the control signals. A change in the control output can be reduced during the period from halt to restart of the run by applying the memory control.

#### Related setting items

[212]START LEVEL SET: setting of start level (%)

[213]STOP LEVEL SET: setting of stop level (%)

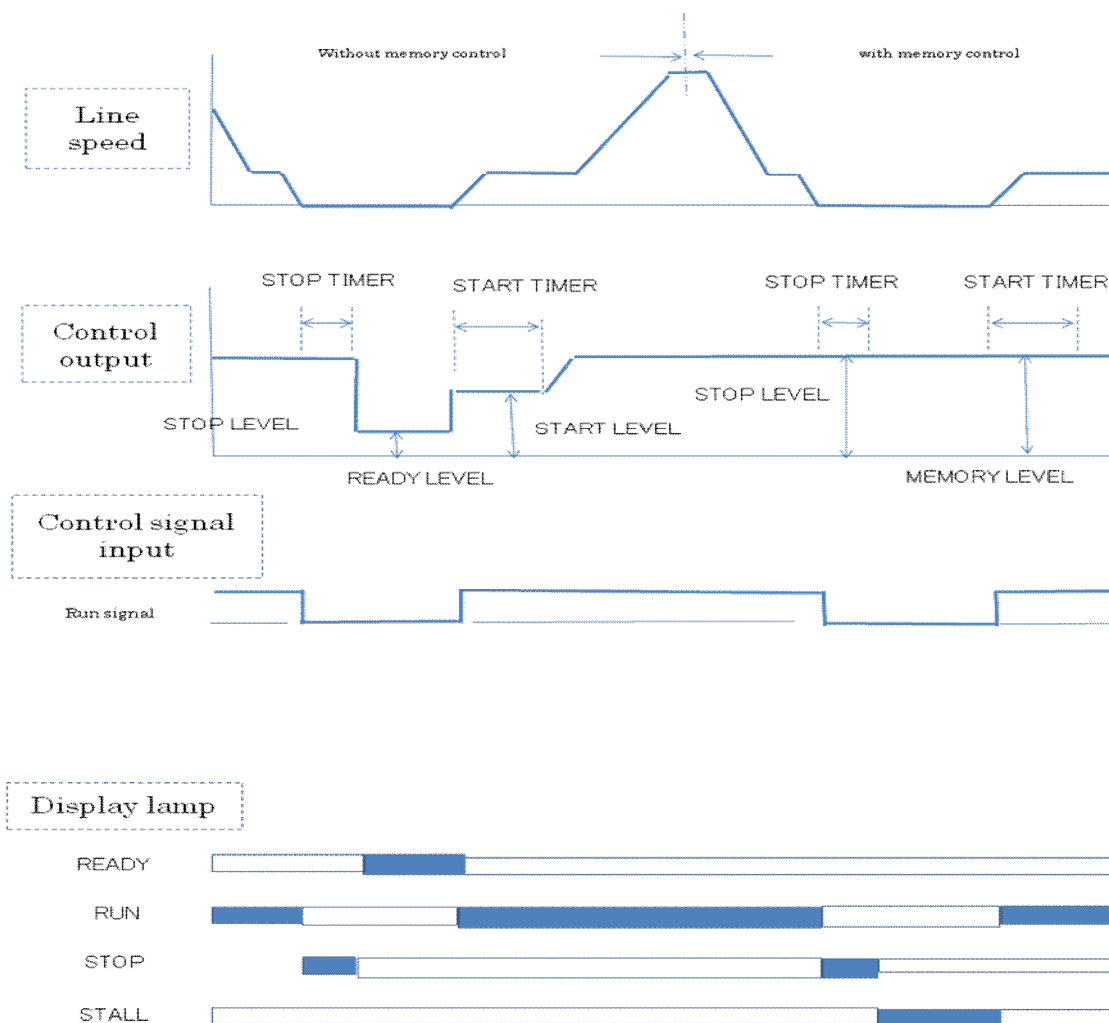
[214]MEMORY (STALL) SET: setting of memory level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)

[564]MEMORY CONT. MODE: use of memory control (0: No, 1: Yes)



## 6-4. Rewinding C500W, C500Wd, C500Wp

### (1) Rewinding normal run

The drive speed of the clutch input axis is supposed to be higher than the line speed with the minimum rewinding diameter. 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.

Related setting items

[212]START LEVEL SET: setting of start level (%)

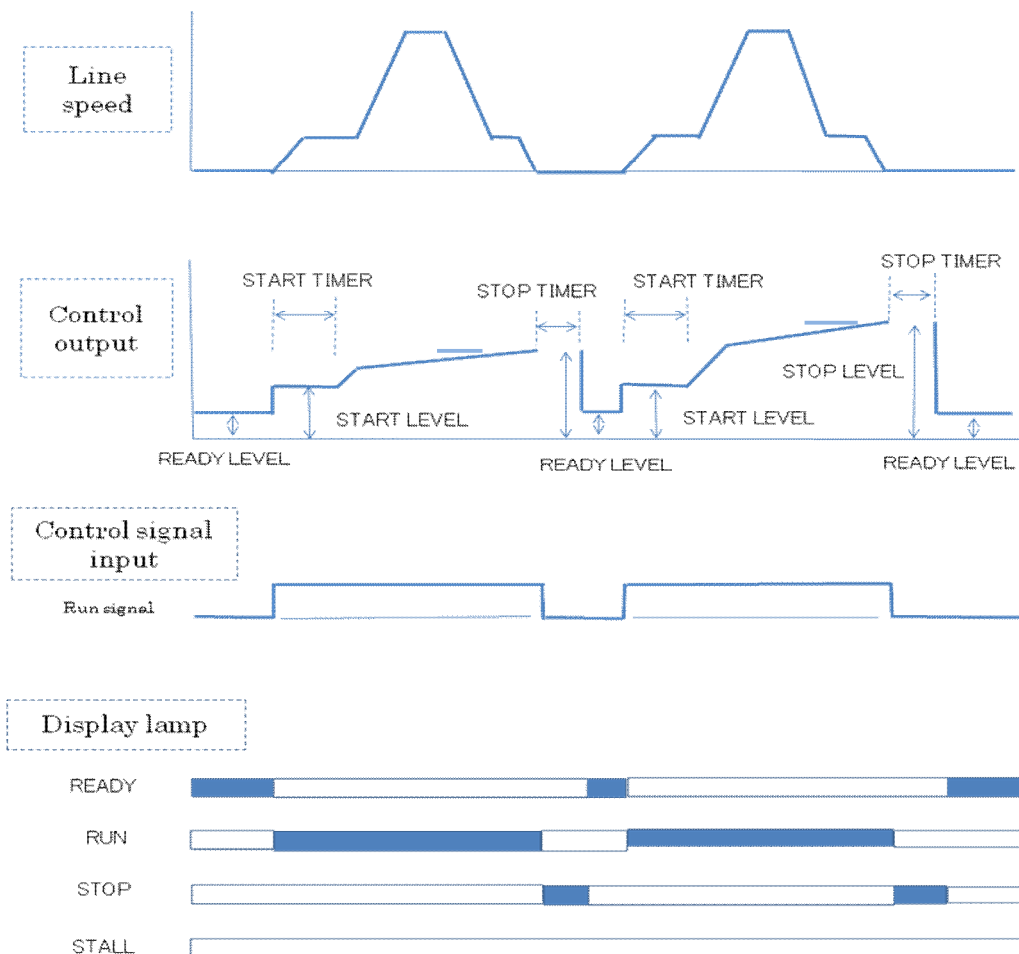
[213]STOP LEVEL SET: setting of stop level (%)

[214]MEMORY (STALL) SET: setting of memory level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)



(2) Stop and run during rewinding [3]

This function is used when you need to stop the line during rewinding and then restart the line. When the run signals run out, STOP LEVEL is output only during STOP TIMER.

After STOP TIMER runs out, the system returns to the memory control.

The value obtained by multiplying the control level by the MEMORY LEVEL set value immediately before the run signals run out is output as the memory level.

The memory level is used to stabilize the tension at the restart after temporary halt.

The system returns to the ready status when the reset signals come in while memory is being controlled or by pressing RESET key on the panel.

## Related setting items

[212]START LEVEL SET: setting of start level (%)

[213]STOP LEVEL SET: setting of stop level (%)

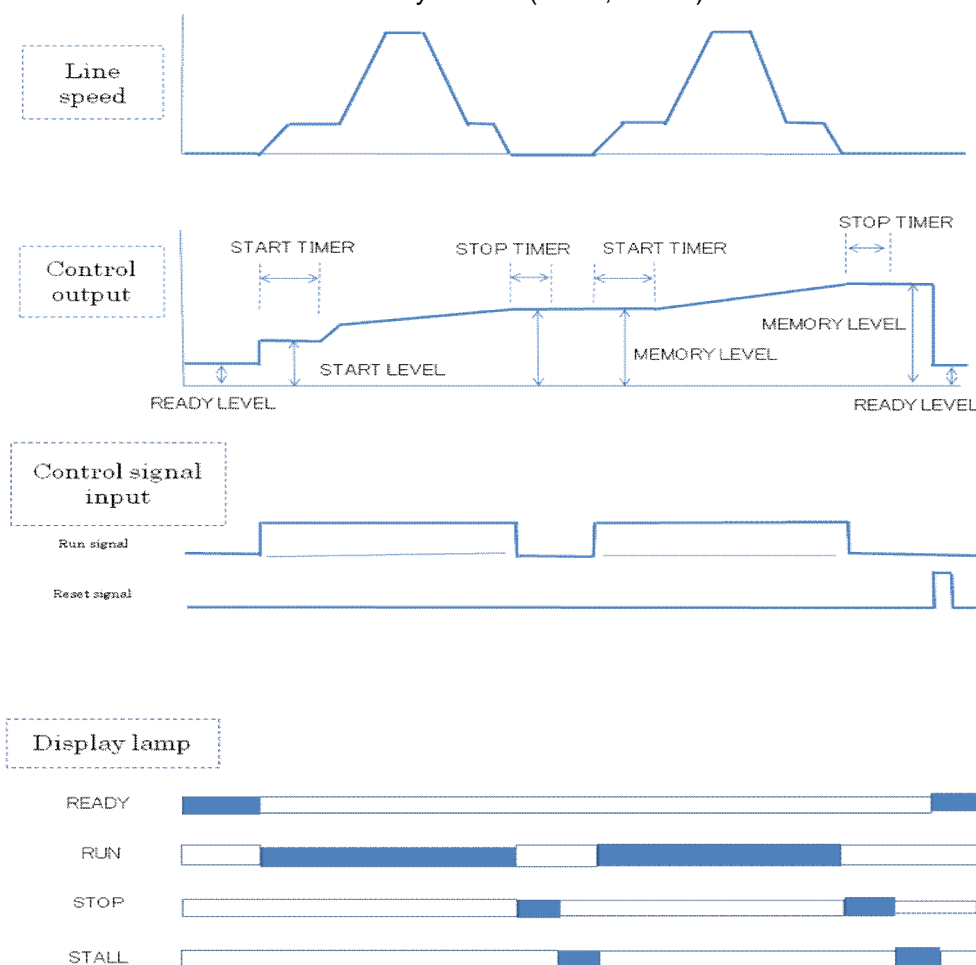
[214]MEMORY (STALL) SET: setting of memory level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)

[564]MEMORY CONT. MODE: use of memory control (0: No, 1: Yes)



### (3) Rewinding axis switching run

In the 2-axis rewinding, the system continues the run while switching both axes without stopping the sheet. In switching axes, the diameter of the new axis quickly becomes smaller than the old axis and a big increase in the control output is needed to keep the tension constant. The normal control causes a big change in tension. When the axis switching signals are input to stabilize the tension by curbing this change, the axis switching correction by the CHANGE LEVEL setting is automatically applied. It is possible to allow the preliminary run by applying the auxiliary output to the new axis prior to switching axes.

Also, to curb the fluctuation in tension that may occur when a turret is rotated in conjunction with the axes switch, the fixing output feature is available. When %2+ (fixing control output) is entered in [569]EXT8PIN MODE SET and the 15<sup>th</sup> terminal stand (output fixing signal) is turned on, the control output is fixed at a value to be derived by multiplying the immediate past level by [213] STOP LEVEL SET.

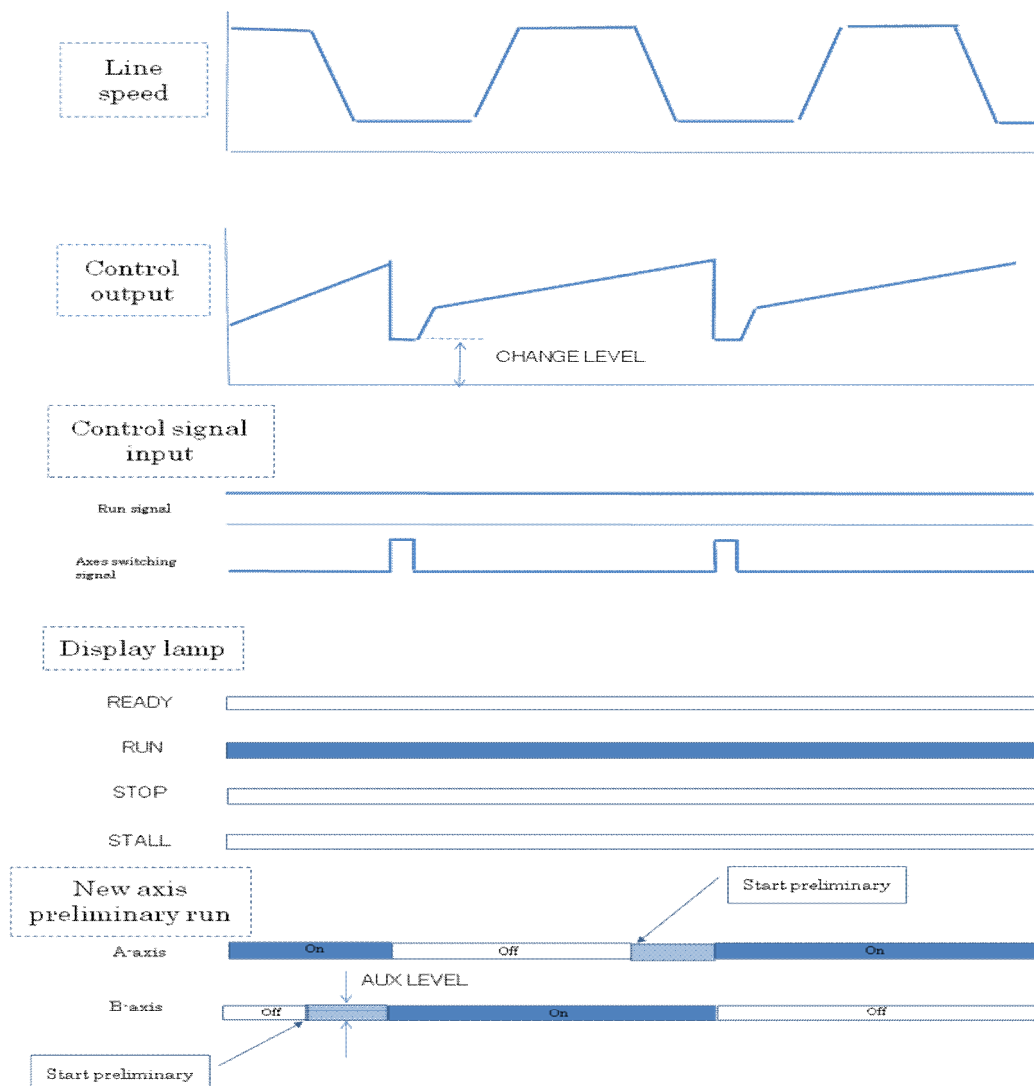
#### Related setting items

[216]CHANGE LEVEL SET: setting of SET axis switching level (%)

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

[213]STOP LEVEL SET: setting of stop level (%)

[569]EXT8PIN MODE SET: role of external terminal stand 8Pin



#### (4) Current taper method C500W [3]

As the tension control at rewinding, there are two rewinding methods. One is the constant tension rewinding that winds in sheets with constant tension regardless of a change in rewinding diameter, and the other one is the taper tension rewinding that reduces tension as a diameter gets bigger.

Current taper is a method in which taper is applied using the control output current.

This is a simple method that uses the principle that the rewinding diameter is proportional to the control output current. It does not require a special sensor.

Enter  $\% \rightarrow$  (C500W) in [567]SECTION MODE.

Operation principle:

The system memorizes the control output current when rewinding starts.

The control current increases as the diameter gets bigger.

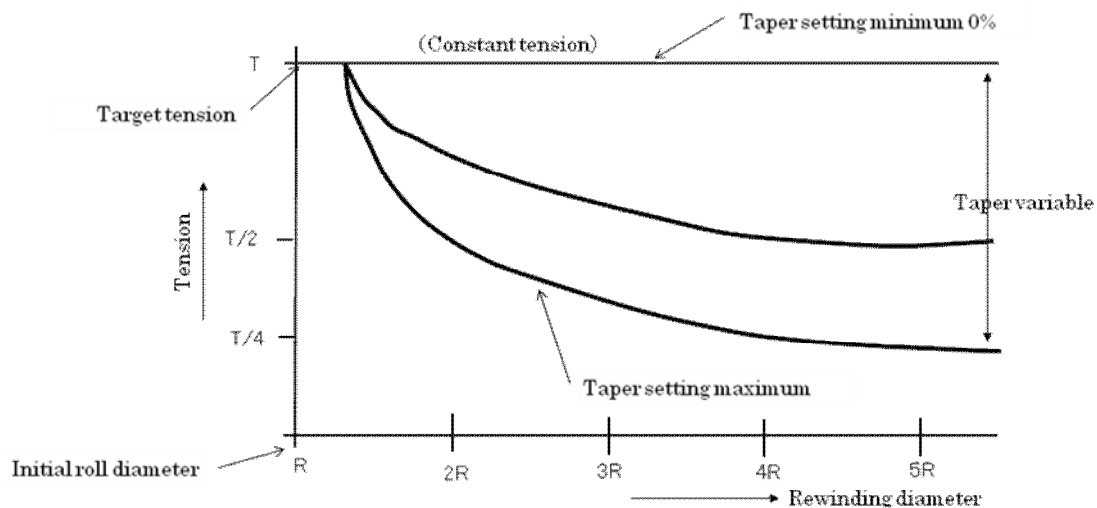
Lower steadily the target tension setting depending on the increase in current.

There is no place to adjust.

The present target tension is displayed in [114] TAPER TENSION.

Drawback:

For a machine that suffers much mechanical loss, the current value in paper tube diameter gets larger. Thus, a change in the current due to the increase in roll diameter becomes small, causing taper to be poorly applied.



(5) Taper method of pulse winding diameter detection type C500Wd

This is a method of detecting the rewinding diameter using line pulses and an axis rotation sensor.

Enter  $\% \rightarrow$  (C500Wd) in [567] SECTION MODE.

The following items must be filled out.

[5A1]LINE PULSE: the number of input pulses while a line moves 1 m (pulse/m)

[5A2]DIA AVE.CYCLE: averaged cycles of diameter to be measured (cycle)

[5A3]Z SIG COUNT]: the number of occurring pulses while an axis rotates one time (cycle)

[5A4]Z SIG CHECK: the number of cycles to check one rotation pulse (cycle)

[5A5]VALID DIA LEVEL: if the difference from the previous value is under this value, it is valid (%).

[5A6]MAX DIA SET: maximum diameter (mm)

[5A7]MIN. DIA SET: minimum diameter (mm)

[5A8]CORNER DIA SET: corner radius to change angle of taper (mm)

[5A9]CORNER TAP. SET: taper amount with point diameter (%)

[5AA]MAX DIA TAP. SET: taper amount with maximum diameter (%)

The status is displayed in the following field.

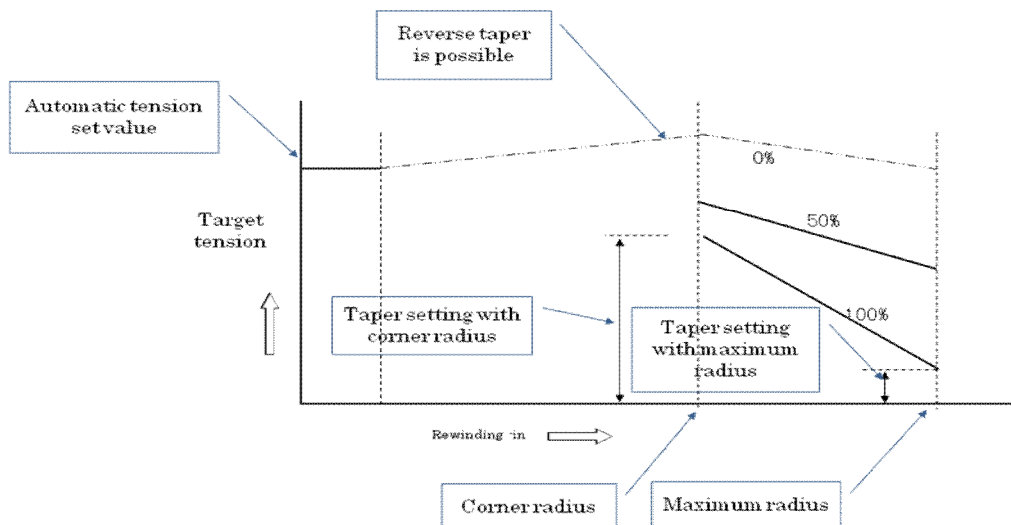
[117]LINE SPEED: Line speed is displayed.

[118]AVERAGE DIA: Average diameter is displayed.

[515]REAL DIA: Real diameter before averaging is displayed.

Arrangement procedures

1. First, enter  $\% \rightarrow$  in [567]SECTION MODE and arrange a series of procedures with current taper. If there is no problem with movement, enter  $\% \rightarrow$  and proceed to adjustment of winding diameter detection.
2. Enter the number of pulses in LINE PULSE so that the display in [117]LINE SPEED becomes the same as a real machine.
3. Confirm the average diameter is displayed in [118]AVERAGE DIA.
4. You can set the taper not only with the maximum diameter but also with the medium diameter.



(6) Taper method of potentiometer winding diameter detection type C500Wp

This is a method of detecting the rewinding diameter using signals of a potentiometer attached to a touch arm.

Enter  $\%+$  (C500Wp) in [567] SECTION MODE.

The following items must be filled out.

[5A6]MAX DIA SET: maximum diameter (mm)

[5A7]MIN. DIA SET: minimum diameter (mm)

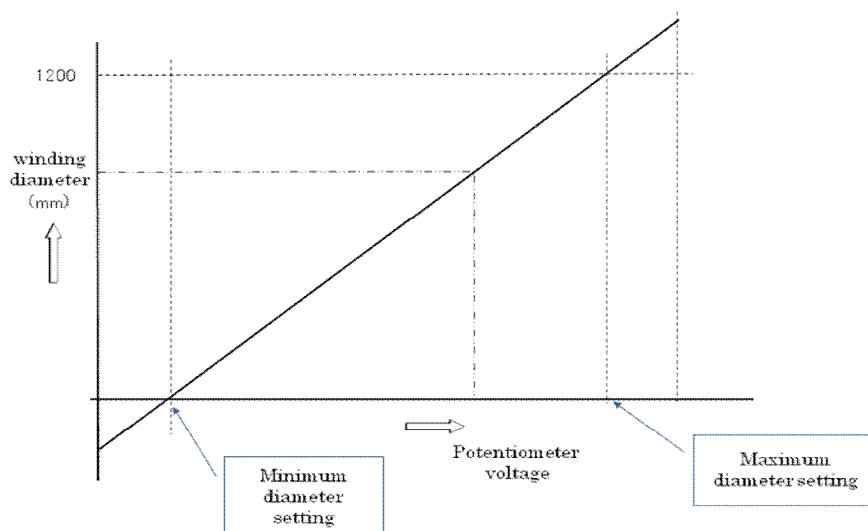
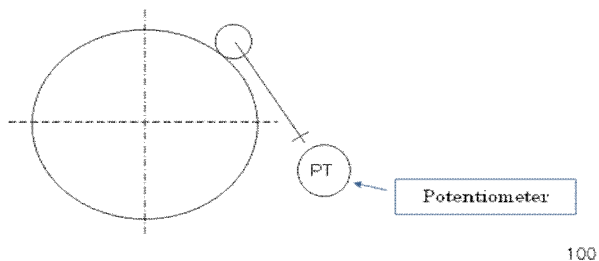
The status is displayed in the following field.

[118]AVERAGE DIA: Average diameter is displayed.

[515]REAL DIA: Real diameter before averaging is displayed.

Arrangement procedures

1. First, enter  $\%+$  in [567]SECTION MODE and arrange a series of procedures with current taper. If there is no problem with movement, enter  $\%+$  and proceed to adjustment of winding diameter detection.
2. As a potentiometer is used like a dancer, adjust it with reference to Articles 5-7.
3. Confirm the average diameter is displayed in [118]AVERAGE DIA.



## (7) Control of applied pressure C500Wd, C500Wp

In case an accurate diameter is determined by pulse winding diameter detection or potentiometer winding diameter detection, you can control the applied pressure using that winding diameter.

Enter  $\%+$  (C500Wd) or  $\%+$  (C500Wp) in [567] SECTION MODE.

The following items must be filled out.

Enter  $\%+$  (output of applied pressure) in [577] DA-CH1 OUTSET (analog output content).

[556] PRESS PRISET: initial value of applied pressure (%)

[557] PRESS TAPER: taper setting of applied pressure (%)  $\div$  .Set the taper amount with a maximum diameter

[578] DA-CH1 SCALE: analog output level (%)  $\div$  ..Control output voltage

The status is displayed in the following field.

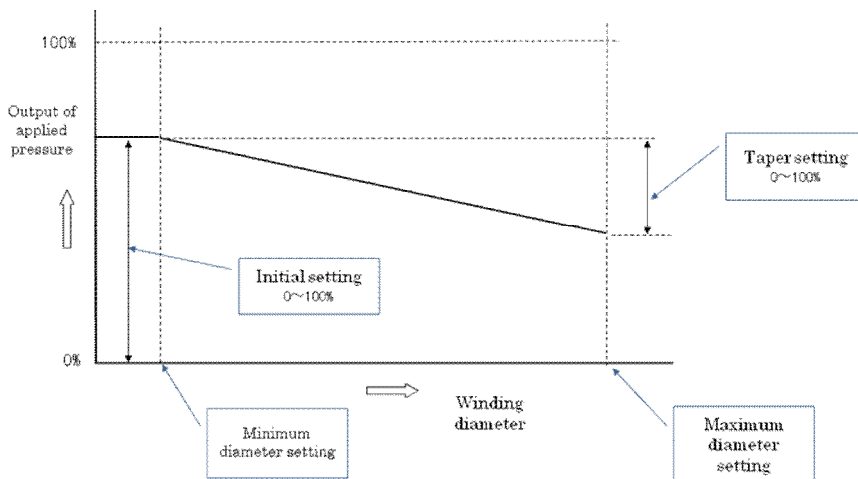
The applied pressure is displayed in [119] PRESS OUTPUT (Display applied pressure (%)).

### Arrangement procedures

1. With potentiometer winding diameter detection type C500Wp, confirm the display of [119] PRESS OUTPUT by shaking a touch arm.
2. In the case of winding diameter detection type C500Wp that uses line pulses, confirm by actually flowing the basic material.

The set value of applied pressure can be directly confirmed by operating the panel.

1. After turning on the power, press the  $\leftarrow$  key twice while MONITOR screen is displayed.  
 $\%+$  mark is displayed at left end of the number display meter and the present output of applied pressure is displayed with a value of 0.0-99.9%.
2. Press the AUTO[ $\blacktriangle$ ][ $\blacktriangledown$ ] key to temporarily display the initial value of applied pressure in [556] PRESS PRESET.
3. Press the TAPER[ $\blacktriangle$ ][ $\blacktriangledown$ ] key to temporarily display the taper setting (%) of applied pressure in [557] PRESS TAPER.





## 6-5. Feed (motor + tension) C500R

In-feed: C500Ri, Out-feed: C500Ro

### (1) Normal run

When the run signals are input, the feed roll starts to rotate at the same speed as the line speed. Furthermore, when the nip signals are input, the roll speed changes depending on the measured tension and the tension approaches the target value.

In the manual control, when only the manual signals are input, the roll starts to rotate at the constant speed set in IDOL LEVEL. The controlled part is added against the speed base.

In case the stop level is 150%, the amount (12.5%) to which 150% (7.5%) of the controlled part (e.g. 5%) immediately before the nip runs out was added will be added to the speed base and be output. The control output that includes the speed base is displayed in [115]PA OUTPUT.

### Related setting items

[212]START LEVEL SET: setting of start level (%)

[213]STOP LEVEL SET: setting of stop level (%)

[214]MEMORY (STALL) SET: setting of memory level (%)

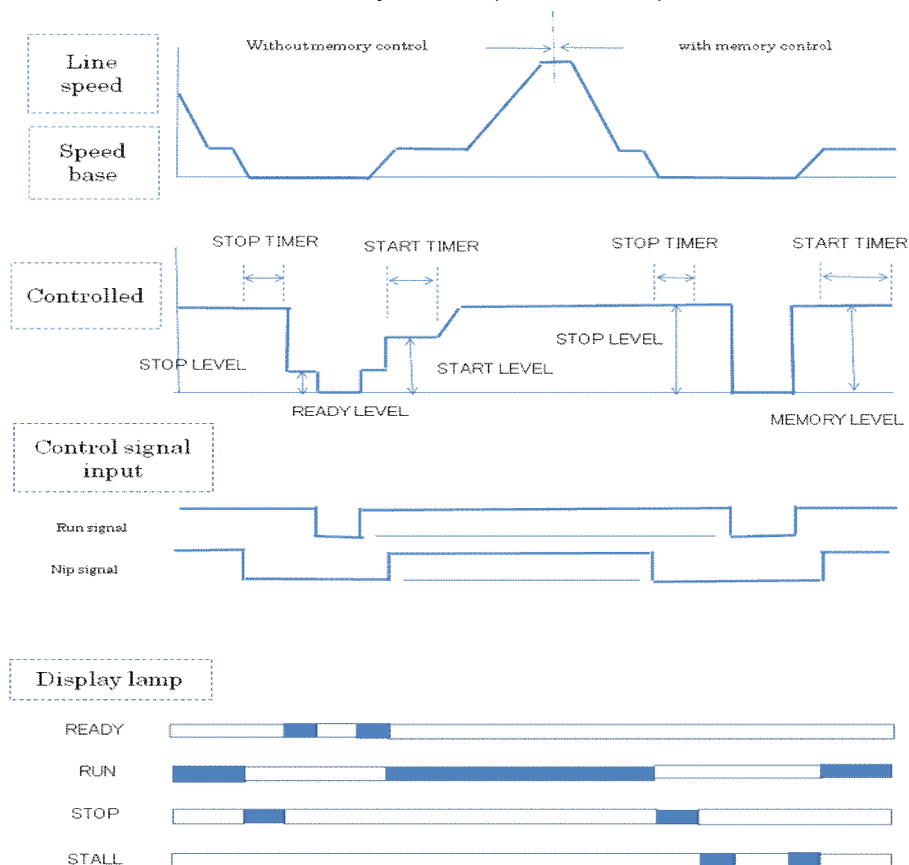
[215]INCHI.(IDOL) SET: setting of inching level (%)

[217]READY LEVEL SET: setting of ready level (%)

[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)

[564]MEMORY CONT MODE: use of memory control (0: No, 1: Yes)



## 6-6. Feed (motor + tension) C500D [1]

In-feed: C500Di, Out-feed: C500Do

### (1) Normal run

When the run signals are input, the feed roll starts to rotate at the same speed as the line speed. Furthermore, when the nip signals are input, the roll speed changes depending on the location of a dancer so that the dancer always comes at the center.

In the manual control, when only the manual signals are input, the roll starts to rotate at the constant speed set in IDOL LEVEL.

By setting the main roll circumference from the TAPER key on the panel, gravure printing can be handled. [3]

By AUTO key on the panel, the output to the signal-air converter for dancer can be set.

Use [57C]E/A SCALE SET to adjust the level. [3]

The setting values by each key on the panel can also be changed by external analog signals. [3]

### Related setting items

[212]START LEVEL SET: setting of start level (%)

[213]STOP LEVEL SET: setting of stop level (%)

[214]MEMORY (STALL) SET: setting of memory level (%)

[215]INCHI.(IDOL) SET: setting of inching level (%)

[217]READY LEVEL SET: setting of ready level (%)

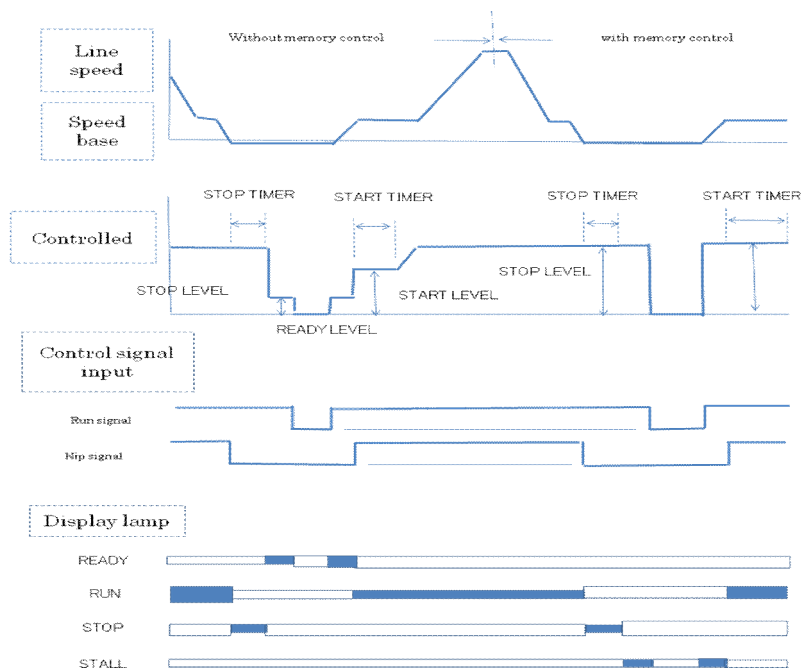
[311]START TIMER SET: setting of start timer (sec)

[312]STOP TIMER SET: setting of stop timer (sec)

[564]MEMORY CONT MODE: use of memory control (0: No, 1: Yes)

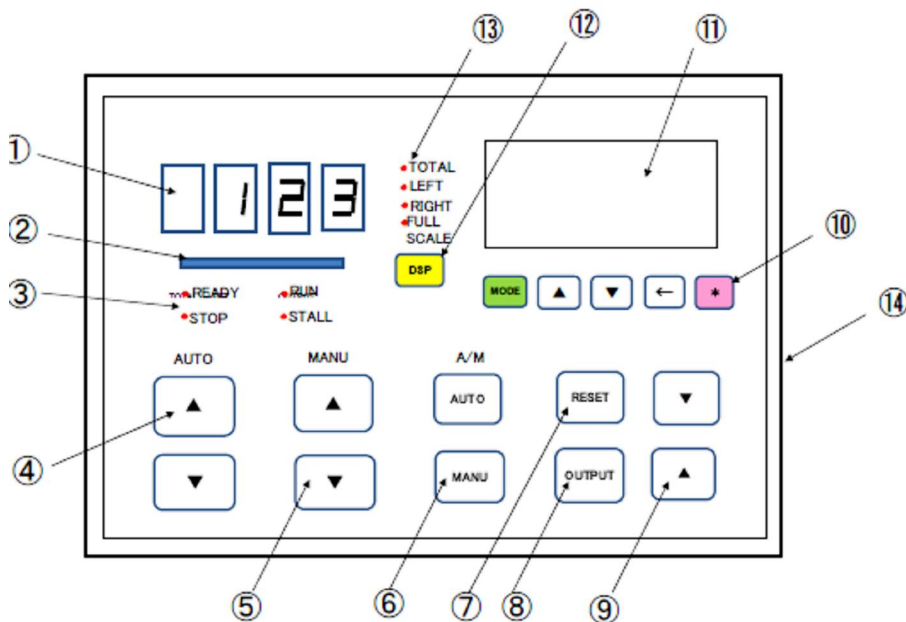
[57B]DANCER MOVE TIME: time dancer takes to move to target location center (sec)

[57C]E/A SCALE SET: coefficient of output to signal-air converter (%)



## 7. Operation

### 7-1. Features on Panel



(i) Number display: Detected tension or the like is displayed.

(ii) Bar display: Control output voltage or the like is displayed with 20 LEDs.

(iii) State display: Control state is displayed with four lamps.

READY: Ready state, RUN: Running state, STOP: Stop state, STALL: Stall state,

All lamps off: free state

(iv) AUTO key: Increases or decreases the automatic tension set value

Increases or decreases the value of [551]AUTO TENSION SET

(v) MANU key: Increases or decreases the manual tension set value

Increases or decreases the value of [552]MAN TENSION SET

(vi) A/M key: Toggles between automatic control and manual control

Changes values in [553]A/M CONTROL SET

(vii) RESET key: Releases the temporary halt state and/or resets taper behavior

(viii) 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.

(ix) TAPER key: With C500W, this increases or decreases the taper set value.

Increases or decreases the value in [554]TAPER LEVEL SET

With C500F, this increases or decreases the auxiliary output.

Increases or decreases the value in [221]AUX LEVEL SET

With C500D, this increases or decreases main roll circumference.

(x) Setting key: Changes the set value.

[▲][▼] key: Switches screens and increases or decreases the value

[←] key: Switches screens and moves to the next/previous digit

[\*] key: Switches screens and registers the setting

[MODE] key: No use

(xi) LCD display: Displays the set value or the like

(xii) DSP key: Changes the display content in the number display

(xiii) Content selection in the number display: Indicates the displayed content in the number display

TOTAL: Total tension display

LEFT: Left tension display

Right: Right tension display

FULL SCALE: Full-scale display of detector

(xiv) LCD contrast adjustment volume

Insert a thin minus-type driver from a small hole on the side face to adjust the volume

## 8. List of Items

### 8-1. Classification list of items

Large class			Middle class		
No.	Name	Content	No.	Name	Content
1	MONITOR	Monitor			
2	LEVEL SET	Control level set			
3	TIMER SET	Timer set			
4	TEN. METER SET Tension dancer adjustment		41	RIGHT ZERO ADJ	Right side tension zero adjustment
			42	LEFT ZERO ADJ	Left side tension zero adjustment
			43	RIGHT SCALE ADJ	Right side tension scale adjustment
			44	LEFT SCALE ADJ	Left side tension scale adjustment
			45	DP INITIALIZE	Initializes electronic volume
			46	AUTO SCALE SET	Sets auto scale level
			47	DANCER ZERO ADJ	Dancer zero adjustment
			48	DANCER SCALE ADJ	Dancer scale adjustment
			49	DAN. DP INITIALIZE	Initializes dancer electronic volume
5	SYSTEM SET System set		51	SYSTEM MONITOR	Displays system state
			52	PID CALC. DISPLAY	Displays PID calculation
			53	PID 1 SET	Sets PID control
			54	PIS 2 SET	Specially sets PID control
			55	SYSTEM LEVEL SET	Sets special items
			56	MODE SET	Sets system behavior
			57	TENSION METER	Sets tension meter behavior
			58	PA POW. GAIN SET	Sets application level to control output
			59	PB POW. GAIN SET	Sets application level to auxiliary output
			5A	DIAMETER SET	Sets winding diameter calculation item
			5B	LINE LEVL SET	Sets line speed item
6	HARDWARE CHECK Hardware check		61	OPERATE I/O CHECK	Checks operation parts
			62	TENSION I/O CHECK	Checks tension detection parts
			63	DIGITAL IN CHECK	Checks digital input signals
			64	POWER I/O CHECK	Checks power part
			65	DANCER I/O CHECK	Checks dancer part
			66	PULSE I/O CHECK	Checks pulse sensor part
			67	DIGITAL OUT CHK	Checks digital output signals

## 8-2. Setting Items

No.	Name	Content (unit)	Ref.	Min.	Max
211	AUX. LEVEL SET	Auxiliary output level set (%)	6-4	0	100
212	START LEVEL SET	Start level set (%)	6-2	0	100
213	STOP LEVEL SET	Stop level set (%)	6-2	0	300
214	MEMORY (STALL) SET	Memory level set (STALL level for Ri, Ro, Di, Do) (%)	6-3	0	200
215	INCH (IDOL) SET	Inching level set (IDOL level for Ri, Ro, Di, Do) (%)	6-2	0	100
216	CHANGE LEVEL SET	Axis switching level set (%)	6-2	0	100
217	READY LEVEL SET	Ready level set (%)	6-2	0	100
311	START TIMER SET	Start timer set (sec)	6-2	0	99.9
312	STOP TIMER SET	Stop timer set (sec)	6-2	0	99.9
461	AUTO SCALE LEVEL	Automatic scale adjustment target tension (by FS)	5-3	1	999
531	P GAIN SET	Proportional element gain set (%)	6-1	0	500
532	I GAIN SET	Integral element gain set (%)	6-1	0	500
533	I TIME SET	Integral time set (sec)	6-1	0.1	900.0
534	D GAIN SET	Differential gain set (%)	6-1	0	500
535	D TIME SET	Differential time set (sec)	6-1	0.1	100.0
536	ERROR GAIN SET	Deviation element gain set (%)	6-1	0	999
537	ACCEL LEVEL SET	Acceleration level set (%)	6-1	0	100
538	I ACCEL TIME SET	Integral time set at acceleration(sec)	6-1	0.1	900
541	OUTPUT BIAS SET	Output bias set (%)	6-1	0	100
542	DEAD ZONE SET	Dead zone set (FS±N%)	6-1	0.1	100
543	INC.I TIME SET	Integral time set at acceleration correction (sec)	6-1	0.1	900
544	DEC. I TIME SET	Integral time set at deceleration correction (sec)	6-1	0.1	900
545	MIRROR TIME SET	Change time set for automatic tension set value (sec)		0.1	99.9
551	AUTO TENSION SET	Automatic tension level set (by FS)	7-1	0	999
552	MANU TENSION SET	Manual tension level set (%)	7-1	0	100
553	A/M CONTROL SET	Control selection (0: automatic control, 1: manual control)	7-1	0	1
554	TAPER LEVEL SET	Taper level set (%)	7-1	-100	100
555	MIN. CHANGE SET	Axis switching minimum level (%)	6-2	0	100
556	PRESS PRISET	Initial value of applied pressure (%)	6-4	0	100
557	PRESS TAPER	Taper set of applied pressure (%)	6-4	0	100
561	BAR DISP. MODE	Bar display content set (0: Tension, 1: Control output, 2: Auxiliary output, 3: Control output voltage, 4: Auxiliary output voltage, 5: Dancer, (6: Separation of control output center [2], 7: Target tension set value) [3]	5-2	0	7
562	NUMBER DISP. MODE	Value display content set (above selection content)	5-2	0	5
563	SENSOR MODE	Detection style set for tension detector (0: Both-side	5-3	0	4

		holding, both side detection, 1: Both-side holding, one-side (right) detection, 2: Both-side holding, one-side (left) detection, 3: One-side (right) holding detection, 4: One-side (left) holding detection)			
564	MEMORY CONT. MODE	Memory control use (0: No, 1: Yes)	6-2	0	1
565	OUTPUT STYLE	Control output method selection by actuator 0 (0-24 V): use internal brake/clutch output 1 (4-20 mA): order to signal-air converter 2 (0-10 V): order to external brake amp	5-2	0	2
566	UNIT RESET!!	Initialize all set contents 1 (RESET): Enter the stipulated value for C500PFW as the initial value 2 (FILE→EE): Write file content in EEPROM [2] 3 (UPLOAD): Upgrade the version without changing the set content [3]	5-2	0	3
567	SECTION MODE	Select section to be used (0: C500P, 1: C500F, 2: C500W, 3: C500WD, 4: C500WP, 5: C500Ri, 6: C500Ro, 7: C500Di, 8: C500Do)	5-2	0	8
568	MANU KEY OPE. MODE	MANU key operation selection (0: manual tension setting, 1: start level, 2: auxiliary output, 3: ready level, 4: same time for MANU, READY and START Until Ver. 1.10, select writing timing to EEPROM at 2 <sup>nd</sup> digit. If the 2 <sup>nd</sup> digit is 0, register it at ON→OFF. If 2 <sup>nd</sup> digit is $\frac{1}{10}$ , press [*] key to register. With Ver. 1.05, be sure to take $\frac{1}{10}$ for 2 <sup>nd</sup> digit. [2] With Ver. 2.10 or newer, as the setting is done at [56B], no setting is done at 2 <sup>nd</sup> digit.	6-1	0	14
569	EXT8PIN MODE SET	Role of external terminal stand 15 pin [4] 0: Unused, 1: Allows automatic control (OFF: Manual, ON: Automatic), 2: Fixes control output (OFF: Normal control, ON: Fixed control) Level higher than STOP level is output to control output immediately before ON.	6-4	0	2
56A	AMT 0:KEY, 1-4: AD [3]	Sets the setting fields on panel by external analog signals 3 <sup>rd</sup> digit is for AUTO key, 2 <sup>nd</sup> digit for MANU key, 1 <sup>st</sup> digit for TAPER KEY 0: Setting by panel keys 1-4: Corresponds to analog CH1-4 (0-100% for 0-5V/fs)	5-11	0	444
56B	PANEL DATA SAVE [3]	Selects panel setting values writing timing to EEPROM 0: Register when run signal turns from ON to OFF 1: Press the [*] key to register.	5-2	0	1
571	TP CAP. FORM SET	Tension fractions (0: **, 1: **. *, 2: *. **)	5-3	0	2
572	TP CAPACITY	Tension detector full scale, abbreviated as FS	5-3	1	999
573	TEN. OUTPUT CHECK	Checks tension analog output voltage (%)	5-3	0	999

574	AVE. CYCLE SET	Tension display averaged cycles (CYCLE)	5-3	1	99
575	TP OUT AVE.CYCLE [1]	Tension analog output reply (CYCLE)	5-3	1	99
576	TENSION UNIT SET	Tension display unit (0: N, 1: x10 N, 2: KN)	5-3	0	2
577	DACH4321 OUTSET [4]	Selects content of analog output to CH1-4 (0: Average tension value, 1: Set tension value, 2: Set taper tension, 3: Output of applied pressure, 4: Tension raw signal, 5: Dancer raw signal [2], 6: Left average value, 7: Right average value [4])	5-3	0000 [4]	7777[ 4]
578	DACH4321 SCALE [4]	Analog output level (V)	5-3	0	10.00
579	TP GAIN SWITCH [1]	Tension amp gain switching (0: x1, 1: x3.4, 2: x5.6, 3:x7.9) 2 <sup>nd</sup> digit: Left side, 1 <sup>st</sup> digit: Right side	5-3	0	33
57A	TP LALS SELECT [1]	Type of tension detector (0: LA, 1: LS)	5-3	0	1
57B	DANCER MOVE TIME [1]	Time the dancer target location takes to move to center (sec)	5-7	1	99
57C	E/A SCALE SET [3]	Coefficient of output to signal-air converter Level to signal-air converter necessary to derive tension full scale	5-10	0.0	99.9
583	PA GAIN SET	Manual setting of load capacity of control output side (%)	5-4	0	100
593	PB GAIN SET	Manual setting of load capacity of auxiliary output side (%)	5-4	0	100
5A1	LINE PULSE	Number of input pulses while line moves 1 m (pulses/m)	5-5	0	99999
5A2	DIA AVE. CYCLE	Average cycles of measured diameter (cycle)	5-6	2	98
5A3	Z SIG COUNT	Number of pulses occurring while axis rotates once (cycle)	5-6	1	99
5A4	Z SIG CHECK	Number of checks of one-rotation pulse (cycle)	5-6	0	9
5A5	VALID DIA LEVEL	If the difference from previous time is under this value, it is valid. (%)	5-6	0	100
5A6	MAX DIA SET	Maximum diameter (mm)	6-4	0	9999
5A7	MIN. DIA SET	Minimum diameter (mm)	6-4	0	9999
5A8	CORNAR DIA SET	Corner radius that changes taper angle (mm)	6-4	0	999
5A9	CORNAR TAP. SET	Taper level at point diameter (%)	6-4	0	200.0
5AA	MAX DIA TAP. SET	Taper level at maximum diameter (%)	6-4	0	200.0
5B1	V/T FS GAIN	Control gain at maximum speed (%)	6-1	0	100.0
5B2	V/T ZS GAIN	Control gain at minimum speed (%)	6-1	0	100.0
5B3	DRIVER SCALE	Driver input at maximum speed [10 V is 100%] (%)	5-8	0	400.0
5B4	MAX LINE SPEED	Maximum line speed (m/min.)	5-5	0	999.9
5B5	SPEED AVE. COUNT	Line speed averaged cycle (cycle)	5-5	2	10
5B6	ACC. DEC. SPEED	Acceleration/deceleration value when acceleration/deceleration correction starts to function (m/m/s)	6-1	0	99.9
5B7	LINE STYLE SET	Specs of encoder (1 <sup>st</sup> digit, 0: Only A phase, 1: Both A and B phases ) (2 <sup>nd</sup> digit, 0: Open collector specs. 1: Line drive specs. )	5-5	0	11
5B8	DREW SCALE SET	Maximum ratio at draw control (x 0.1%)		0	19



623	RIGHT ZERO DP	Electronic volume location for right zero adjustment (div)	5-3	0	255
624	LEFT ZERO DP	Electronic volume location for left zero adjustment (div)	5-3	0	255
625	RIGHT SCALE DP	Electronic volume location for right scale adjustment (div)	5-3	0	255
626	LEFT SCALE DP	Electronic volume location for left scale adjustment (div)	5-3	0	255
627	RIGHT ZERO OFF.	Offset for right zero adjustment (div) [2]	5-3	-999	999
628	LEFT ZERO OFF.	Offset for left zero adjustment (div) [2]	5-3	-999	999
629	RIGHT SCALE OFF.	Offset for right scale adjustment (div) [2]	5-3	-999	999
62A	LEFT SCALE OFF.	Offset for left scale adjustment (div) [2]	5-3	-999	999
632	SS SIGNAL	Run signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
633	INCHING SIGNAL	Inching signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
634	INC. SPEED SIGNAL	Acceleration correction signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
635	DEC. SPEED SIGNAL	Deceleration correction signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
636	RESET SIGNAL	Reset signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
637	CHANGE SIGNAL	Axis switching signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
638	EXT8PIN SIGNAL	15 <sup>th</sup> terminal signal state display and forcible set (0: OFF, 1: ON, 2: external input)	5-9	0	2
639	DI8 SIGNAL [3]	Spare	5-9	0	2
652	DANCER ZERO DP	Electronic volume for dancer zero adjustment (div)	5-7	0	255
653	DANCER SCALE DP	Electronic volume for dancer zero adjustment (div)	5-7	0	255
672	SERVO ON SIGNAL [3]	Servo ON signal and forcible set (0: OFF, 1: ON, 2: Internal)	5-9	0	2
673	DO2 SIGNAL [3]	Spare	5-9	0	2
674	DO3 SIGNAL [3]	Spare	5-9	0	2
675	DO4 SIGNAL [3]	Spare	5-9	0	2
676	DO5 SIGNAL [3]	Spare	5-9	0	2
677	DO6 SIGNAL [3]	Spare	5-9	0	2
678	DO7 SIGNAL [3]	Spare	5-9	0	2
679	DO8 SIGNAL [3]	Spare	5-9	0	2

### 8-3. Display Items

No.	Name	Content (unit)	Ref.	Min.	Max.
111	TOTAL TENSION	Total tension display (by FS)		0	FS
112	RIGHT TENSION	Right tension display (by FS)		0	FS
113	LEFT TENSION	Left tension display (by FS)		0	FS
114	TAPER TENSION	Taper tension display (by FS)		0	FS
115	PA OUTPUT	PA control output display (%)		0	100

116	PB OUTPUT	PB auxiliary output display (%)		0	100
117	LINE SPEED	Line speed display (m/min.)	6-4	0	999.9
118	AVERAGE DIA	Averaged diameter display (mm)	6-5	0	9999
119	PRESS OUTPUT	Applied pressure output display (%)		0	99.9
511	PA VOLTAGE DISP.	Control output voltage display (V)		0.0	24.0
512	PA CURRENT DISP.	Control output current display (A)		0.0	4.0
513	PB VOLTAGE DISP.	Auxiliary output voltage display (V)		0.0	24.0
514	PB CURRENT DISP.	Auxiliary output current display (A)		0.0	4.0
515	REAL DIA	Pre-averaged diameter display (mm)	6-5	0	9999
516	DANCER POSITION	Dancer position display (%)		-999.9	999.9
517	AD CH1 AVE. [3]	CH1 external analog signal input level ( $\pm 10$ V/fs)		-999.9	999.9
518	AD CH2 AVE. [3]	CH2 external analog signal input level ( $\pm 10$ V/fs)		-999.9	999.9
519	AD CH3 AVE. [3]	CH3 external analog signal input level ( $\pm 10$ V/fs)		-999.9	999.9
51A	AD CH4 AVE. [3]	CH4 external analog signal input level ( $\pm 10$ V/fs)		-999.9	999.9
521	ERROR DISPLAY	PID deviation element display (%)		-100	100
522	P DISPLAY	Proportion element display (%)		-100	100
523	I DISPLAY	Integral element display (%)		-100	100
524	D DISPLAY	Differential element display (%)		-100	100
525	PID DISPLAY	PID addition element display		-100	100
526	V/T GAIN DISP	Gain of tension control by speed (%)		0	9999.9
527	PID*V DISP	Tension control level by speed (%)		0	9999.9
528	ACC. DEC. FLAG	Acceleration/deceleration of line speed (ACC. DEC. CONST)			
529	ACCELERATE DISP	Acceleration/deceleration of line speed/sec (m/min.)		0	9999.9
621	RIGHT TENSION	Right tension display (%)		0	100
622	LEFT TENSION	Left tension display (%)		0	100
631	DI CHK 87654321	All display of digital input signal (0: OFF, 1: ON)	5-9	0	***
651	DANCER POSITION	Hard check dancer location display (%)		-100.0	100.0
661	PL1 COUNTER CHK	Pulse count of counter 1 (x256P)		0	99999
662	PL2 COUNTER CHK	Pulse count of counter 2 (x256P)		0	99999
671	DO CHK 87654321	All display of digital output signal (0: OFF, 1: ON)	5-9	0	***

## 8-4. Operation Items

No.	Name	Content (unit)	Ref.	Min.	Max.
411	RZ START->PUSH*	Right side zero adjustment start order (Do by [*] key)	5-3		
412	RZ STOP->PUSH*	Right side zero adjustment end order (Do by [*] key)	5-3		
421	LZ START->PUSH*	Left side zero adjustment start order (Do by [*] key)	5-3		
422	LZ STOP->PUSH*	Left side zero adjustment end order (Do by [*] key)	5-3		
431	RS START->PUSH*	Right side scale adjustment start order (Do by [*] key)	5-3		
432	RS STOP->PUSH*	Right side scale adjustment end order (Do by [*] key)	5-3		
441	LS START->PUSH*	Right side scale adjustment start order (Do by [*] key)	5-3		
442	LS STOP->PUSH*	Right side scale adjustment end order (Do by [*] key)	5-3		
451	DP INIT PUSH*	Start initialization of electronic volume (Do by [*] key)	5-3		
452	DP INITIALIZE	End initialization of electronic volume	5-3		
471	DZ START->PUSH*	Start dancer zero adjustment (Do by [*] key)	5-7		
472	DZ STOP->PUSH*	End order of dancer zero adjustment (Do by [*] key)	5-7		
481	DS START->PUSH*	Start dancer scale adjustment (Do by [*] key)	5-7		
482	DS STOP->PUSH*	End order of dancer scale adjustment (Do by [*] key)	5-7		
491	DAN. DP INIT PUSH*	Start initialization of dancer electronic volume (Do by [*] key)	5-7		
492	DAN. DP INIT.	End initialization of dancer electronic volume	5-7		
581	PA START->PUSH*	Start control output side load capacity automatic adjustment (Do by [*] key)	5-4		
582	PA MEASURE	Result display of control output side load capacity automatic adjustment	5-4		
591	PB START->PUSH*	Start auxiliary output side load capacity automatic adjustment (Do by [*] key)	5-4		
592	PB MEASURE	Result display of auxiliary output side load capacity automatic adjustment	5-4		
611	OPERATE KEY	Function check of operation key			
612	SET KEY	Function check of setting key			
613	STATE LED LAMP	Function check of lamps on panel			
614	NUMBER DISPLAY	Function check of number display			
615	BAR DISPLAY	Function check of bar display			
616	SETTING DISPLAY	Function check of setting display			
641	ANALOG OUT CHECK	Analog voltage check			
642	PA OUTPUT CHECK	Control output voltage check			
643	PB OUTPUT CHECK	Auxiliary output voltage check			
644	A/D COVE. CHECK	AD converter check [2]			

## 9. 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	Stipulated value by model				Memo of difference
		C500PFW	C500Wd・Wp	C500Ri・Ro	C500Di・Do	
211	AUX. LEVEL SET	25	←	18	←	
212	START LEVEL SET	25	←	23	←	
213	STOP LEVEL SET	200	←	100	←	
214	MEMORY(STALL) SET	120	←	100	←	
215	INCHI.(IDOL) SET	10	←	18	←	
216	CHANGE LEVEL SET	30	←	0	←	
217	READY LEVEL SET	25	←	23	←	
311	START TIMER SET	2.0	←	2.0	←	
312	STOP TIMER SET	0.1	←	2.0	←	
461	AUTO SCALE LEVEL	FS	←	FS	←	
531	P GAIN SET	0	←	50	←	
532	I GAIN SET	100	←	100	←	
533	I TIME SET	300.0	←	100.0	←	
534	D GAIN SET	0	←	0	←	
535	D TIME SET	0.1	←	1.0	←	
536	ERROR GAIN SET	100	←	100	←	
537	ACCSEL LEVEL SET	10	←	5	←	
538	I ACCEL TIME SET	10.0	←	10.0	←	
541	OUTPUT BIAS SET	0	←	0	←	
542	DEAD ZOOM SET	0.5	←	0.5	←	
543	INC. I TIME SET	10.0	←	10.0	←	
544	DEC I. TIME SET	10.0	←	10.0	←	
545	MIRROR TIME SET	10.0	←	FS/2	←	
551	AUTO TENSION SET	FS/2	←	23	←	
552	MAN TENSION SET	23	←	0	←	
553	A/M CONTROL SET	0	←	0	←	
554	TAPER LEVEL SET	10	←	0	←	
555	MIN. CHANGE SET	63	←	0	←	
556	PRESS PRISET	0	80	0	←	
557	PRESS TAPER	0	50	0	←	

No	Name	C500PFW	C500Wd・Wp	C500Ri・Ro	C500Di・Do	Memo
561	BAR DISP. MODE	3	←	1	←	
562	NUMBER DISP. MODE	0	←	0	5	
563	SENSOR MODE	0	←	0	←	
564	MEMORY CONT. MODE	0	←	0	←	
565	OUTPUT STYLE	PFW:0 Pk:1 [4]	Wd,Wd:0	2	←	
566	UNIT RESET!!	0	←	0	←	
567	SECTION MODE	P,Pk:0 F:1 W:2	Wd:3 Wd:4	Ri:5 Ro:6	Di:7 Do:8	
568	MAN KEY OPE MODE	P,Pk:4 F,W:2	←	4	←	
569	EXT8PIN MODE SET	2	←	0	←	
56A	AMT 0 : KEY,1-4 : AD	0	←	0	0	
56B	PANEL DATA SAVE	0	←	0	0	
571	TP CAP. FORM SET	0	←	0	0	
572	TP CAPACITY	FS	←	FS	999	
573	TEN. OUTPUT CHECK	0	←	0	0	
574	AVE. CYCLE SET	90	←	90	90	
575	TP OUT AVE.CYCLE	10	←	10	10	
576	TENSION UNIT SET	0	←	0	0	
577	DACH4321 OUTSET [4]	0760	←	0760	0005	
578	DA CH4321 SCALE [4]	10.00	←	10.00	←	
579	TP GAIN SWITCH	LA:11 LS:00	←	LA:11 LS:00	←	
57A	TP LALS SELECT	0	←	0	←	
57B	DANCER MOVE TIME	10	←	10	10	
57C	E/A SCALE SET	99.9	←	99.9	99.9	
583	PA GAIN SET	100	←	100	←	
593	PB GAIN SET	100	←	100	←	
5A1	LINE PULSE	5000	←	5000	←	
5A2	DIA AVE. CYCLE	10	←	10	←	
5A3	Z SIG COUNT	1	←	1	←	
5A4	Z SIG CHECK	1	←	1	←	
5A5	VALID DIA LEVEL	10	←	10	←	
5A6	MAX DIA SET	1200	←	1200	←	
5A7	MIN. DIA SET	100	←	100	←	

No	Name	C500PFW	C500Wd・Wp	C500Ri・Ro	C500Di・Do	Memo
5A8	CORNAR DIA SET	300	←	300	←	
5A9	CORNAR TAP. SET	100.0	←	100.0	←	
5AA	MAX DIA TAP. SET	70.0	←	70.0	←	
5B1	V/T FS GAIN	10.0	←	10.0	←	
5B2	V/T ZS GAIN	10.0	←	10.0	←	
5B3	DRIVER SCALE	100.0	←	100.0	←	
5B4	MAX LINE SPEED	200.0	←	200.0	←	
5B5	SPEED AVE. COUNT	10	←	10	←	
5B6	ACC. DEC. SPEED	5.0	←	5.0	←	
5B7	LINE STYLE SET	0	0	0	←	
5B8	DREW SCALE SET	2	←	2	←	
623	RIGHT ZERO DP	128	←	128	←	
624	LEFT ZERO DP	128	←	128	←	
625	RIGHT SCALE DP	175	←	175	←	
626	LEFT SCALE DP	175	←	175	←	
627	RIGHT ZERO OFF.	0	←	0	←	
628	LEFT ZERO OFF.	0	←	0	←	
629	RIGHT SCALE OFF.	0	←	0	←	
62A	LEFT SCALE OFF.	0	←	0	←	
632	SS SIGNAL	2	←	2	←	
633	INCHING SIGNAL	2	←	2	←	
634	INC. SPEED SIGNAL	2	←	2	←	
635	DEC. SPEED SIGNAL	2	←	2	←	
636	RESET SIGNAL	2	←	2	←	
637	CHANGE SIGNAL	2	←	2	←	
638	EXT8PIN SIGNAL	2	←	2	←	
639	DI8 SIGNAL	2	←	2	←	
652	DANCER ZERO DP	128	128	128	128	
653	DANCER SCALE DP	128	128	128	128	
672	SERVO ON SIGNAL	2	←	2	←	
673	DO2 SIGNAL	2	←	2	←	
674	DO3 SIGNAL	2	←	2	←	
675	DO4 SIGNAL	2	←	2	←	
676	DO5 SIGNAL	2	←	2	←	
677	DO6 SIGNAL	2	←	2	←	
678	DO7 SIGNAL	2	←	2	←	
679	DO8 SIGNAL	2	←	2	←	

## 10. Emergency Handling

### 10-1. Error Display

#### (1) Display of file-related error

The settings are kept in the memory by several files.

If a file is lost for any reason, the following message is displayed.

In that case, enter a value again in each setting field on the right side.

The file will be created again and the error message will disappear.

Error message		Field to be set again									
ERROR	0000	211	212	213	214	215	216	217	311	312	451
ERROR	0001	452	461	491	492	531	532	533	534	535	536
ERROR	0002	537	538	539	541	542	534	544	545	546	547
ERROR	0003	548	549	551	552	553	554	555	556	557	558
ERROR	0004	559	561	562	563	564	565	566	567	568	569
ERROR	0005	56A	56B	56C	56D	56E	56F	571	572	573	574
ERROR	0006	575	576	577	578	579	57A	57B	57C	57D	57E
ERROR	0007	57F	581	582	583	591	592	593	5A1	5A2	5A3
ERROR	0008	5A4	5A5	5A6	5A7	5A8	5A9	5AA	5AB	5AC	5AD
ERROR	0009	5AE	5AF	5B1	5B2	5B3	5B4	5B5	5B6	5B7	5B8
ERROR	0010	5B9	5BA	5BB	5BC	5BD	5BE	5BF	611	612	613
ERROR	0011	614	615	616	621	622	623	624	625	626	627
ERROR	0012	628	629	62A	631	632	633	634	635	636	637
ERROR	0013	638	639	641	642	643	644	651	652	653	654
ERROR	0014	655	661	662	663	664	671	672	673	674	675
ERROR	0015	676	677	678	679	67A	67B	67C	67D	67E	67F

## 10-2. Replacement Procedures

In the case of malfunction of internal circuit or the like, a controller needs to be replaced.

Here are the work procedures.

### (1) How to handle the set values

1. In case a sheet [SD Memory Card Cover] is stuck on the upper surface of the controller

In removing the main controller body, peel off the sheet and take out the SD card kept inside. All the set values are memorized on the SD card.

Even if the main controller body is replaced, the same settings are restored by inserting the same SD card into a new controller body.

2. In case a sheet [SD Memory Card Cover] is not stuck on the upper surface of the controller

The SD card cannot be pulled out without removing a case.

After removing the main controller body, remove the case too to replace the SD card.

3. In case replacing the type that employs T-SH2MB for the CPU board with the type of C5CPU

Since the content of the SD card is different, simply replacing the cards will not make the system work.

Read out the set values and record them using [9. Table of Setting].

After replacing the main controller body, re-set the recorded values.

If the program version is different, new setting fields may have been added. In that case, use the initial values as they are.

### (2) How to replace the main controller body

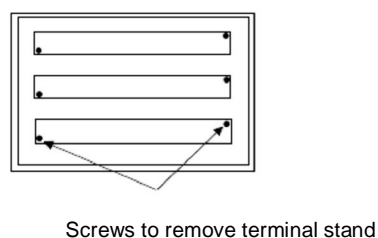
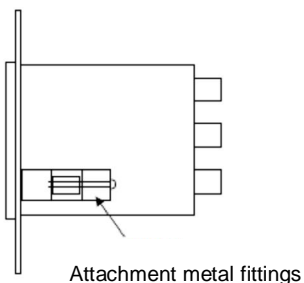
1. Turn off the power. It may be very dangerous if the replacement is done without turning off the power.

2. Remove terminal stands on the back side. Remove only the terminal stands that have wires inside.

Since the terminal stands are separable, they can be removed without taking out wires. Separate the terminal part by loosening screws on the upper right and lower left.

3. Take out the main body by removing attachment metal fittings.

4. Attach the new body in the reverse procedures.





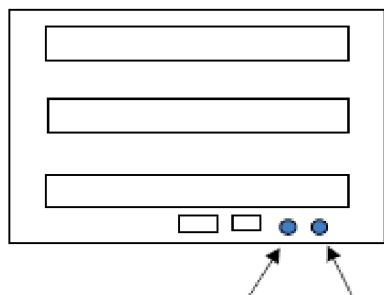
(3) Zero adjustment (Necessary only for LA-type tension detector)

The rough zero adjustment volume needs to be adjusted.

Display tensions of both right and left sides using [DSP] key on the panel.

Implement zero adjustment using the rough zero adjustment volume on the back side.

Backside



Left rough adjustment volume

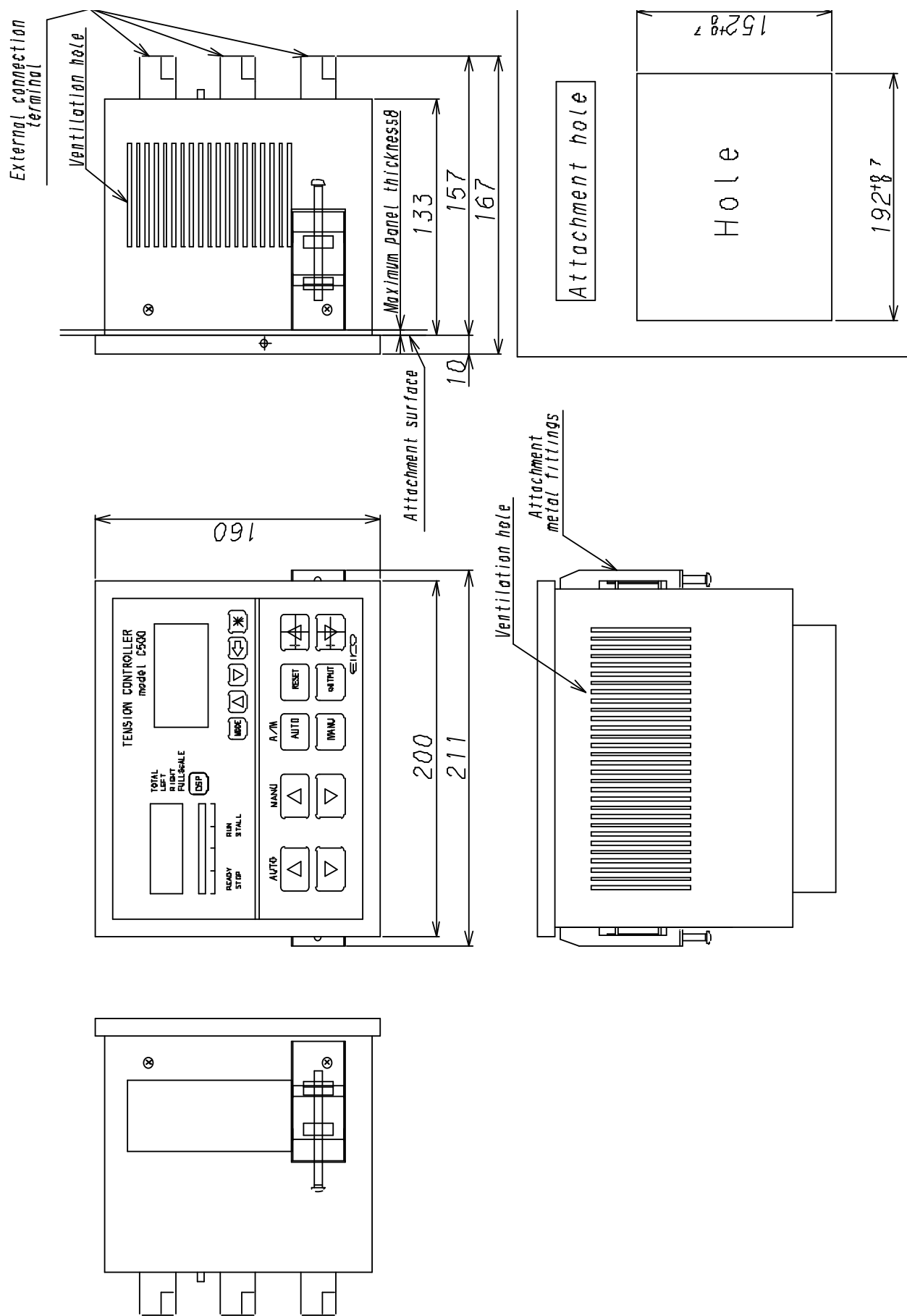
Right rough adjustment volume

# 11. Specifications

## 11-1. Specifications

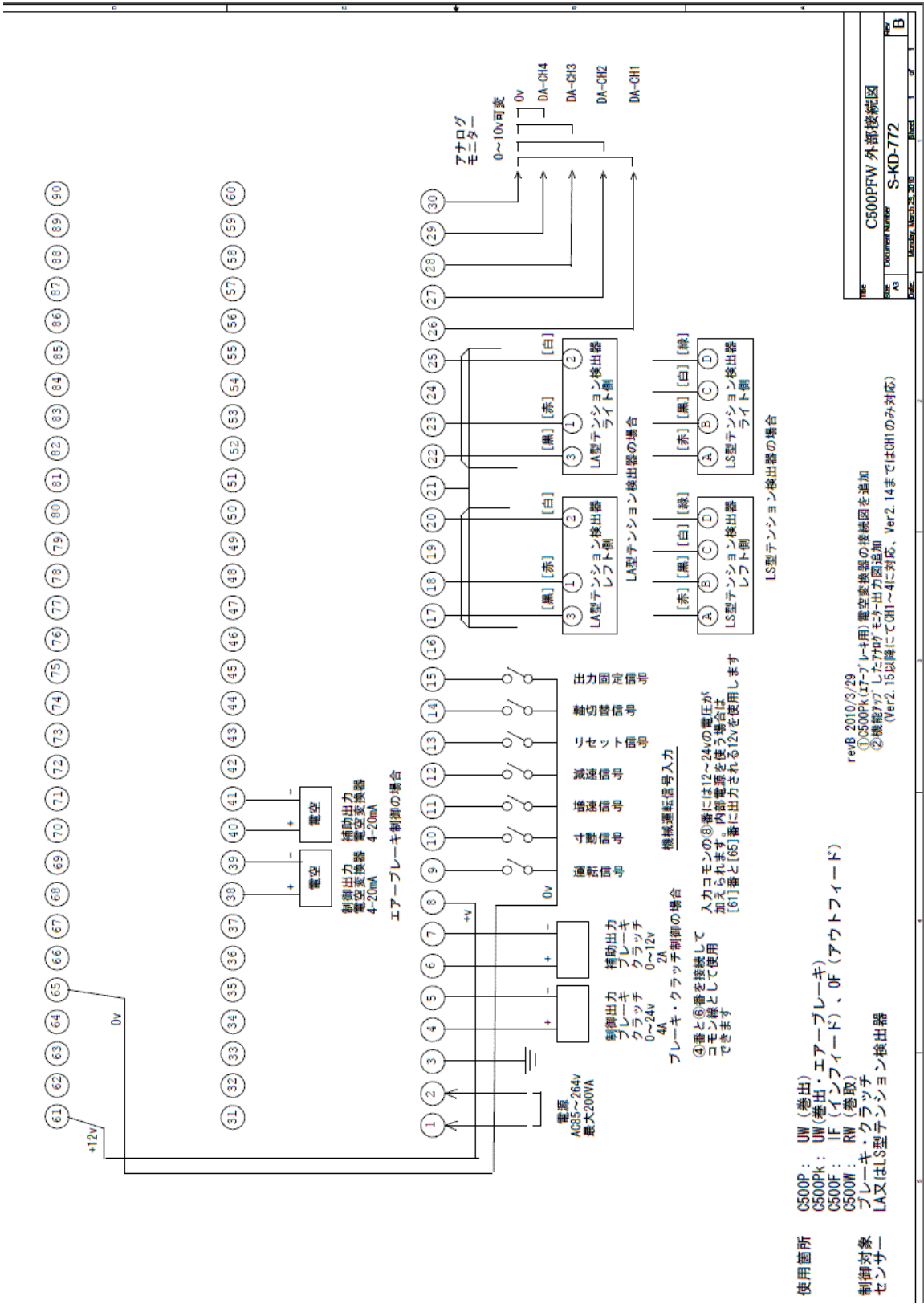
Control target	<ul style="list-style-type: none"> <li>• To deal with unwinding, feed and rewinding control using brake, clutch and signal-air converter</li> </ul>
	<ul style="list-style-type: none"> <li>• Feed part can handle control by a motor.</li> </ul>
	<ul style="list-style-type: none"> <li>• To deal with dancer control in addition to tension control</li> </ul>
Tension detector	<ul style="list-style-type: none"> <li>• Both LA and LS series tension pick-up usable</li> </ul>
	<ul style="list-style-type: none"> <li>• To deal with both-side holding both-side detection, both-side holding one-side detection and independent detection method</li> </ul>
	<ul style="list-style-type: none"> <li>• Features of automatic zero and automatic scale available</li> </ul>
	<ul style="list-style-type: none"> <li>• Independent analog output possible for total, right and left side</li> </ul>
Dancer potentiometer	<ul style="list-style-type: none"> <li>• Receiving signals from potentiometer for detecting dancer location</li> </ul>
	<ul style="list-style-type: none"> <li>• Automatic adjustment feature available</li> </ul>
	<ul style="list-style-type: none"> <li>• Analog output of dancer location possible</li> </ul>
Digital input	DC 24 V, 5 mA, source input x 8
Digital output	DC 24 V, 100 mA, synch output x 8
Analog input	DC voltage input: Voltage -10 V to + 10 V (input impedance 100 k $\Omega$ ) x 6
	Common, power for volume
Power output	For control output :0-24 V (maximum 4 A), for auxiliary output: 0-12 V (maximum 2 A) x 2
4-20 mA output	4-20 mA (maximum 10 V) x 2
Analog output	-10 V to +10 V (max. 10 mA) or -1 mA to +1 mA (max. $\pm 10$ V) switching x 4
	-10 V to +10 V (max. 10 mA) power output and same signal source as 4-20 mA output x 4
Pulse input	Open collector: A phase, B phase, Z phase input x 1
	Line drive: A phase, B phase, Z phase input x 1
	Rotation sensor A-axis, B-axis input x 1
Pulse output	Open collector output CW, CCW each 10 mA x 1
Power	Voltage AC 100-240 V, 50/60 Hz, max. 200 VA
Ambient temperature	0-50°C
Weight	3.5 kg
Size (W x H X D)	200 x 160 x 143 mm
Size of attachment hole (W x H)	192 x 152 mm

11-2. External Dimension

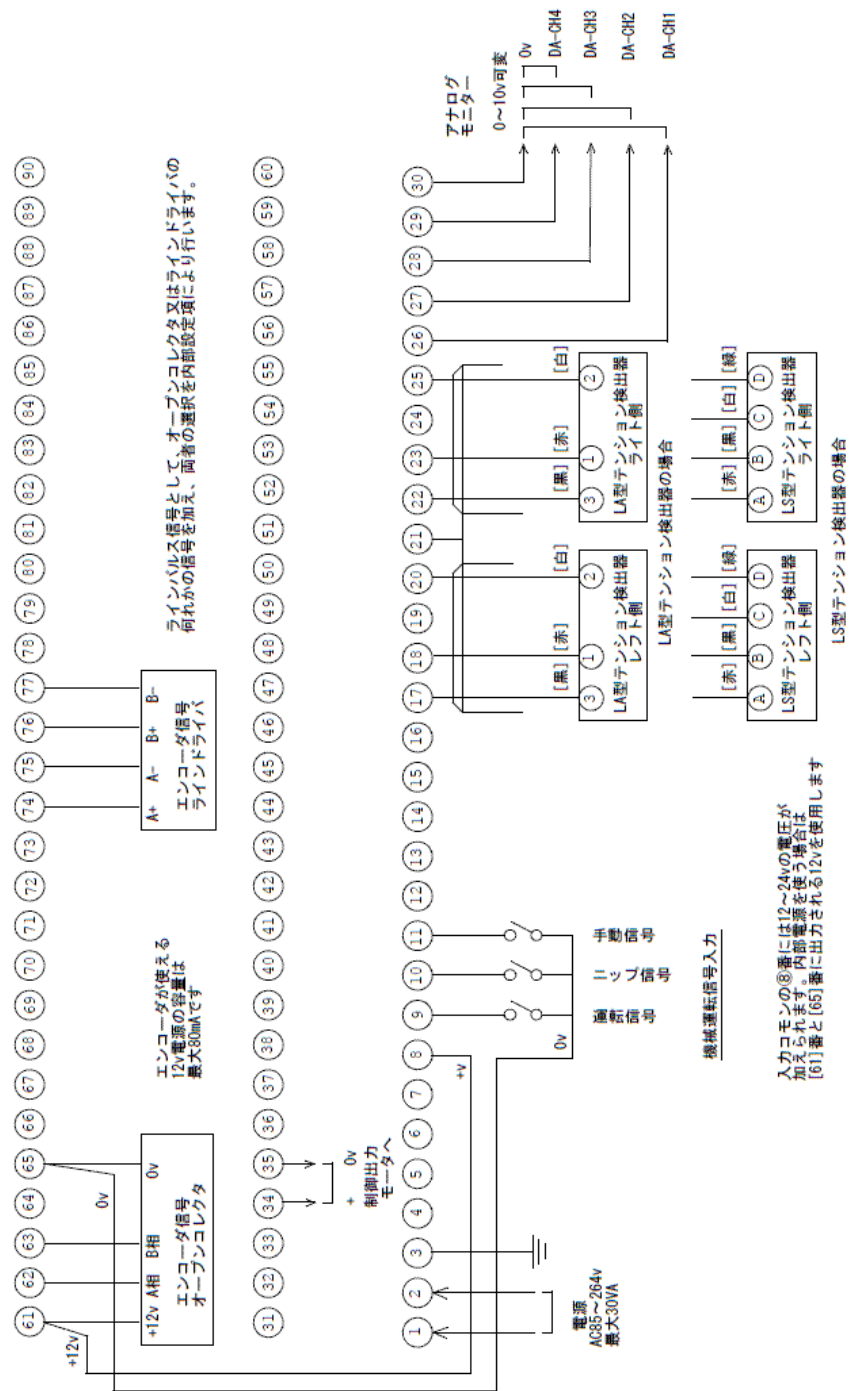


11-3. Wiring Examples for Each Model

(1) C500P, C500Pk, C500F, C500W



(2) C500Ri, C500Ro

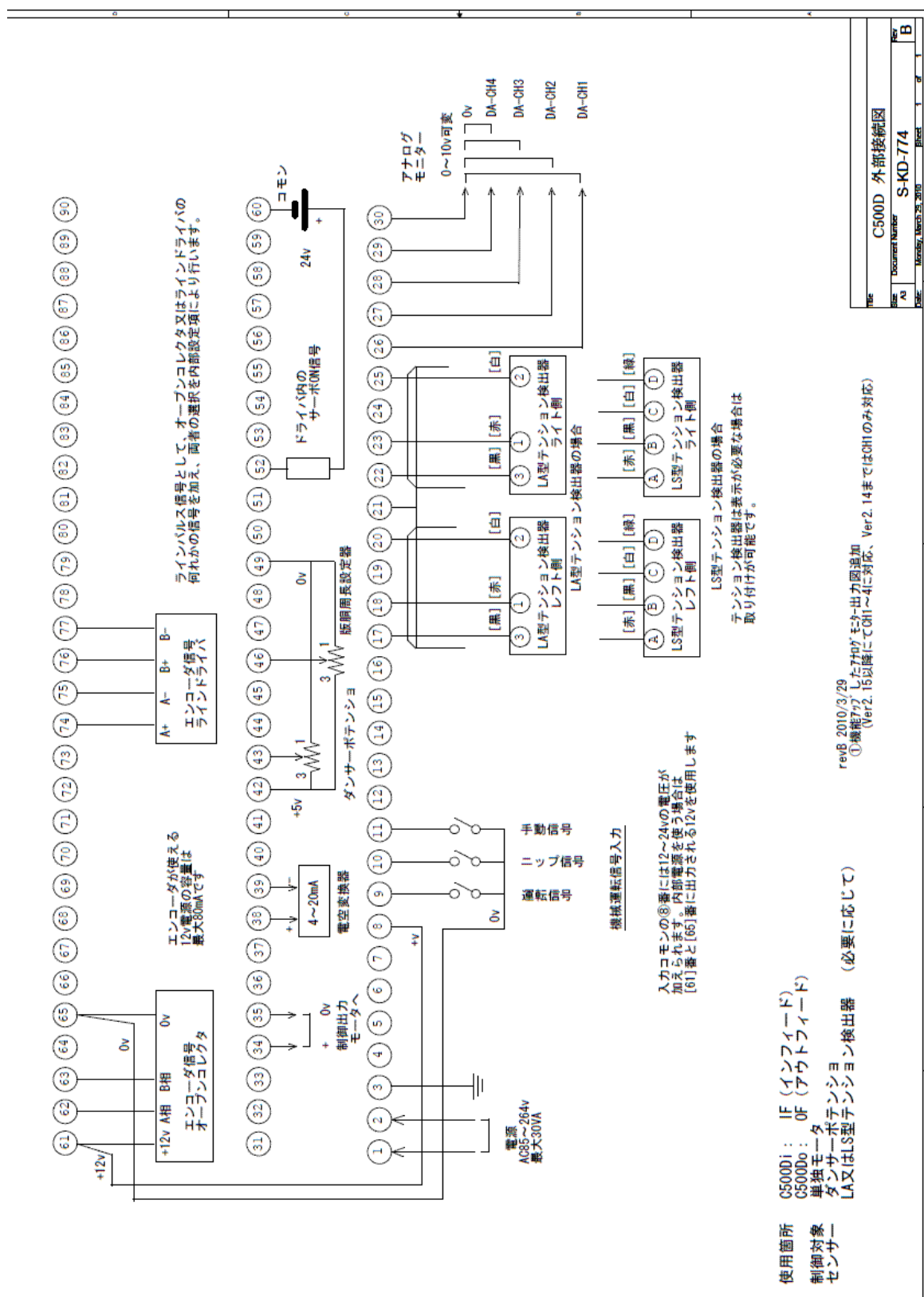


使用箇所 C500Ri : IF (インフィード)  
C500Ro : OF (アウトフィード)  
制御対象 単独モータ  
センサー LA又はS型テンション検出器

revB 2010/3/29  
①機能7777 した7777 モニタ出力図追加  
(Ver2.15以降にてCH1~4に対応、Ver2.14まではCH1のみ対応)

C500R 外部接続図	
Docu. No.	S-KD-773
Rev.	B
Issue	1
Model	Ver2.15, 2010

(3) C500Di, C500Do [1]



## 12. Revision History

### 12-1. Program Change

#### Ver. 1.03

- Added the feed control by motor + dancer.
- Dealt with LS-type tension detector.
- Changed the setting field of [575]T/M AUTO. MAN SET and added [579]TP GAIN SWITCH, [57A]TP LALS SELECT, AND [57B]DANCER MOVE TIME.

#### Ver. 1.05

- Added [Press ENTER (\*) key on panel to register] to the timing of registering the set values changed by operation switches on the panel. If registration is done at the timing of the run signal turning ON to OFF, files may be broken when the power is turned off simultaneously with the registration. The addition has been made to deal with it.

#### Ver. 1.07

- To enhance stability, the registration place of the set values changed by operation switches on the panel has been changed from file to EEPROM.
- A measure has been taken to prevent corrupt letters that may occur due to poor handling of minus values in file registration.

#### Ver. 1.08

- Since there was no feature of copying from file to EEPROM, 2 (FIL->EEP) has been added to [566].
- Display of center allocation of control output has been added to [561].

#### Ver. 1.09

- A bug in which output is not made for the minus side when only the control output is used with C500R was found. The bug has been fixed.

#### Ver. 1.10

- A bug in which after confirming the setting by pressing MANU key after turning on the power, re-pressing the key causes the value to get bigger was found. The bug has been fixed.
- By changing the attached letter to a lower case like %~~h~~ of C500WD and %~~p~~ of C500WP, pulse winding diameter detection and potentiometer winding diameter detection have been made the type of rewinding type.

#### Ver. 2.10

- In changing CPU board from T-SH2MB to C5CPU, since there are so many changes in the program, the version number has been greatly changed from Ver. 1.10 to Ver. 2.10.
- By adding the main roll circumference setting for dancer control, now it is possible to change the set values by TAPER key on the panel.
- The feature of %~~u~~ UPLOAD+ has been added so that a new file can be created from an old file when the number of setting fields increase due to the version renewal.
- [654]E/A SCALE SET has been added so that the output to signal-air converter for dancer can be set

by AUTO key on the panel in dancer control.

Ver. 2.11

- Capacity of the setting file has been increased and [654]E/A SCALE SET has been moved to [57C] field that can be easily understood.

Ver. 2.12

- [56A]AMT 0:KEY, 1-4: AD has been added so that the settings by panel keys can be changed by external analog signals.
- Since there was no display of input level of external analog signals, [517]AD CH1 AVE, [518], [519] and [51A] have been added.

Ver. 2.13

- The digital output feature has been added and the servo ON signal has been assigned to DO1. [671]DO CHK 87654321-[679]DO8 SIGNAL have been installed.
- [639]DI8 SIGNAL has been added to the digital input feature.

Ver. 2.14

- Control output by center zero and the automatic tension set value have been added to the bar display [561] and value display [562].

Ver. 2.15

- Channel that outputs analog output like tension has been expanded from only CH1 to CH1-CH4. [577]DA-CH1 OUTSET has been changed to [577]DA-CH4321 OUTSET, which selects output content of CH1-CH4. 6: left (left average) and 7: right (right average) have been added to the selection contents. In the past, values averaged by cycles of [574]AVE CYCLE SET were output for 0:ten.ave. Those values have been changed to values averaged by [575]TP OUTAVE.CYCLE. The same thing goes for 6: left and 7: right. Only the name of [578]DA-CH1 SCALE has been changed to [578]DA-CH4321 SCALE.



## 12-2. Hardware Changes

### (1) Board

CPU board has been changed from T-SH2MB to C5CPU.

### (2) CPLD

C5CNT Ver. 3.00

- Noise cancel feature has been added to line pulse input.

C5OPE Ver. 3.00

- Key taking-in part has been improved to prevent unsteady continuous key taking-in.

C5CPU Ver. 3.00

- Initial version

## 12-3. Operation Manual Changes

### (1) SM-C500-B, [1] mark in the book

1. Added description of adjustment and run items
2. Changes due to the program upgrade from Ver. 1.00 to Ver. 1.03

### (2) SM-C500-C, [2] mark in the book

1. Error correction in Table of Set Values
2. Added a page of ~~%5.~~ Set Value Memo+
3. Changes due to the program upgrade from Ver. 1.03 to Ver. 1.10

### (3) SM-C500-D, [3] mark in the book

1. Changed from horizontal writing to vertical writing
2. ~~%Setting+~~ and ~~%Adjustment+~~ have been consolidated to ~~%5.~~ Adjustment+ ~~%6.~~ Operation+ that simply explains panel operation has been newly added.
3. Explanation has been added to the run sequence part.
4. Changes due to the program upgrade from Ver. 1.10 to Ver. 2.14

### (4) SM-C500-E, [4] mark in the book

1. In unwinding, the signal-air converter used as actuator has been clarified as a model C500Pk.
2. Configuration example of differential gear has been added to feed.
3. Changes due to the program upgrade from Ver. 2.14 to Ver. 2.15
4. Added some explanation
  - Supplemented contents of [5. Adjustment], [10. Emergency Handling] and [12. Revision History]
5. Misprint correction
  - In ~~%5-3~~ Adjustment of Tension Detector-(1) Setting example+, ~~%Total output 2+~~ has been deleted and changed to ~~%Tension output+~~
  - In ~~%5-69~~EXT8PIN MODE SET+, ~~%8~~ Pin+ was wrong and has been corrected to 15 Pin.