# Tension Controller – Feedback System

TC-608P Control Panel

(In the Form of a Load Cell)
(Built-In communications Function)

User Manual

TENSION CONTROLLER

⏚ RUN

⏚ OUT

⏚ ERR

⏚ CATCH

- +

MODE ▲ ▼ SET

⏚ LINK

TC-608P

Contents

1. Foreword

Many thanks for choosing TC-608P Feedback-System Tension Controller (hereinafter referred to as 608P.)

Read this user manual before using to take full advantage of 608P and for users' safety. The manual tells you how to do the wiring, set parameters and detect abnormalities and deal with them. Keep the manual for future reference.

Contact us in the event of questions to which answers cannot be found in the manual. We will do our utmost to offer you satisfactory solutions. Your comments are welcome anytime.

2. Attention:

· No wiring and removing/installing connector of 608P when the power is on.

· Terminals of 608P are contacts of feedback and output signals. Do not use them for other purposes.

· Do not connect the output terminal of 608P to AC power or allow alien voltage to enter.

· Do not remove the casing and conduct pressure-endurance tests on components.

· Make sure the power input into terminals 1 and 2 to be AC 220V ±10%.

3. Principles

The controller sets the material put-in and roll-up and the tension value required according to the actual production conditions. 608H adjusts the output command after comparing the settings with the value detected and returned by the Load Cell in order to change the braking force or the roll-up torque, automatically setting the actual tension to the preset tension, a high-precision tension control system.

4. Features:

· high precision, high reliability

· tension value may be set at: kg / N / LB by the user

· may be directly connected to LOAD CELL for input; digitized zeroing and rate adjustment features for ease of operation.

· digital design, unchanged characteristic

· humanistic design, easy to operate

· output command multi-functional display including preset and actual tension values

· possess the features of accelerating and decelerating master speed and augmentative delayed time output

· parameter power outage memory function

· able to initiate augmentative function, able to compensate static friction arising from initiating machine

· tension reduction function at shutdown eliminates excessive tension

5. Working Diagram

· Put-in

Motor

Air
Pressure
Brake

Magnetic
Powder
Brake

Load cell

INV.

E/P

VA-816

Electro
Pneumatic

INV.

TC-608P

· Roll-up

Load cell

INV.

INV.

Dc-Driver

VA-816

Oil Pressure Motor
Driver
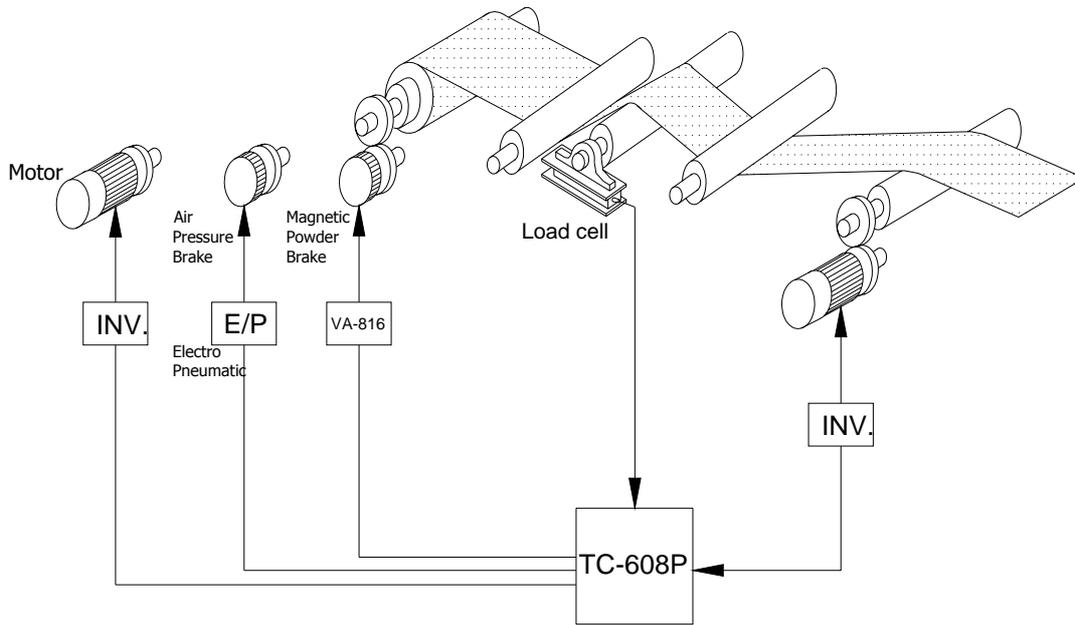
TC-608P
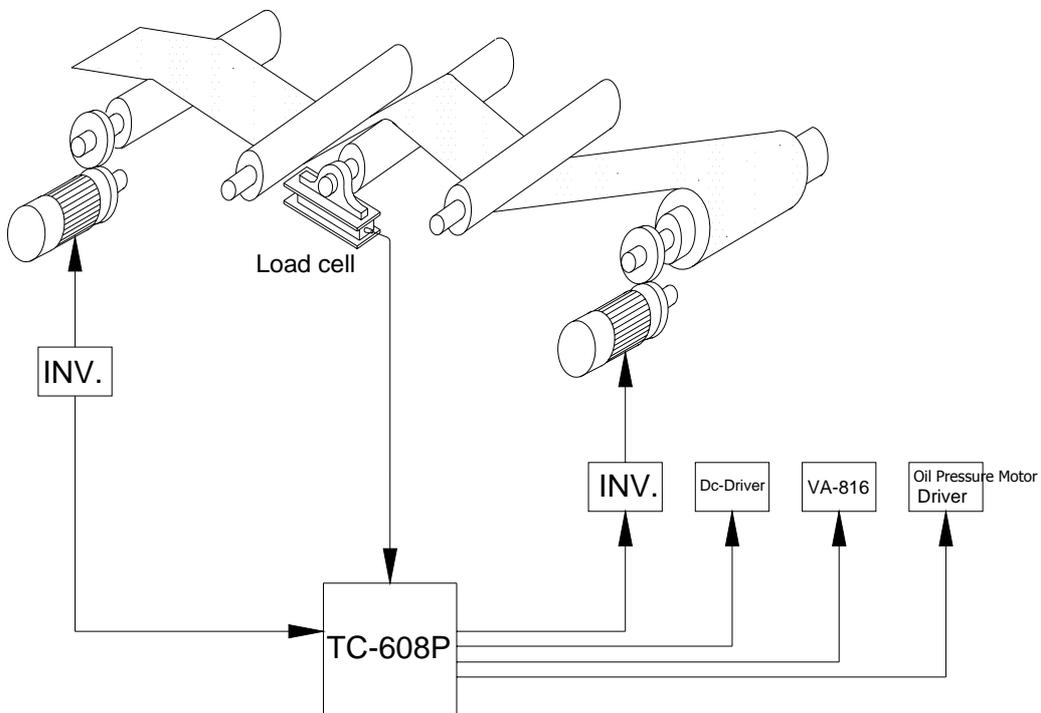
6. Inspection of Products

· Exterior Dimensions

TENSION CONTROLLER

RUN
OUT
ERR
CATCH

8888 KG
8888 KG

MODE ▲ ▼ SET
LINK
TC-608P

· Back Panel Pins

Pins 12-24

Back Cover

Pins 1-3

Pins 4-11
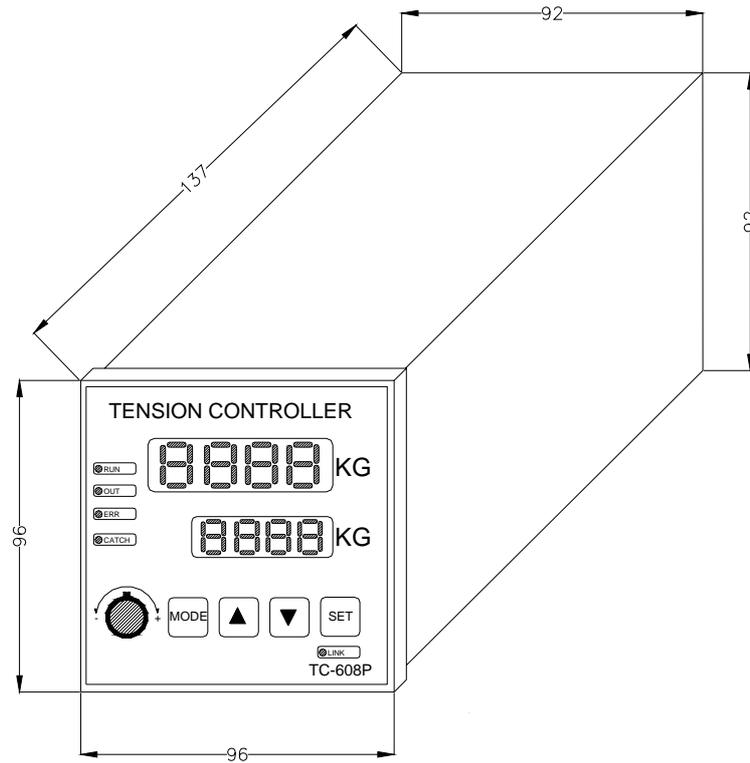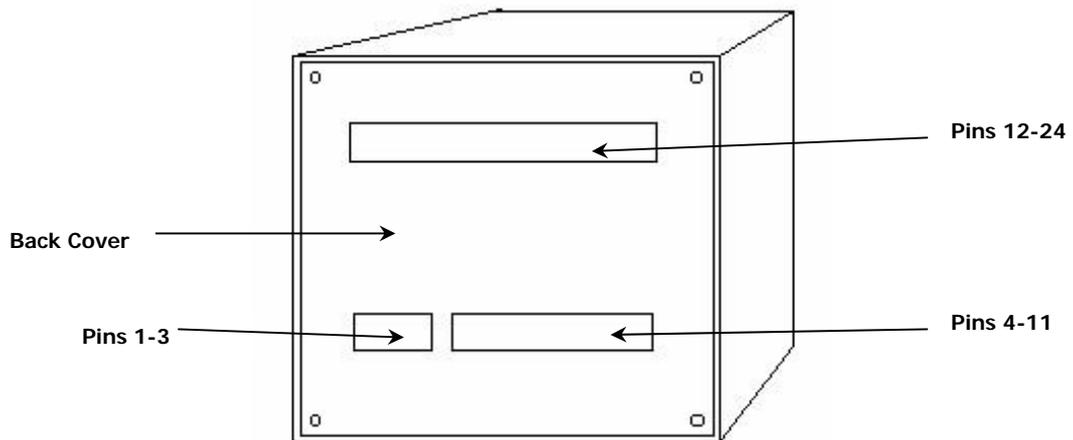
Casing Dimensions: 96mm X 96 mm
Opening Dimensions: 92 mm X 92 mm

■ Control Panel and Operating Directions

TENSION CONTROLLER

Operating Status — ⊘RUN

Relay Output — ⊘OUT

Abnormal Status — ⊘ERR

Tracking Complete — ⊘CATCH

Manual VR Knob — MODE ▲ ▼ SET

⊘LINK

TC-608P

KG — Tension Display

KG — Setting Display

Communication Status

Change Parameter

Increase

Decrease
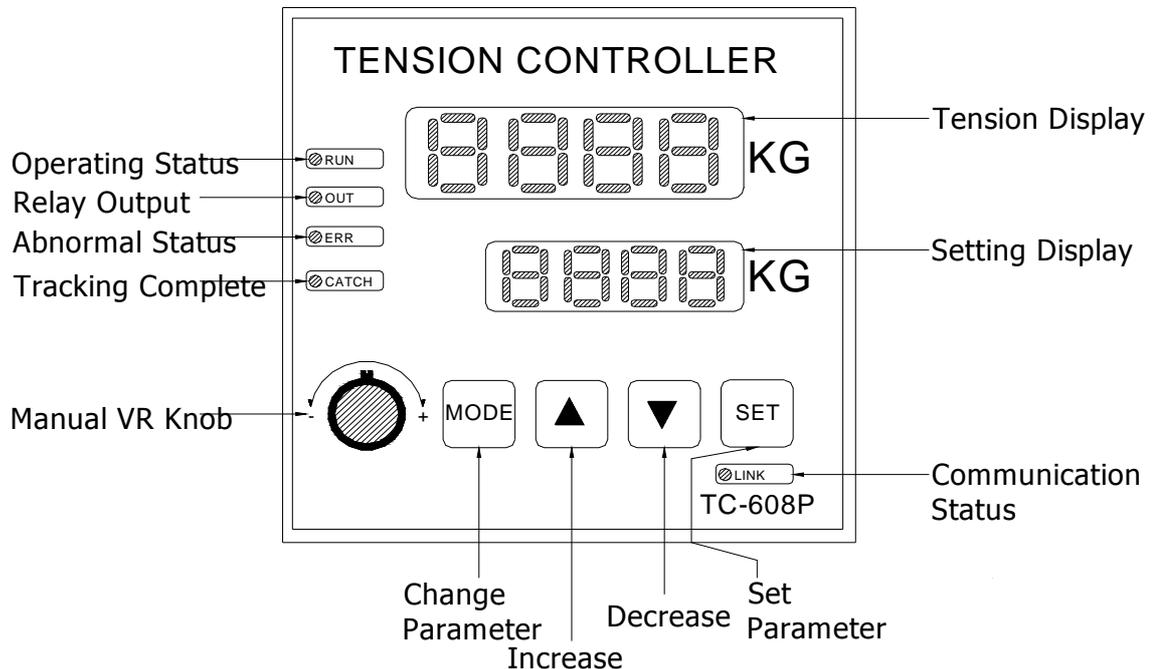
Set Parameter

■ LED Signals:

|		
Upper-row LED display		Specifies display of feedback value or output percentage through parameter 18 while the display is in regular display mode.
Lower-row LED display		Displays tension setting while the display is in regular display mode.
RUN		When the controller stops working, RUN goes off. When the controller begins working, RUN continues outputting.
OUT		When relaying output.
CATCH		When the INDEX feature is turned on, if INDEX error is within preset range (Pr.02), this light is lit to indicate completion of tracking.
ERR		When the system detects abnormalities, this light is lit.
LINK (Optional)		When RS-485 has external connection, each time a communication is completed, LINK flashes one time.

■ **Setting Parameters (Using press keys):**

| MODE | ▲ | ▼ | SET |
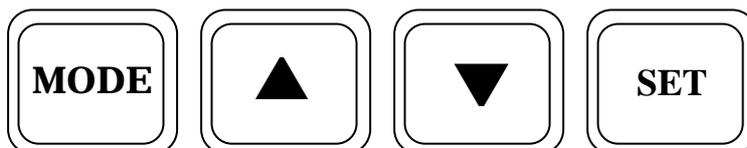
(1) **<MODE>**:
The key is used to enter parameter display mode or return to regular display mode. Press once to enter parameter display mode. Press again to return to regular display mode. When inputting parameters, the Pr XX displayed at the bottom is parameter number, while the content of the parameter is displayed at the top.

(2) **<SET>**:
This key serves three purposes. When pressing <MODE> and <SET>, the Pr XX displayed at the bottom begins flashing, indicating entry into parameter change mode.
After parameter change is completed, press <SET> to store changed value in the controller. If <SET> is not pressed before pressing <MODE> to exit, the parameter will remain unchanged. When in regular display mode, <SET> may be used to remove error status.

(3) **<▲>**:
After entry into parameter display mode, <▲> may be used to add one to parameter number. After entry into parameter change mode, <▲> may be used on <Lower-row Display Flash> to add one to parameter value.

(4) **<▼>**:
When in parameter display mode, <▼> may be used to deduct one from parameter number. When in parameter change mode, <▼> may be used on < Lower-row Display Flash > to deduct one from parameter value.

7. Operating TC-608H:
Enter corresponding values used by the system's Load Cell into internal parameters of 608H (see "Parameters" for details.)
Press   or   on the control panel and enter the tension value needed. Or, set to "Manual" and use the control panel knob to enter the tension needed.
(See "Terminals" and "Parameters" for applicable contacts' functions and parameters.)

8. Electric Dimensions and Use Environment for Installation:

Electric Dimensions and Standard Dimensions

	Voltage	AC 220 V ± 10%50/60HZ
Electric Dimensions	1 set of LOAD CELL input	0-4 mV input, floating zeroing and magnifying
	2 sets of AI (optional)	DC 0-10V input, 12 bit resolution, input impedance 200K
	1 set of AO (1 set optional)	DC 0-10V output, max 10mA, 12 bit resolution
	4 sets of DI	Dry contact or crystal method mode (Low Active)
	2 sets of RELAY DO	Relay A contact 5A 250VAC/30VDC
	RS-485 MODBUS communication (optional)	Communication adopts RS-485 interface MODBUS RTU protocol, output and read may be activated, revised, and specified through communication.
Standard Dimensions	Panel dimensions	96mmx96mm
	Opening dimensions	92mmx92mm
	Installation depth	150mm
	Weight	1kg and under

Use Environment for Installation

	Site of use	Indoors; no corrosive gases, fluids, and dust
Environment	Operating temperature	0℃ to 60℃
	Storing temperature	0℃ to 60℃
	Humidity of surrounding environment	90% RH and under

9. Wiring

■ Terminal code numbers and pins

Serial #	Name	Function	Description
1	AC1	AC 220V	Power input (±10% error)
2	AC2	AC 220V	Power input (±10% error)
3	FG	FG	Power grounding
4	V+	LOAD CELL +10V	Connect LOAD CELL reference power supply + input
5	V-	LOAD CELL 0V	Connect LOAD CELL reference power supply - input
6	S+	LOAD CELL signal+	Connect LAOD CELL signal output +
7	S-	LOAD CELL signal-	Connect LAOD CELL signal output -
8	RY1C	Relay1 COM contact	

| Serial #	Name	Function	Description
9	RY1A	Relay1 A contact	Parameter designation 5A AC250/DC35V
10	RY2C	Relay2 COM contact	
11	RY2A	Relay2 A contact	Parameter designation 5A AC250/DC35V
12	AI1	Analog input 0-10V	Analog external feedback input
13	AI2	Analog input 0-10V	Master speed input
14	ACOM	ACOM	Analog COMMON contact
15	+12V	DC 12V	Use of +12V power output analog setting
16	AOUT1	Analog output 1	Analog command output 0-10V
17	AOUT2	Reserved	
18	INP1	External input contact 1	Operating started
19	INP2	External input contact 2	Tension reversion (manual/automatic)
20	INP3	External input contact 3	G1 plus % compensation
21	INP4	External input contact 4	G2 minus % compensation
22	ICOM	Input contact COM	Digital input contact COMMON
23	485+	RS - 485 +	RS – 485 communication
24	485 -	RS - 485 -	RS – 485 communication

Attention: Input contact is a dry contact or NPN contact

Configuration of terminals:

Wiring of terminals:

0−10V master speed input
0−10V analog input
0−10V analog output
communication connection

| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| A11 | A12 | ACOM | +12V | AOUT1 | AOUT2 | INP1 | INP2 | INP3 | INP4 | ICOM | 485+ | 485− |

DC12V

START OFFSET G1+% G1−% COM

variable resistor or external analog signals

VR

Driver

master motor

P.C, PLC, human machine

roll-up, put-in motors

Driver

Cylinder

electro-pneumatic transducer

magnetic particle brake, clutch

magnetic particle driver

AC220V

| AC1 | AC2 | FG | V+ | V− | S+ | S− | RY1C | RY1A | RY2C | RY2A |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

Relay-1   Relay-2

Loadcell

tension feedback signals

10. Parameters

Pr · 01   Setting password

Description: Parameter password. The setting needs to be the same as 1234 before other parameters can be set.

Range: 0-9999

Factory setting: 1234

Pr · 02   Setting maximum value

Description: Setting the maximum value when adjusting tension setting on control panel (lower row).

Range: 0.1-999.9

Factory setting: 100.0

Pr · 03   Setting minimum value

Description: Setting the minimum value when adjusting tension setting on control panel (lower row).

Range: 0.1-999.9

Factory setting: 100

Pr・04 Feedback upper limit

Description: When the feedback is greater than the setting, a feedback upper limit will be set, which can be used in conjunction with RELAY output.

Range: 0-999.9

Factory setting: 90.0

Pr・05 Feedback lower limit

Description: When the feedback is greater than the setting, a feedback lower limit will be set, which can be used in conjunction with RELAY output.

Range: -100.0-999.9

Factory setting: 0.1

Pr・06 Insensitive area

Description: When the error between the feedback and the setting falls below the parameter's setting, corrective computation will terminate in order to avoid the instability caused by a minor error.

Range: 0-25.5

Factory setting: 0.3

Pr.07 Basic output voltage

Description: When input contact INP2 is ON, tension output will revert to basic torque output. If Pr.36 (source of basic torque) is set at 0 (designated by Pr.07), the parameter is able to set basic torque output value.

Range: 0-10.00 (V)

Factory setting: 1.00 (V)

Pr・08 Startup augmentation (%)

Description: When INP1 operation is started, tension output will compensate startup augmentation first with compensation time set by Pr.09.

Range: 0-255 (%)

Factory setting: 20 (%)

Pr・09 Startup time

Description: When INP1 operation is started, tension starts augmentation compensation time value. Computation begins from the instant INP1 is ON.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

| **Pr · 10** | Axis acceleration augmentation (%) |

Description: When AI2 axis speed input detects acceleration, tension output will compensate for acceleration augmentation.

Range: 0-255 (%)

Factory setting: 20 (%)

| **Pr · 11** | Axis acceleration augmentation delay time |

Description: Once axis acceleration is over, delay time of acceleration augmentation may be set by this parameter.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

| **Pr · 12** | Axis deceleration augmentation (%) |

Description: When AI2 axis speed input detects deceleration, tension output will compensate for deceleration augmentation.

Range: 0-255 (%)

Factory setting: 20 (%)

| **Pr · 13** | Axis deceleration augmentation delay time |

Description: When axis deceleration is over, delay time of deceleration augmentation may be set by this parameter.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

| **Pr · 14** | Terminating augmentation (%) |

Description: When INP1 operation is OFF, tension output will compensate for the termination.

Range: 0-255 (%)

Factory setting: 20 (%)

| **Pr · 15** | Terminating movement time |

Description: When INP1 is OFF, tension terminates augmentation compensation time. The time begins from the moment INP1 is OFF.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

| **Pr · 16** | G1 contact augmentation value (+%) |

Description: When INP3 G1 compensation setting is ON, tension output will compensate G1 augmentation. The value is fixed at adding % augmentation.

Range: 0-255 (%)

Factory setting: 20 (%)

Pr·17 | G1 augmentation delay time

Description: When INP3 G1 is OFF, this parameter is able to set delay termination
compensation time.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

Pr·18 | G2 contact augmentation value (-%)

Description: When INP4 G2 compensation setting is ON, tension output will compensate for
G2 augmentation. This value is fixed at deducting % augmentation.

Range: 0-255 (%)

Factory setting: 20 (%)

Pr·19 | G2 augmentation delay time

Description: When INP4 G2 is OFF, this parameter is able to set delay termination
compensation time.

Range: 0-25.5 (seconds)

Factory setting: 0.5 (seconds)

Pr·20 | Output minimum torque voltage

Description: Regardless of the results of output computation, output shall not fall below this
preset voltage.

Range: 0-10.00 (V)

Factory setting: 1.00 (V)

Pr·21 | Output maximum torque voltage

Description: Regardless of the results of output computation, output shall not exceed this
preset voltage.

Range: 0-10.00 (V)

Factory setting: 10.00 (V)

Pr·22 | Selecting work mode

Description: Compensation direction varies as different work modes are selected.

0 = Put-in ; 1 = Roll-up

Range: 0-1

Factory setting: 0

| Pr · 23 | Feedback zero drift (correcting ZERO) |

Description: When tension feedback reading zero is different the actual, this parameter may be used to move zero position forward and backward.

Range: -9999-9999

Factory setting: 0

| Pr · 24 | Adjusting feedback rate (correcting rate SPAN) |

Description: When tension feedback reading is different the actual weight, this parameter may be used to adjust the rate. When using, zero shall be adjusted before adjusting rate.

Range: 0.001- 9.999

Factory setting: 1.000

| Pr · 25 | Position of tension decimal point |

Description: This is used to set the position of tension display's decimal point.

Range: 0-3

Factory setting: 1

| Pr · 26 | Displaying average frequency |

Description: When tension displays, this parameter can be used to set average frequency in order to obtain more stable readings.

Range: 1-255

Factory setting: 1

| Pr · 27 | Starting the minimum master speed voltage value of integral |

Description: When master speed (AI2) voltage is smaller than the setting, integral terminates. If integral is set at 0, it continues after startup. Otherwise, master speed is set at 0.

Range: 0-10.00(V)

Factory setting: 0.05 (V)

| Pr · 28 | Segment 1 integral compensation rate |
| | (I1t segment 1 integral compensation time) |

Description: When error continues to be generated, this value can be used to set integral rate. The greater the value of setting is, the slower the speed of compensation and vice versa. Excessively small setting will lead to output vibration.

Range: 0.01-99.99 (seconds)
Factory setting: 5.00 (seconds)

Pr · 29   <u>Segment 2 integral compensation rate</u>
               <u>(I2t segment 1 integral compensation time)</u>

Description: Integral can be computed in two steps. The parameter is segment 2 value. When using, segment 1 will be set at a greater rate (slower compensation), while segment 2 set at a small rate (faster compensation). Pr.30 is then used to determine the division point, which can achieve the effect of faster and steadier revision.

Range: 0.01-99.99 (seconds)
Factory setting: 1.00 (seconds)

Pr · 30   <u>The margin of error when using segment 1 integral (I revision)</u>

Description: This value is the margin of error when using segment 1. Use segment 1 when smaller than the margin of error, while using segment 2 when greater than the margin of error.

Range: 0.1-999.9
Factory setting: 1.00

[Integral control output equation]

$$I \qquad = \qquad \sum (E \, \Delta \, It1)$$

Integral control output   =   Total of past errors

Example: When integral control time constant (Δ It1) is set at a greater value, within a fixed period of time T, the accumulated I value is smaller, and the output effect caused by I value is smaller, too. By the same token, When integral control time constant (Δ It1) is set at a smaller value, within a fixed period of time T, the accumulated I value is greater, and the output effect caused by I value is greater, too.

Example: For an error response curve as shown below, when the error goes from 0 to 3 and back to 0, the integral value obtained varies due to different It settings.
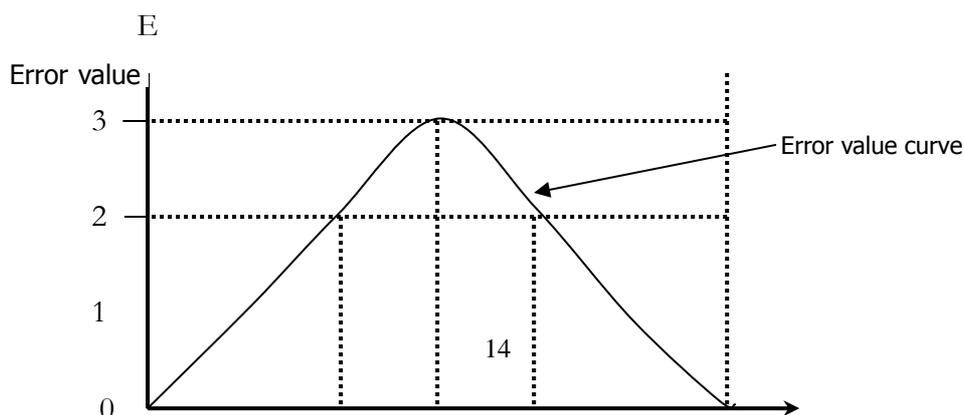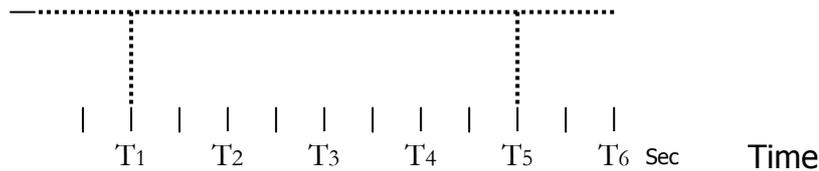
When It = 1 second, total integral I=∑ (E Δ1) is as follows:

$$I = T_1(E) + T_2(E) + T_3(E) + T_4(E) + T_5(E) + T_6(E) = 1 + 2 + 3 + 2 + 1 + 0 = 9$$

When It = 0.5 second, total integral I=∑ (E Δ0.5) is as follows:

$$I = T_{0.5}(E) + T_1(E) + T_{1.5}(E) + T_2(E) + T_{2.5}(E) + T_3(E) + T_{3.5}(E) + T_4(E) + T_{4.5}(E) + T_5(E) + T_{5.5}(E) + T_6(E) = 0.5 + 1 + 1.5 + 2 + 2.5 + 3 + 2.5 + 2 + 1.5 + 1 + 0.5 + 0 = 18$$

| **Pr・31** | Integral computation substitutes maximum error value |

Description: Integral is computed by substituting the error. When the error is greater, integral may be continuously substituted until an excessive value is accumulated. This parameter is adopted to place an upper limit on substitution error in order to prevent this situation from happening.

Range: 0.1-999.9

Factory setting: 10.0

| **Pr・32** | Error correction percentage adjustment (P correction) |

Description: Basic percentage adjustment varies depending on the variation of error. The greater the setting is, the percentage relationship of greater percentage correction is obtained.

Range: 0-99.99

Factory setting: 0

Example: P is used to directly correct error deviation. It also serves to inhibit excessive integral. Excessively great setting will result in vibration.

[Integral control output equation]

$$P = PK \times E \text{ (error)}$$

Percentage control output value = percentage setting augmentation constant x difference between setting and current value

2.5V   5V   Correction
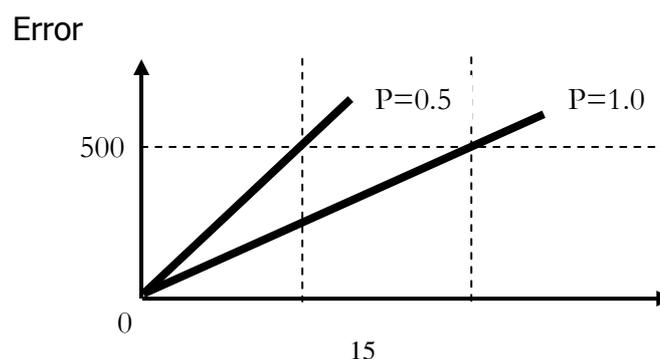
[Different output values corresponding to different PK percentage setting augmentation constants]

| **Pr・33** | DK differential setting (D correction) |

Description: Differential control augmentation constant.

Differential control is added to reduce the control system's overshoot.

"Brake" is applied to differential control in order for the control system to slow down before reaching the ideal position.

D (differential control output value) =

DK (integral control augmentation constant) x (ΔE / Δt) (rate of change of error)

Range: 0-99. 99

Factory setting: 0

**[Integral control output equation]**

$$D = DK * \Delta E / \Delta t$$

Differential control output value = <u>Differential augmentation</u>   *   <u>Rate of change of error</u>

Differential control is based on the variation within differential sampling time (Δt) to turn ΔE/Δt into output value.   Example: DK = 1.00, D = 2 when T2.

(2/1) x 1.00 = 2

E

Error

4

ΔE=2

2

0

T₁   T₂   Sec

T

ΔT=1
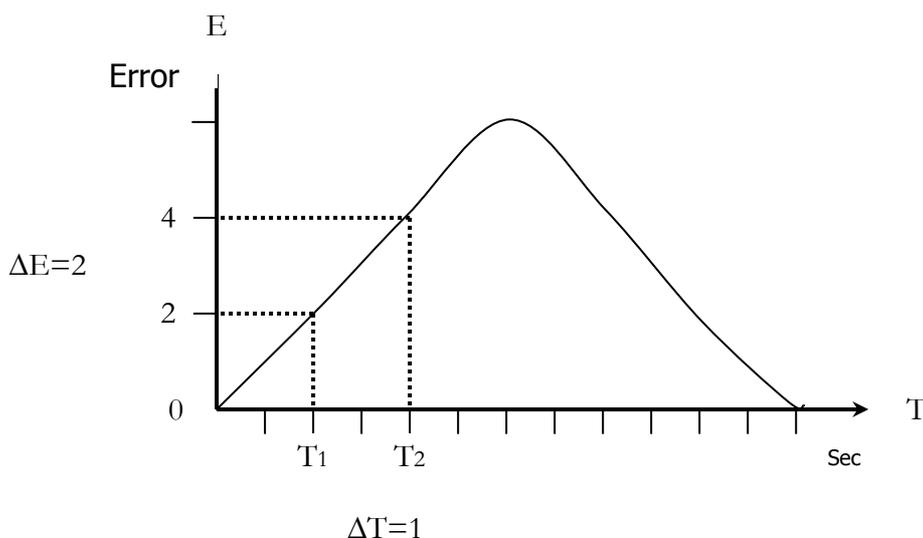
| **Pr・34** | Decline percentage of differential per 0.1 second |

Description: The correction method of differential is of pulse type. Therefore, when error

stops changing, correction declines. This parameter sets the rate of decline. When the setting is large, the decline is slow; while when the setting is small, the decline is fast.

Range: 0.1-0.99

Factory setting: 0.50

| Pr·35 | Source of tension feedback |

Description: 0 = LOAD CELL;   1 = AI1

Range: 0-1

Factory setting: 0

| Pr·36 | Source of basic torque setting |

Description: 0 = Pr.07; 1 = Control panel knob

Range: 0-1

Factory setting: 0

| Pr·37 | Display of the lower row |

Description: This parameter is used to display the value to be observed. Settings of the parameter are listed below:

Range: 0-2

Factory setting: 0

Setting	Display
0	Tension setting
1	Output value
2	Master speed voltage

| Pr·38 | MODBUS designated communication station number |

Description: When using the communication feature of MODBUS, an one and only station number for the machine can be set in order to distinguish between different controllers.

Range: 1-255

Factory setting: 1

| Pr·39 | MODBUS communication rate |

Description: When using communication, a certain rate can be designated as follows:

        1 = 2400

2 = 4800
3 = 9600
4 = 19200
5 = 38400

Range: 1-5

Factory setting: 4

| **Pr · 40** | MODBUS communication format |

Description: When using communication, the format may be designated as follows:

0 = N, 8, 2
1 = E, 8, 1
2 = N, 8, 1

Range: 0-2

Factory setting: 0

| **Pr · 41** | RELAY1 output designation |

Description: RELAY1 may designate the output method:

1 = Start
2 = Feedback HI
3 = Feedback LOW
4 = Feedback NORMAL

Range: 1-4

Factory setting: 2

| **Pr · 42** | RELAY2 output designation |

Description: RELAY1 may designate the output method:

1 = Start
2 = Feedback HI
3 = Feedback LOW
4 = Feedback NORMAL

Range: 1-4

Factory setting: 3

| **Pr · 43** | Selecting range of output voltage |

Description:　0 = 0-10 V ; 1 = 0-5 V

Range: 0-1

Factory setting: 0

11. List of Parameters

Serial #	Parameter	Scope	User Settings	Note
1	Set password	0000 - 9999	1234	
2	Set maximum value	000.1- 999.9	100.0	
3	Set minimum value	000.1- 999.9	100	
4	Feedback upper limit	0000 - 999.9	90.0	
5	Feedback lower limit	-100.0-999.9	00.1	
6	Insensitive area	000.0 -025.5	00.3	
7	Basic output voltage	00.00- 10.00(V)	1.00	
8	Initiate augmentation	0000 - 0255(%)	020	
9	Initiate delay time	000.0 - 025.5(seconds)	00.5	
10	Correct percentage when master speed increases	0000 - 0255(%)	020	
11	Correct delay time when master speed increases	000.0 - 025.5(seconds)	00.5	
12	Correct percentage when master speed decreases	0000 - 0255(%)	020	
13	Correct delay time when master speed decreases	000.0 - 025.5(seconds)	00.5	
14	Master speed stop correction percentage	0000 - 0255(%)	020	
15	Master speed stop correction delay time	000.0 - 025.5(seconds)	00.5	
16	G1 contact augmentation value	0000 - 0255(%)	020	

17	G1 augmentation delay time	000.0 - 025.5(seconds)	00.5	
18	G2 contact augmentation value	0000 - 0255(%)	020	
19	G2 augmentation delay time	000.0 - 025.5(seconds)	00.5	
20	Minimum output voltage	00.00- 10.00(V)	1.00	
21	Maximum output voltage limit	00.00- 10.00(V)	10.00	
22	Set roll-up, put-in	0000 - 0001	000	
23	Feedback zero deviation	-9999 - 9999	000	

Serial	Parameter	Scope	User Settings	Note
24	Feedback value rate adjustment	0.001 - 9.999	1.000	
25	Tension decimal point	0000 - 0003	001	
26	Tension average time	0001 - 0255	001	
27	Initiate integral's minimum master speed voltage value	0000 - 10.00(V)	00.5	
28	Segment 1 integral compensation rate	00.01 - 99.99(seconds)	5.00	
29	Segment 2 integral compensation rate	00.01 - 99.99(seconds)	1.00	
30	Error scope of use of segment 1 integral	000.1 - 999.9	1.00	
31	Integral computation substitution maximum error value	000.1 - 999.9	10.0	
32	Error correction percentage adjustment value	000.0 - 99.99	000	
33	DK differential setting	000.0 - 99.99	000	
34	Decline percentage of differential per 0.1 second	000.1 – 00.99	0.50	
35	Source of tension feedback	0000 - 0001	000	
36	Initiate source of voltage setting	0000 - 0001	000	
37	Display method of lower row	0000 – 0002	000	
38	MODBUS communication	0001 - 0255	001	

	address			
39	Communication rate	0001 - 0005	004	
40	MODBUS communication format	0000 - 0002	000	
41	RELAY 1 designated output method	0001 - 0004	002	
42	RELAY 2 designated output method	0001 - 0004	003	
43	Select scope of output voltage	0000 - 0001	000	

12. **List of Communication Parameters**

MODBUS communication description

(0000): tension display value

(0001): output voltage value

(0002): error code

(0003): tension setting

(0004): Set maximum value

(0005): Set minimum value

(0006): feedback upper limit

(0007): feedback lower limit

(0008): insensitive area

(0009): basic torque voltage (reversion)

(0010): initiate augmentation

(0011): initiation time

(0012): axis acceleration augmentation

(0013): master speed acceleration termination delay (X 0.1 second)

(0014): axis deceleration augmentation

(0015): master speed deceleration termination delay (X 0.1 second)

(0016): terminate augmentation

(0017): termination time

(0018): G1 contact augmentation value (+)

(0019): G1 contact movement termination delay time

(0020): G2 contact augmentation value (+)

(0021): G2 contact movement termination delay time

(0022): minimum output torque voltage

(0023): maximum output torque voltage

13. Indicating Output Status:
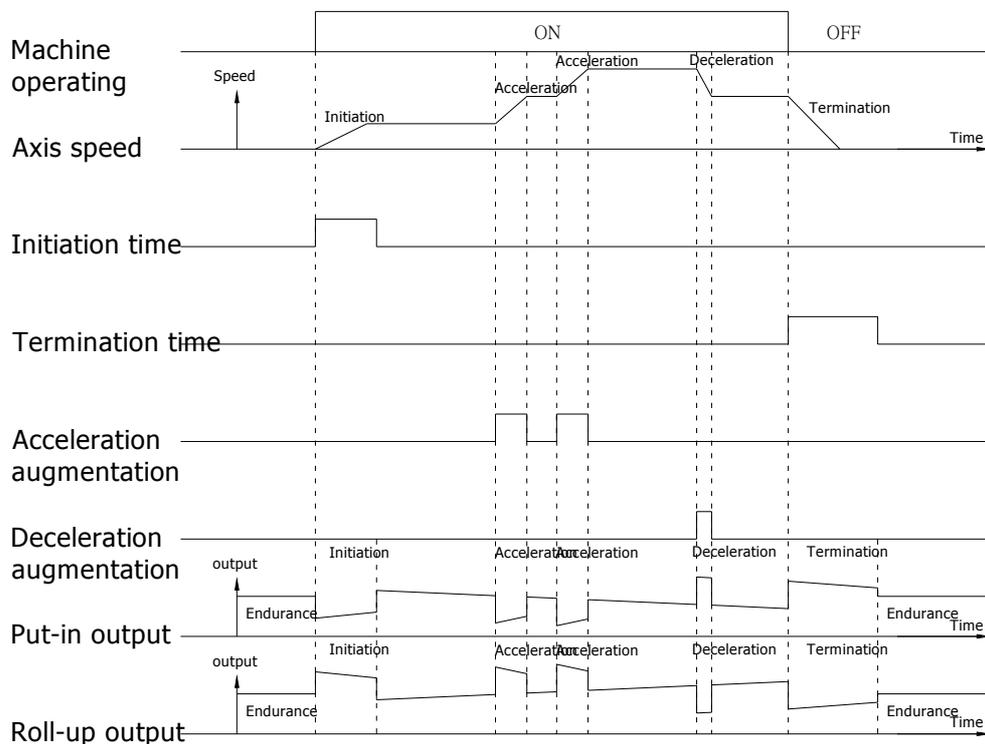
Initiation: Use Pr.8 to set initiation augmentation percentage and Pr.9 to set initiation augmentation time. Compensation direction will change depending on put-in or roll-up.

Termination: Use Pr.14 to set correction compensation percentage and Pr.15 to set correction compensation time. Compensation direction will change depending on put-in or roll-up.

Acceleration: Use Pr.10 to set acceleration augmentation percentage and Pr.11 to set acceleration augmentation time. Compensation direction will change depending on put-in or roll-up.

Deceleration: Use Pr.12 to set deceleration augmentation percentage and Pr.13 to set deceleration augmentation time. Compensation direction will change depending on put-in or roll-up.

14. Feedback Equipment:

1. LOAD CELL: LOAD CELL detects material surface tension and relay signal to controller for calculation.

2. Dancer: Dancer detects position of roller or arm and relay signal to controller for calculation in order to control material tension.

3. Frequency converter: TC-608H may connect master motor frequency converter 0-10VDC output into master speed signal (AI2) in order to determine master acceleration/deceleration or stop, and assist in controlling material tension.

15. Control Equipment:

4. Magnetic powder brake: TC-608P analog output contact can be used to control put-in axis's torque in order to achieve material surface tension control, to be used in passive put-in.

5. Electro-pneumatic converter: , Use cylinder to control put-in axis's torque through TC-608P analog output contact in order to achieve material surface tension control, to be used in passive put-in.

6. Magnetic powder clutch: Through TC-608P analog output contact, speed may be fixed using roll-up axis's motor. Material surface tension control can be achieved with magnetic powder brake controlling axis's torque, to be used in roll-up.

7. Motor driver: A. Use TC-608P analog output contact and roll-up speed differential of roll-up axis's motor to achieve material surface tension control, to be used in roll-up.
    B. Use TC-608P analog output contact and roll-up speed differential of put-in axis's to achieve material surface tension control, to be used in power put-in.

16. Issues Needing Attention When Conducting Trials:

1. Please check wiring and parameter settings to make sure they are correct.

2. Calibrating and zeroing tension:
    A. Zeroing tension: After power is turned on, under the circumstance of zero load, check to see whether reading of controller's upper row displays zero. If tension displays, please adjust Pr.23 to ZERO until reading displays zero.
    B. Calibrating tension: After tension is zeroed, please set Pr.24 (number of kilos corresponding to 10V) to total weight of LOAD CELL. Take a weight

(suggested weight is 1/2 or 1/5 of total weight of LOAD CELL). Fasten it with a rope. Pass the rope through simulation material's actual route. Fasten front end of weight to front end of LOAD CELL. Allow back end of LOAD CELL to droop in order to create tension. Check to see value displayed on upper row of controller is the weight of the weight. If the value is different from tension displayed, please adjust SPAN of Pr.24 until displayed value is the same as the weight's weight. (See illustration below.)

fastening end

Loadcell

weight
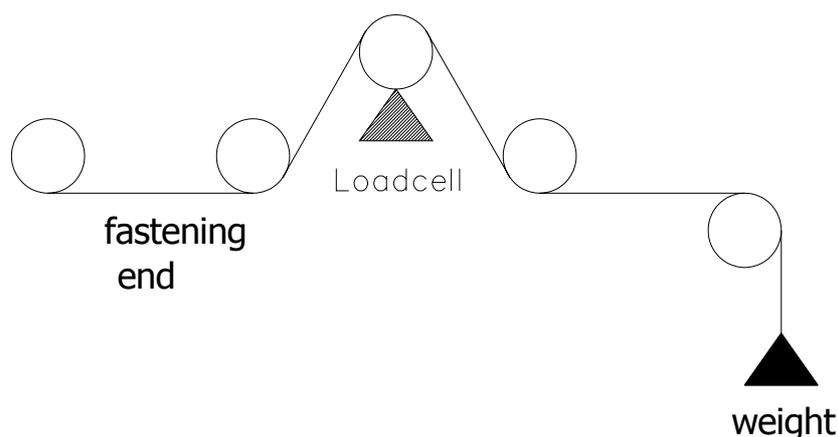
3. TC-608P may obtain feedback solely from LOAD CELL (AI1), without having to refer to master speed signal (AI2) before conducting tension control. If above control methods are needed, adjust Pr.27 (initiating integral correction minimum master speed voltage) to 10V.

4. If contacts (16- VOUT analog output+) and (17- VCOM analog output-) voltage output move in opposite directions (such as material tension becomes larger or smaller), please check the setting for Pr.22 (setting roll-up/put-in) is correct.

17. Troubleshooting:

1. TC-608P cannot calculate:

a. Please check RUN to see if it is lit. If RUN flashes, please check contacts (18-IP1 initiating contact) and (22-ICOM control contact common contact) to see whether they are short-circuited.

b. Please check LOAD CELL feedback to see whether there is voltage input. If there is no voltage input, please check loudspeaker and LOAD CELL to see whether output is normal.

c. Please check Pr.21. voltage value to see whether the setting is so small that

output voltage is limited to the extent that it cannot reach the output voltage needed.

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