ALTEC®

TC818
TENSION CONTROLLER
INSTRUCTION MANUAL(V4.00)

Table of Contents

Note: This manual is applicable to software version 4.00 or later.

1 Introduction

1.1 Overview

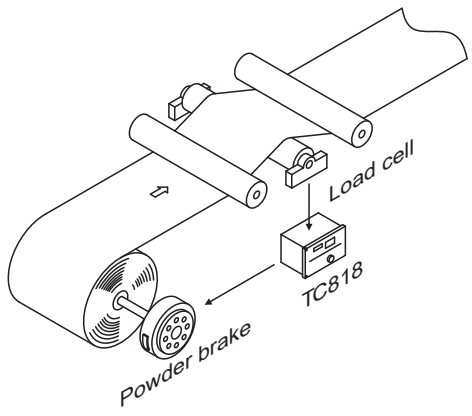
The TC818 tension controller is part of a closed-loop tension control system with tension sensor feedback. The controller continuously controls the web tension to the setting tension value and display the true web tension on an LCD screen. The screen will display the tension applied to each tension sensor separately.

The controller has a graphic LCD display, Chinese and English menu selectable, the user interface is friendly and easy to use.

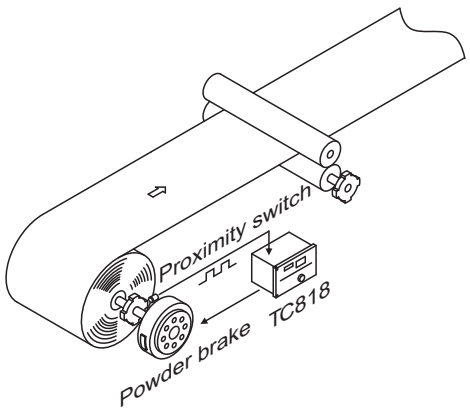
The controller can drive the magnetic powder brake/clutch directly with its built-in 0~24V/4A output, the controller can also outputs 0~5V, -5V~+5V, this can drive the inverter, servo motor or other power units.

The TC818 can be used in papermaking, printing, packaging, textile, print and dyeing industries, etc.

Chapter 4 covers automatic tension control and the Chapter 5 covers diameter tension control.



Automatic Tension Control



Radius Tension Control

1.2 Features

- 128x96 graphic LCD, Chinese and English menu, easy to use.
- Full digital circuits, no potentiometer.
- High and stable measurement and easy tension calibration.
- Single/Dual tension signal input, can be used with several kinds of tension sensors:
  1. Micro-displacement based tension sensor (signal: 200mV, power supply: 5V DC)
  2. Strain gauge based tension sensor (signal: 20mV, power supply: 10V DC)
  3. 2K potentiometer in dancer control system
- Taper tension control.
- Diameter tension control.
- RS232/RS485 communication interface, the controller can be used to form Distributed Control System(DCS) with PLC and PC.
- Build-in PI algorithm.
- Two reel exchange.
- Acceleration and deceleration operation.
- Automatic/Manual tension control.
- Parameters protection by password, avoid inadvertent modification.
- Wide range input switching power supply(92~264V AC).

1.3 Order code

TC818 - [Main Output] / [Aux Output1] / [Aux Output2] / [Comms] - [Version]
(1) (2) (3) (4) (5)

(1) Main Output

Code	Meaning
0	None
24V	24V/4A, drive magnetic powder brake/clutch
36V	36V/3A, drive magnetic powder brake/clutch

(4) Communication

Code	Meaning
0	None
RS232	RS232 interface, 3 wires
RS485	RS485 interface, 2 wires

(2) Auxiliary Output 1 (3) Auxiliary Output 2

Code	Meaning
0	None
V05	0~5V DC
V10	0~10V DC
A420	4~20mA DC
V05PN	-5V ~ +5V DC

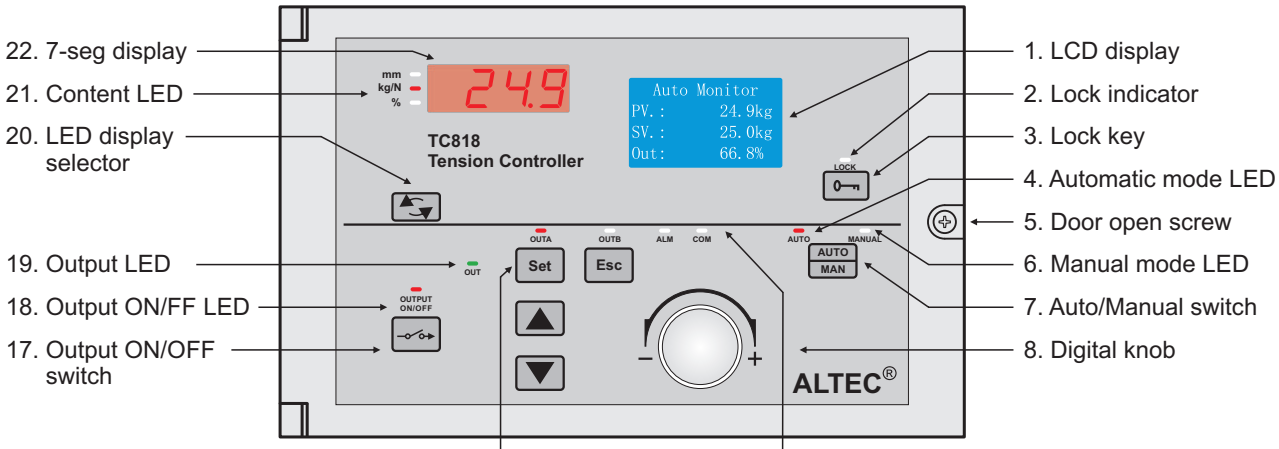
(5) Software Version

Code	Meaning
V1.00	Radius tension controller
V2.00	Automatic tension controller
V3.00+	Automatic and Radius tension controller

Code examples:
(1) TC818-36V/0/0/0-V3.00 designates the controller with 36V/3A main output which can drive magnetic powder brake/clutch, software version V3.00.

(2) TC818-24V/V05/V05/0-V4.00 designates the controller with 24V/4A main output and with 0~ 5V auxiliary output 1 and auxiliary output 2, drive torque motor driver or inverter, software version is V4.00.

1.4 User interface



13. Set, Confirm
14. Esc, Escape
15. ▲, **Inc**rease key
16. ▼, **Dec**rease key
9. OUTA, Reel A output indicator
10. OUTB, Reel B output indicator
11. ALM, Tension alarm indicator
12. COM, Communication indicator

1. Set/Esc

Set: Enter the next menu screen or confirm operation.
Esc: Back to previous menu screen or “Confirm/Exit” after finishing the setting of the value.

2. AUTO/MAN switch and indicators

The automatic mode and manual mode can be switched by pressing this key.
In automatic mode, the indicator AUTO will be lit, at this time, the setting tension can be altered by pressing the Inc/Dec key or turning the digital knob.

The flash of AUTO LED indicates that the controller is in stopping mode.

In manual mode, the indicator MAN will be lit, at this time, the output can be altered using the Inc/Dec key or turning the digital knob.

While switching the controller from manual mode to automatic mode, the measured tension before switching will be used as the setting tension for automatic control, this makes the smooth transition.

If the measured tension is incorrect and the error code appears, the controller will switch to manual mode automatically, in this case, the controller can not be switched to automatic mode.

3. OUTPUT ON/OFF switch and Indicator

The output of Reel-A and Reel-B can be turned ON and OFF by pressing the 'OUTPUT ON/OFF' switch. When the indicator is lit, output is 'ON' otherwise the output is 'OFF'.

4. LED display selector and Content LED

The type of contents displayed on the 7-seg display is changed every time the **LED Display Selector** is pressed. The type of contents displayed is indicated by the **Content LED** provided on the left side of the 7-seg display:
kg/N: measured tension in kg or Newton
% : output
mm : radius in mm

5. LOCK key and Indicator

This key is used to lock/unlock the keypad except the **LED display selector**.
Lock indicator is on: keypad locked.
Lock indicator is off: keypad unlocked.

If set Function[29] to Radius control, in "Enter PWD" screen, the reel radius can be initialized to initial radius R0. In this case, if Ctrl Mode[30] = Program Ctrl, the "Radius-Output" parameter list can be revealed using the LOCK key, at this time, the user can alter the value of the parameters.

6. OUT: Output indicator

The brightness of this green LED indicates the magnitude of the output, the brighter LED, the greater output. The LED will be off when the output is zero.

7. OUTA: Reel A output indicator

This LED indicates the output states of Reel A, it is lit when output of Reel A is ON.

8. OUTB: Reel B output indicator

This LED indicates the output states of Reel B, it is lit when output of Reel B is ON.

9. ALM: Tension alarm indicator

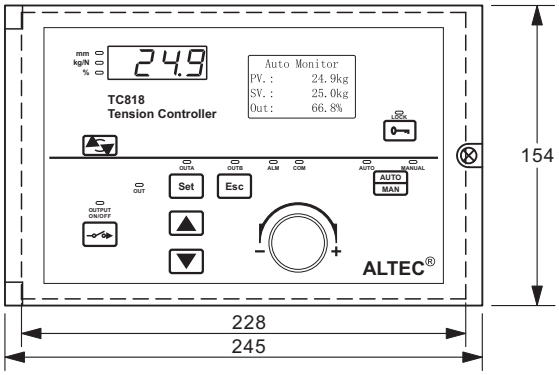
According to the setting of **Alarm Mode[44]** and **Alarm Value[04]**, this red indicator **ALM** will be lit when the alarm condition appears. At the same time, the relay ZT will be 'ON' to output an alarm signal. The alarm function does not act in Run/Stop and reel exchange progress. See **4.2.9 Alarm** for details.

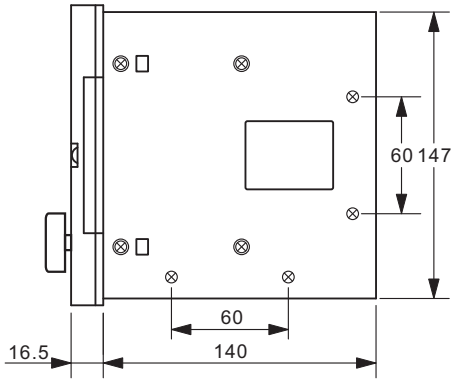
10. COM: Communication indicator

The indicator **COM** flashes when the controller is in active communication with a host computer.

2 Mounting and electrical wiring

2.1 Dimensions

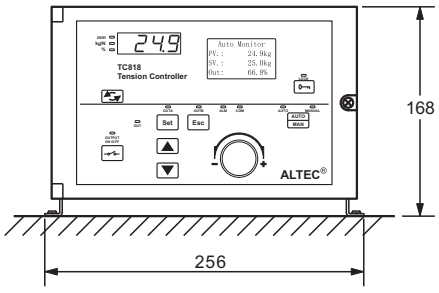




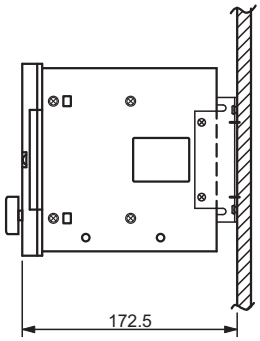
unit: mm

2.2 Mounting

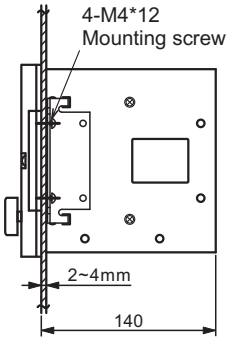
The controller can be installed on floor, wall or panel.



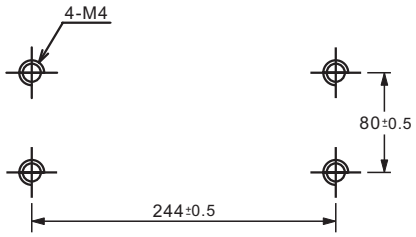
Installed on floor



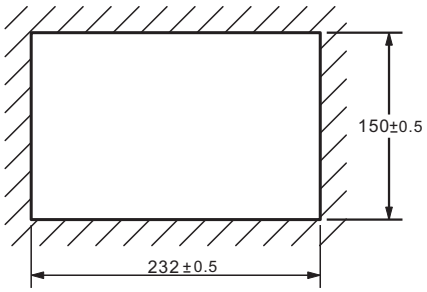
Installed on wall



Installed on panel



Screw holes for mounting
on floor and wall



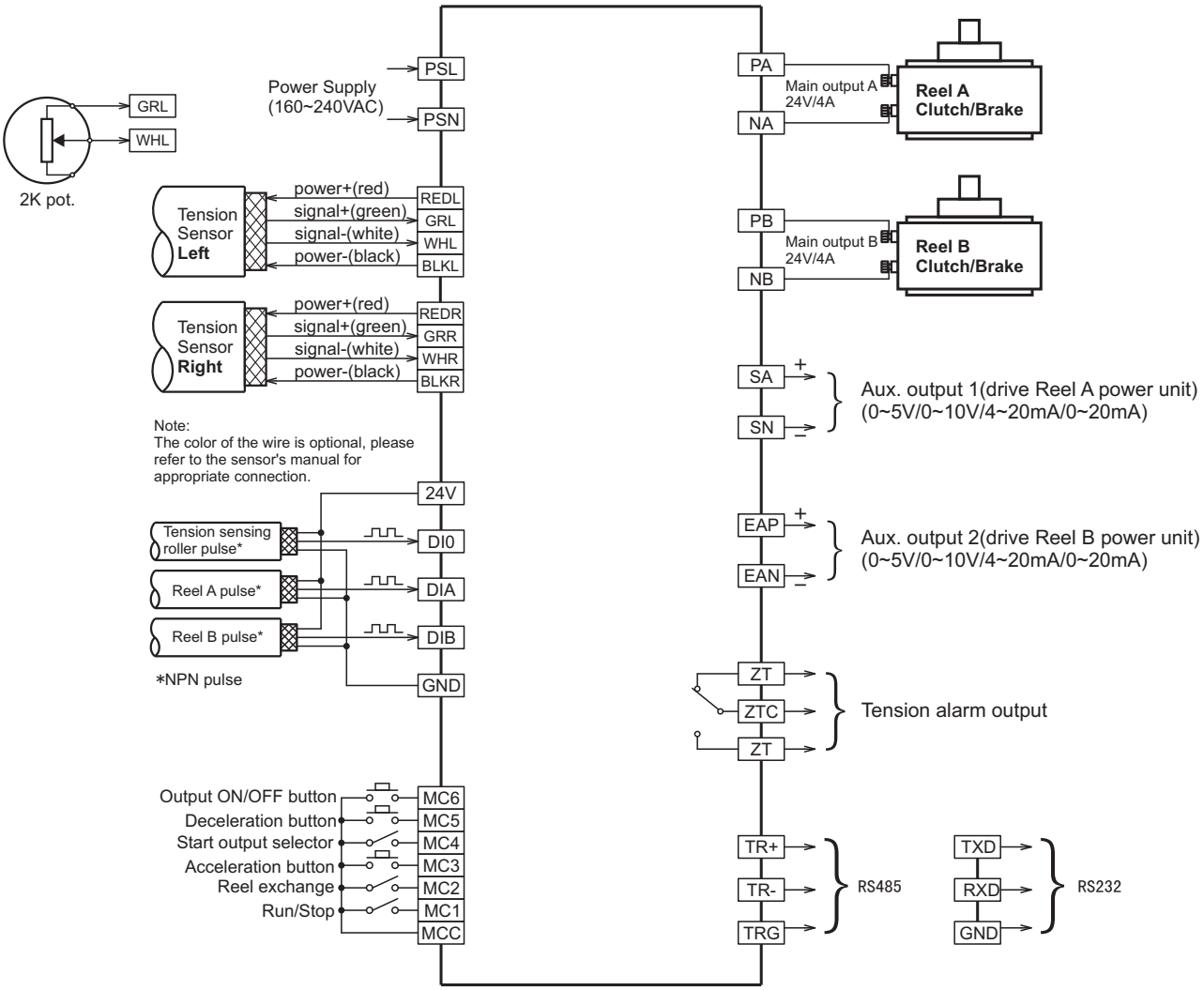
Panel mounting cut-out

2.3 Electrical connection

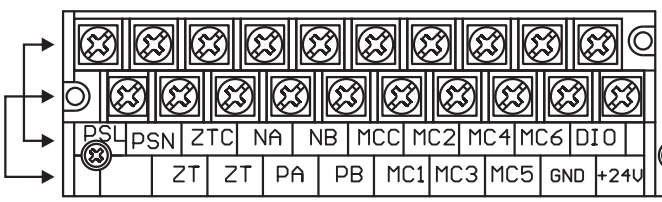
2. 3. 1 Connection notes

[1] In order to avoid electrical noise to the input signal, the signal line should be away from the power line.
[2] If the AC power supply is connected to the I/O terminals or DC supply terminals, the tension controller will be burn out.
[3] Connect the tension sensor according to the wiring diagram, pay more attention to the wiring of tension sensor if two tension sensors are connected otherwise the measurement value will be incorrect.
[4] When one tension sensor is used, make sure to short-circuit the unused tension signal terminals.

2.3.2 Connection diagram



Terminal block 1:



Terminal block 2:

2.3.3 Terminals description

Terminal block 1:

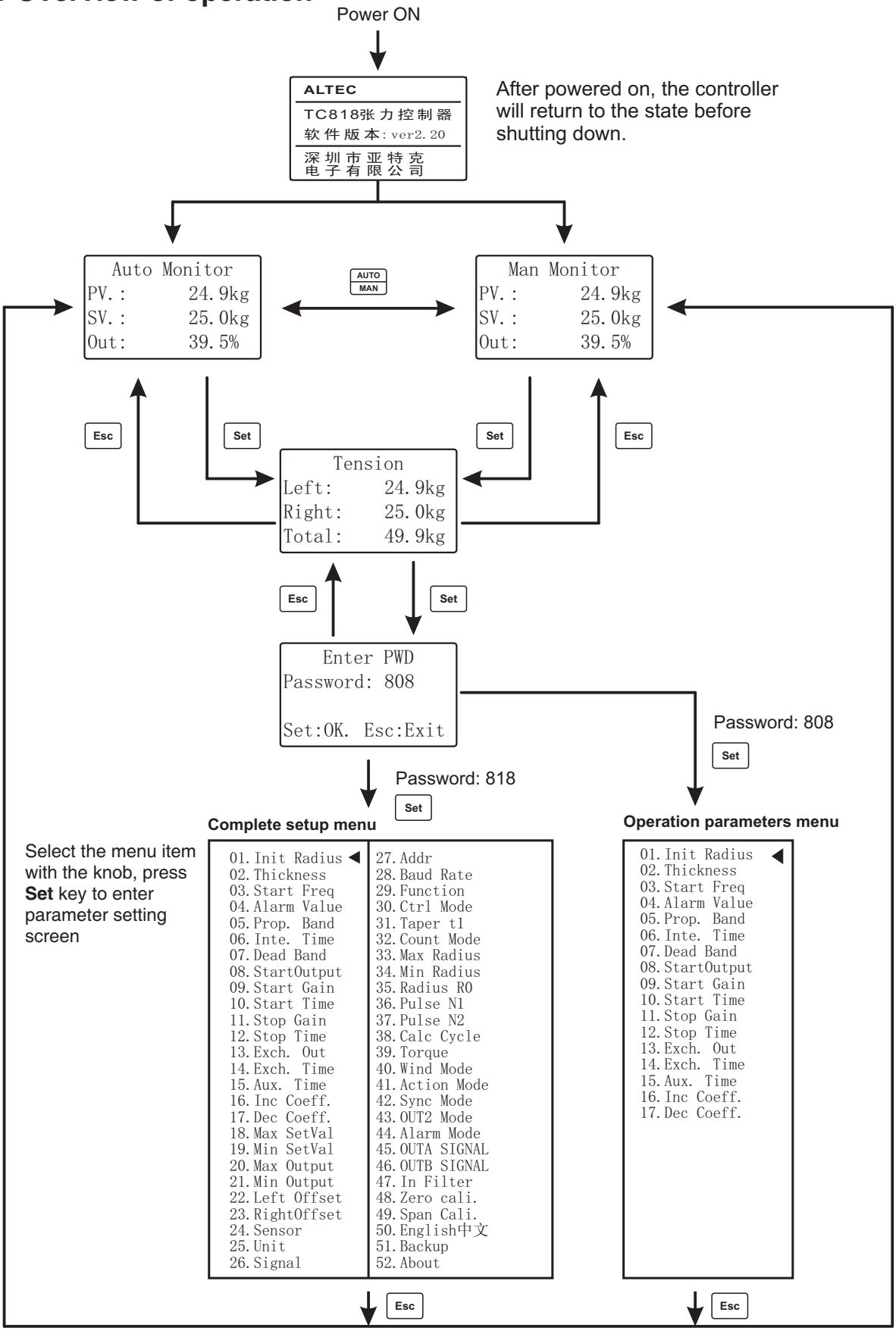
SN	Terminal	I/O	Specification	Comments
1	PSL, PSN	IN	85~264V AC, 50/60 Hz	Controller Power supply
2	ZT, ZTC	OUT	Relay, 3A/250VAC, NO	Tension alarm output
3	PA, NA	OUT	24V/4A or 36V/3A	drive Reel A magnetic powder clutch/brake
4	PB, NB	OUT	24V/4A or 36V/3A	drive Reel B magnetic powder clutch/brake
5	MCC	IN		External switch/button input common terminal
6	MC1	IN		Run/Stop
7	MC2	IN		Reel exchange
8	MC3	IN		Acceleration button
9	MC4	IN		Start output selection
10	MC5	IN		Deceleration button
11	MC6	IN		External OUTPUT ON/OFF button
12	+24V, GND	OUT	24V DC	Power supply for proximity switch/Encoder
13	DI0	IN	Max frequency 15kHz	Main roller proximity switch pulse input

Terminal block 2:

SN	Terminal	I/O	Specification	Comments	
1	DIA	IN	Max frequency 15kHz	Reel A proximity switch pulse input	
2	DIB	IN		Reel B proximity switch pulse input	
3	GRL	IN	0~200mV or 0~20mV or 2K pot.	**Left** tension sensor signal+	**Left**
4	WHL	IN		**Left** tension sensor signal-	
5	REDL	OUT	5V or 10V	**Left** tension sensor power supply+	
6	BLKL	OUT		**Left** tension sensor power supply-	
7	GRR	IN	0~200mV or 0~20mV	**Right** tension sensor signal+	**Right**
8	WHR	IN		**Right** tension sensor signal-	
9	REDR	OUT	5V or 10V	**Right** tension sensor power supply+	
10	BLKR	OUT		**Right** tension sensor power supply-	
11	SA, SN	OUT	0~20mA or 0~5V	Sync. output, 0~5V(drive Reel A power unit)	
12	EAP, EAN	OUT	0~20mA or 0~5V	Output 2, 0~5V(drive Reel B power unit)	
13	TR+,TR-,TRG	OUT	RS232, RS485	RS232/RS485 communication interface	
14	+5V,0V	OUT		Auxiliary power supply	

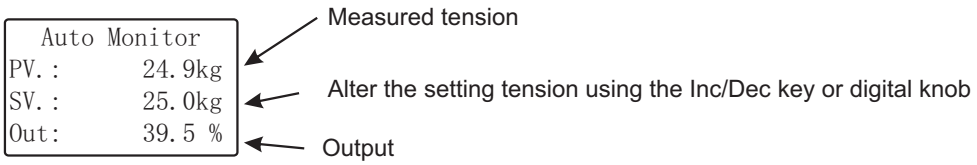
3 Menu operation

3.1 Overview of operation

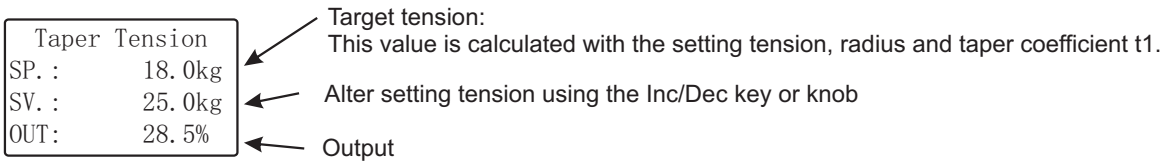


3.2 Introduction to major screens

(1) Automatic tension control: constant tension

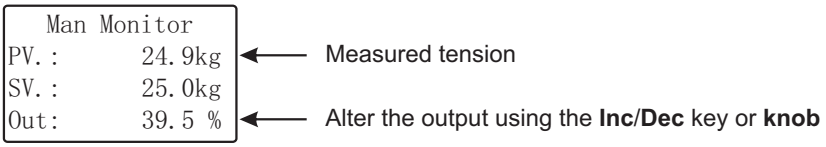


(2) Automatic tension control: taper tension

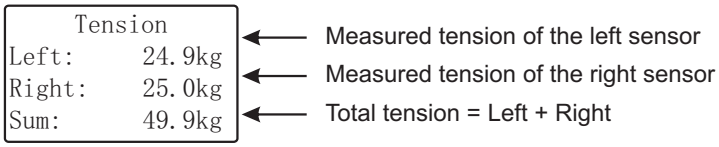


Note: The measured tension can be viewed in the LED display when the **kg/N** indicator is lit.

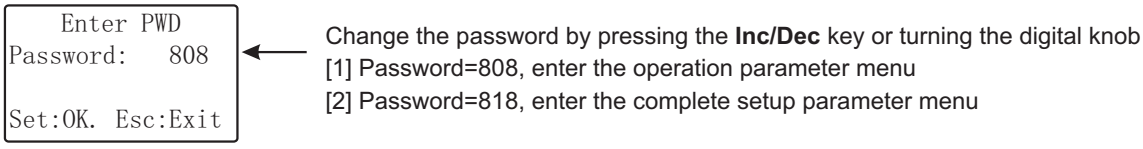
(3) Manual tension control



(4) Tension monitor

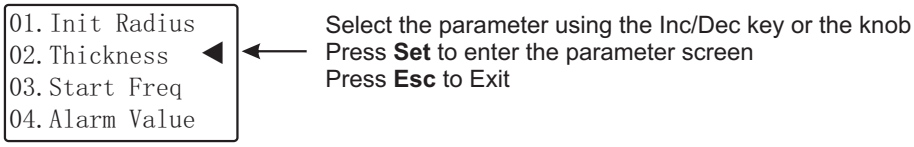


(5) Password



Note: In order to void inadvertent modification, change the password other than 808 after configuration.

(6) Parameters menu



3.3 Parameter list

The table below divided the parameters into several categories by the functions.

SN	Parameter	Adjustable Range	Default	Description
Function Setting: The essential parameters, set prior				
29	Function	Auto control Radius control	Auto control	Automatic tension control and radius tension control
30	Ctrl Mode	Constant ctrl Taper tension Program ctrl	Constant ctrl	Control mode
31	Taper t1	0.01~1.00	1.00	Used in taper tension control
43	OUT2 Mode	AUX OUTPUT Sync OUTPUT PV OUTPUT	Sync OUTPUT	Type of Output 2
Tension Measurement: Must be configured properly when **Function[29]**=**Auto control**				
22	Left Offset	-50.0~50.0kg	0.0kg	Left sensor error compensation for small error (for big error, re-calibrate the sensor)
23	RightOffset	-50.0~50.0kg	0.0kg	Right sensor error compensation
24	Sensor	Left Right Left and Right	Left and Right	Tension sensor configuration, set according to the mounting
25	Unit	kg N	kg	All items which use units will be changed accordingly
26	Signal	±30 mV ±300 mV	±30 mV	Signal range of the tension sensor, set accordingly
47	In Filter	0.01~99.99	3.00	The larger value, the smoother readout
48	Zero Cali.	0.0kg	0.0kg	Zero calibration
49	Span Cali.	0.0~999.9kg	50.0kg	Span calibration
Radius Measurement: Must be configured when using **Radius control** or **taper tension control**				
01	Init Radius	40-500mm	50mm	The initial radius of the roller
02	Thickness	0.001~1.000mm	0.020mm	The thickness of the web
33	Count Mode	Thick Sum Ratio	Thick Sum	The method of measurement of the radius
33	Max Radius	10~999mm	500mm	The maximum radius(upper limit of the radius)
34	Min Radius	10~999mm	40mm	The minimum radius(lower limit of the radius)
35	Radius R0	10~999mm	50mm	Radius of main roller(needed by ratio method)
36	Pulse N1	01~1000	01	Number of pulse/r, main roller
37	Pulse N2	01~1000	01	Number of pulse/r, material roller
38	Calc Cycle	01~1000	20	When the number of pulses counts up to this value, the radius will be calculated
39	Torque	05~999Nm	50Nm	The rated torque of the powder brake/clutch
40	Wind Mode	Wind, Unwind	Unwind	Setting of rewind and unwind
Regulation: These parameters affect the control precision, must be set properly when **Function[29]**=**Auto control**				
05	Prop. Band	0.1~999.9kg	200.0kg	Affects the control precision in automatic tension control systems
06	Inte. Time	0.1~10.0S	1.0S	
07	Dead Band	0.1~999.9kg	8.0kg	
20	Max Output	0.0~100.0%	100.0%	The upper limit of the output
21	Min Output	0.0~50.0%	0.0%	The lower limit of the output
41	Action Mode	Reverse Ctrl Direct Ctrl	Reverse Ctrl	Direct/Reverse control

(Continued)

SN	Parameter	Adjustable Range	Default	Description
Limit of Setting Value				
18	Max SetVal	0.0~999.9kg	50.0kg	The maximum setting value (upper limit)
19	Min SetVal	0.0~999.9kg	0.0kg	The minimum setting value (lower limit)
Start/Stop: The outputs and timing in start/stop process (see 4.2.3 Run and stop operation)				
03	Start Freq	1~100Hz	01Hz	The speed of the main roller. If Sync. Mode[42]=Enable, the system will start/stop automatically by monitoring the speed of the main roller
08	Start Output	0.0~100.0%	0.0%	The output when system starts
09	Start Gain	50~200%	100%	
10	Start Time	0.1~25.0S	0.1S	Starting time of system
11	Stop Gain	01~400%	100%	
12	Stop Time	0.1~25.0S	0.1S	Stopping time of system
16	Inc Coeff.	0.01~2.00	1.20	see 4.2.5 Acceleration and Deceleration
17	Dec Coeff.	0.01~2.00	1.00	
42	Sync Mode	Disable Enable	Disable	If enabled, the system will start/stop automatically according to the speed of the main roller
Reel Exchange: The outputs and timing in reel exchange process				
13	Exch. Out	0.0~100.0%	0.0%	See **4.2.4 Reel exchange** for details
14	Exch. Time	0.1~25.0S	0.1S	
15	Aux. time	0.1~25.0S	0.1S	
Communication				
27	Addr	0.0~9.9	0.0	Address of Instruments
28	Baudrate	4800,9600,19.2k bps	4800 bps	Baud rate
Additional Functions				
04	Alarm Value	0.0~999.9kg	0.0kg	Does not work during reel exch., Start, Stop
50	中文English	中文 English	中文	Language
51	Backup	Restore? Backup?		Prameters backup and restore
52	About			Copyright information and URL

4 Automatic tension control

Please debug by stepping through the following steps:

[1] Assure that the mounting and connection of the tension controller is completed and correct, and switch on the power.
[2] Assure that the mounting and connection of the tension sensor is correct, check the output signal of the tension sensor.
[3] Set the tension measurement related parameters to proper value.
[4] Make zero and span calibration and check whether the display of the measured tension is correct, if not, go to step [2].
[5] Test the tension measurement and driving system in manual operation mode.
[6] Switch to automatic mode, set proper value for operation parameters to get the stable control of the web tension.

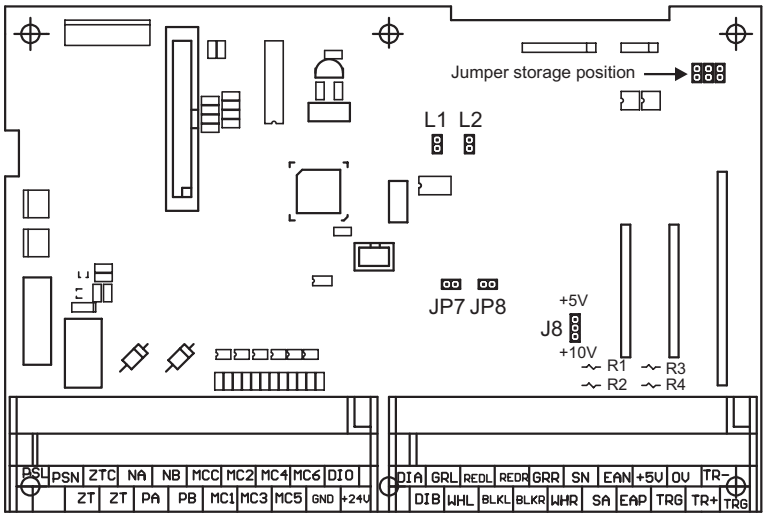
4.1 Tension measurement

4.1.1 Tension sensor connections

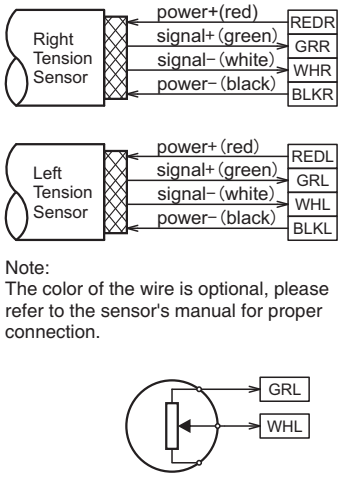
The controller may be used with micro-displacement based tension sensor and strain gauge based tension sensor. The jumpers JP7, JP8 and J8 must be in the proper position for correct measurement.
1. Using micro-displacment based tension sensor, e.g. the LX series tension sensor(compatible with the Mitsubishi tension sensor). The signal range is 200mV, powered by 5V DC.
Please short-circuit jumpers JP7, JP8, jump J8 to +5V.

2. Using strain gauge based tension sensor, e.g. the SUP and the CTS/HTS series tension sensors. The signal range is 20mV, powered by 10V DC.
Please open jumpers JP7, JP8, jump J8 to +10V.

3. In dancer control systems(using 2K Ohm potentiometer), please short-circuit jumpers L1 (provides constant current source for pot.), JP7 and JP8.



Jumper settings



Tension sensor connections

4.1.2 Setting of measurement related parameters

In order to get the precise measurement of the web tension, the measurement related parameters must be set properly:

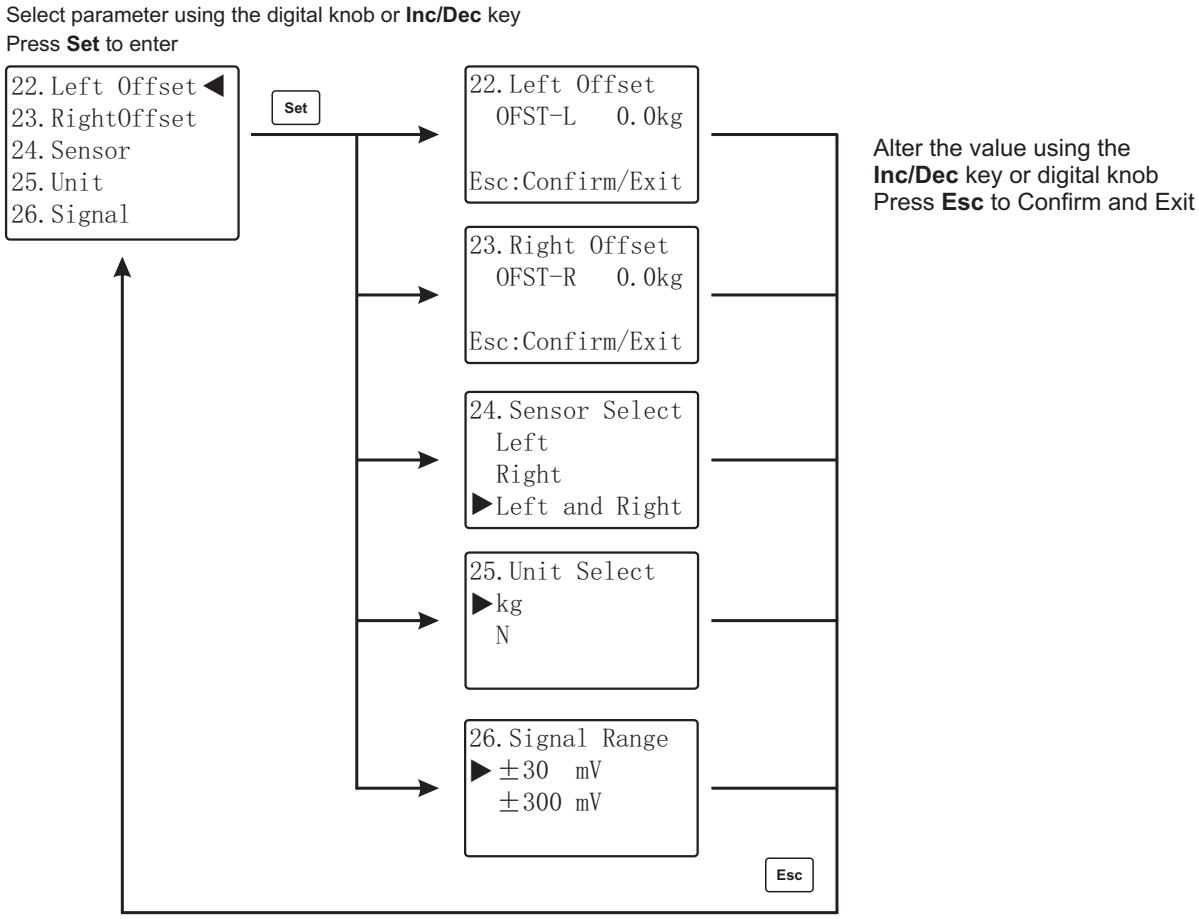
1. **Sensor[24]**
The controller can be used with one or two tension sensors, please make the selection according to the number of the mounted sensors.
In dancer control systems, only one pivot point sensor are needed(connect to GRL and WHL), set **Sensor[24]** to **Left**.

2. **Unit[25]**
The tension can be displayed in Newtons or Kilograms. Select an unit system, all items which use units will be changed accordingly.

3. **Signal[26]**
The controller can be used with two input signal range: ± 30mV or ± 300mV, select the proper range according to the sensor.
For LX series tension sensor, select ± 300mV.
For SUP/CTS/HTS series tension sensor, select ± 30mV.
In dancer control systems(with a 2K Ohm pot.), select ± 300mV.

4. **Left Offset[22]/RightOffset[23]**
The measured tension will drift sometimes, if the drift error is small, the measured tension can be corrected by adding an offset value. But if the drift error is big, the re-calibration of the controller is necessary.
Note that the left and right offset will be reset to 0 after calibration.

5. **In Filter[47]**
The controller has a built-in digital filter algorithm, it can cancel the interference and jump of the input signal and make the display of the tension stable.
The greater filter coefficient, the more stable of display of tension but slow response, generally set to 2.00.



4.1.3 Calibrate tension

In order to implement the closed loop tension control system, the tension controller must be calibrated after installation, and only the proper calibrated controller can get the desirous measurement precision. The controller uses two-points linear calibration method, the process is very easy.

4.1.3.1 Calibration notes

[1] Before calibrating, ensure the connection of the sensor is correct and jumpers JP7, JP8, J8, L1 and L2 have been set corresponding to the tension sensor.

[2] For LX series tension sensor, please short-circuit jumpers JP7 and JP8, jump J8 to +5V and set **Signal[26]** to ±300 mV.

[3] For SUP/CTS/HTS series tension sensor, please open jumpers JP7 and JP8, jump J8 to +10V and set **Signal[26]** to ±30 mV.

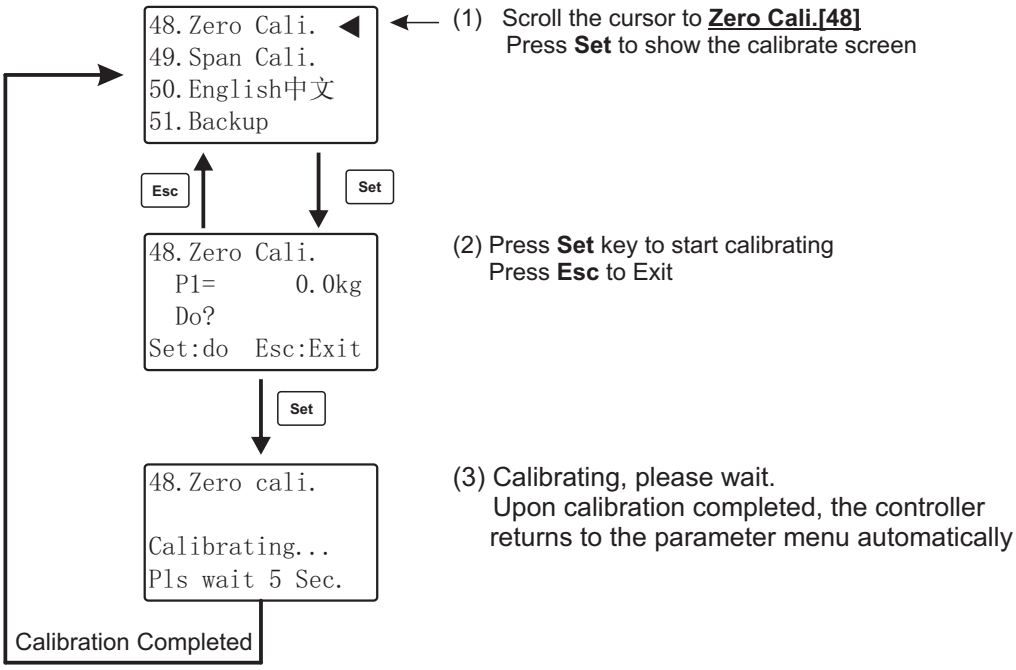
[4] In dancer control systems(using 2K Ohm potentiometer), please short-circuit jumpers L1, JP7 and JP8 and set **Signal[26]** to ±300 mV.

[5] The output signal of the tension sensor can be tested using a multimeter, before testing, please switch the multimeter to the 200mV position.The output signal should be about 0mV when there is no load applied to the tension sensor.

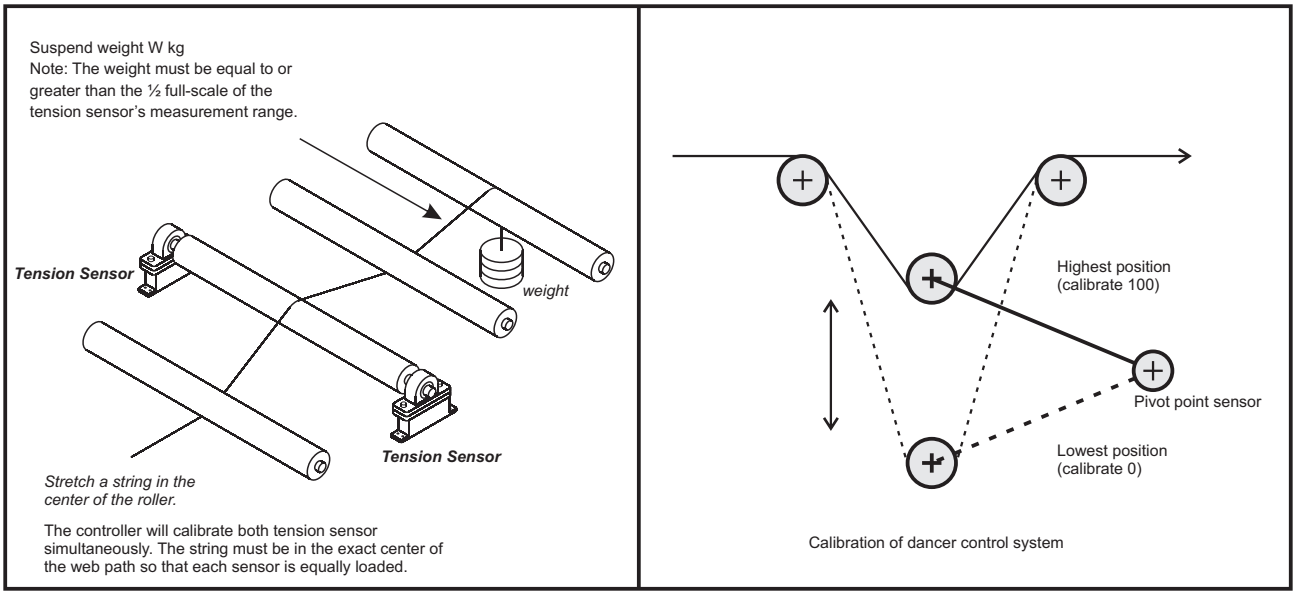
While applied some force to the tension sensor, the readout of the multimeter will be changed: The bigger force, the stronger signal, but it won't exceed the max output range of the tension sensor, the output signal of LX series tension sensor won't exceed 200mV, for SUP/CTS/HTS series tension sensor, the upper limit is 20mV, if the measured signal exceeds the upper limit, the tension sensor may be damaged, please replace new sensor and reinstall then re-calibrate.

4.1.3.2 Zero Calibration

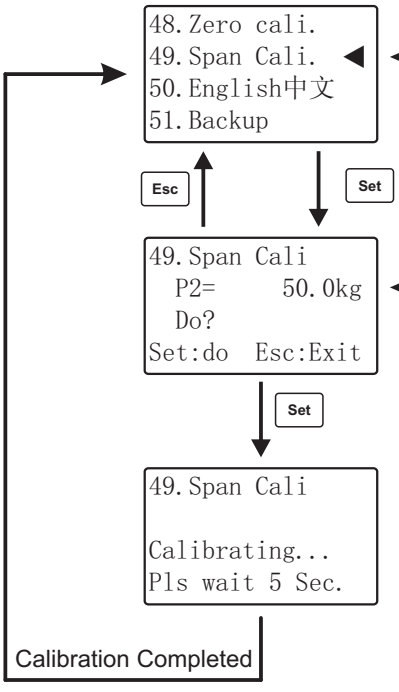
Purpose: To compensate for the sensing roller weight and for any of the other analog zero offset voltages.
Note: The zero calibration must be performed with the weight of the tension sense roller and without material.
In dancer control systems, adjust the dancer roller to the lowest position.



4.1.3.3 Span Calibration



(1) Suspend a known weight on the tension sensing roller, see the figure above.
(In dancer control systems, adjust the dancer roller to the highest position)



(2) Scroll the cursor to **Span Cali.[49]**
Press **Set** to show the calibrate screen

(3) Alter the value of P2 using the ▲/▼ key or the digital knob until the value equals to the known weight W

(4) Press **Set** to start, **Esc** to exit.

(5) Calibrating..., please wait.
Upon calibration completed, the controller returns to the parameter menu automatically

(6) If the displayed tension is incorrect after calibration, please check the mounting and output signal of the sensor and the related parameter settings and then re-calibrate. Until the display of the measured tension is correct.

After calibrating, return to the control screen and verify that the display shows zero when no tension is being measured and that the display shows the correct tension value when the weight is applied.

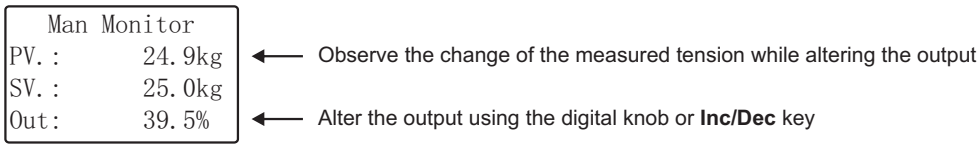
4.2 Operation

After finishing the tension calibration and the measured tension is right, the controller can be tested with manual operation and automatic operation. First use manual operation, if the tension system works well(get the stable tension), the controller can be switched to automatic mode to perform closed loop tension control.

4.2.1 Manual operation

In manual mode, the indicator **MAN** will be lit, the output can be altered using the **Inc/Dec** key or turning the digital knob, the output is limited by **Max Output[18]** and **Min Output[19]**.

The measured tension will be changed during the altering of the output, after the measured tension of the web is stable, the controller is ready to be switched to the automatic operation mode. To switch to automatic mode, just press the **AUTO/MAN** key.



4.2.2 Automatic operation

In automatic mode, the indicator **AUTO** will be lit, the setting tension can be altered using the digital knob or the **Inc/Dec** keys. The adjustable range is limited by the **Max Setvalue[18]** and **Min Setvalue[19]**.

While switching the controller from manual mode to automatic mode, the measured tension before switching will be used as the setting tension for automatic control, this makes the smooth transition. So it's better to operate the system in manual mode first, after the web tension gets stable the system should be switched to automatic mode.

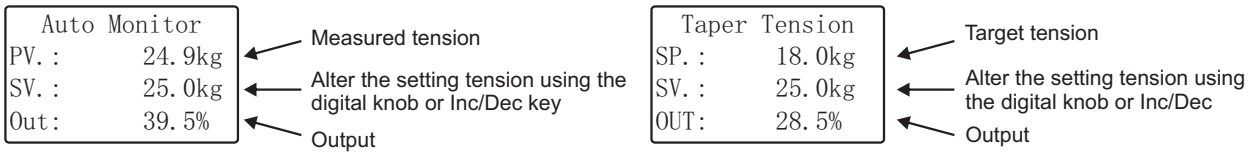
The setting tension refers to the process of control, the value expected to reach the goal of tension. In automatic mode, the controller compares the measured tension with the desired tension, called the 'setting tension', and regulates the output power to make them the same.

The measured tension is referred to as the Process Value, or 'PV' for short while the setting tension is referred to as the Setting Value, or 'SV' for short.

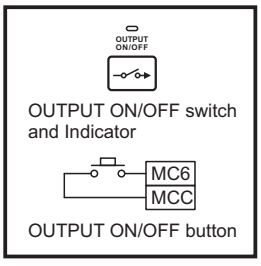
If the tension measurement fails, the error message will appear and the controller will be automatically switched to the manual mode, the automatic/manual mode can not be switched at this time.

Note that in stopping mode, the **AUTO** LED flashes.

To switch to manual mode, just press the **AUTO/MAN** key.

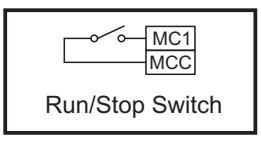


Automatic mode: constant tension control **Automatic mode: taper tension control**



The control output is controlled by the **OUTPUT ON/OFF** switch, repeatedly press this key, the output switches between ON and OFF.
OUTPUT ON/OFF indicator is lit: Control output is ON;
OUTPUT ON/OFF indicator is off: Control output is OFF, output becomes 0.

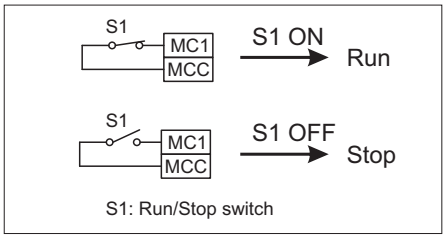
Note that the control output also is controlled by the **OUTPUT ON/OFF button**(MC6 and MCC), repeatedly press this key, the output switches between ON and OFF.

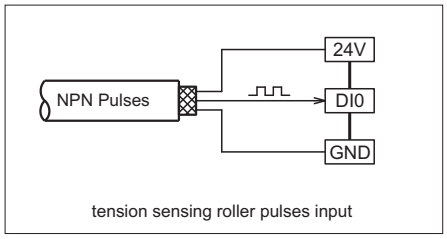


Please close switch **MC1** in automatic control mode.
If MC1 is open, controller will turn into stopping mode, **AUTO** indicator flashes, the output will become P.on.
Note that if the **Sync. Mode[42]** function is enabled, the Run/Stop of the system will not only controlled by MC1, but also by the speed of tension sensing roller.

4.2.3 Run and stop operation

4.2.3.1 Run/Stop switch





The start and stop operation is controlled by the **Start/Stop Switch(S1)** connected to MC1 and MCC.

If the **Sync. Mode[42]** function is enabled, the start and stop of the tension system is not only controlled by the Start/Stop Switch but also be controlled by the speed of main roller. To use the Sync start/stop function, a proximity switch or encoder must be mounted on the main roller to monitor the running revolution.(i.e. the running frequency)
When S1 is ON, if the running frequency of the main roller is greater than **Start Freq[03]**, system starts, the AUTO LED will be lit.
When S1 is ON, if the running frequency of the main roller is less than **Start Freq[03]**, system stops, the AUTO LED will flash.
In automatic tension control systems, normally short-circuit the MC1 and MCC, the controller will start or stop the system automatically according to the running frequency of the main roller.

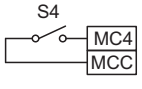
4.2.3.2 Start process

Once switch S1 on, the controller will start the automatic control to the tension system, the controller performs the closed loop control, LED **AUTO** will be it.
When the system halts, switch S1 on, **start output***Start Gain[09]** will be the output value, this speeds up the tension system, at the same time, the start timer starts, when the **Start Time[10]** times up, the controller will enter the closed loop control mode.

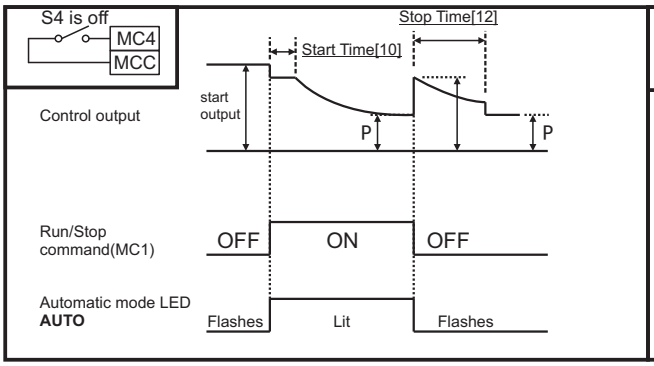
4.2.3.3 Stop process

When the system is running, once turn the switch S1 off, the output before stopping(turn MC1 off) times **Stop Gain[11]** will be applied to the running reel to brake the reel, at the same time, the stop timer starts count, the controller perform automatic control during stop process, when **Stop Time[12]** times up, the controller enters the opened loop control and output the start output with value of P.on to generate prepared tension. In stopping mode, indicator **AUTO** flashes.

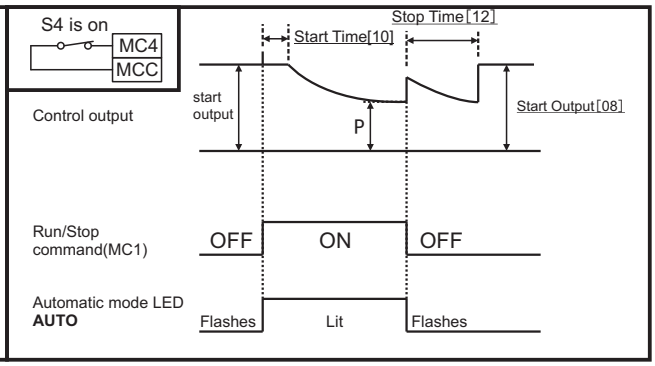
4.2.3.4 Start output selection



The start output of the controller is selected using the **Start output selector** S4.
When S4 is off, the output before stopping(turn MC1 off) will be used as start output.
When S4 is on, the presetting **Start Output[08]** will be used as start output.
Generally use **start output selector** as follow:
1. In normal operaions, keep S4 off, with the output memory function, the controller will restart with the output before stopping.
2. When replacing new material reel, switch S4 on once, the controller will start with the pre-setted **Start Output[08]**.



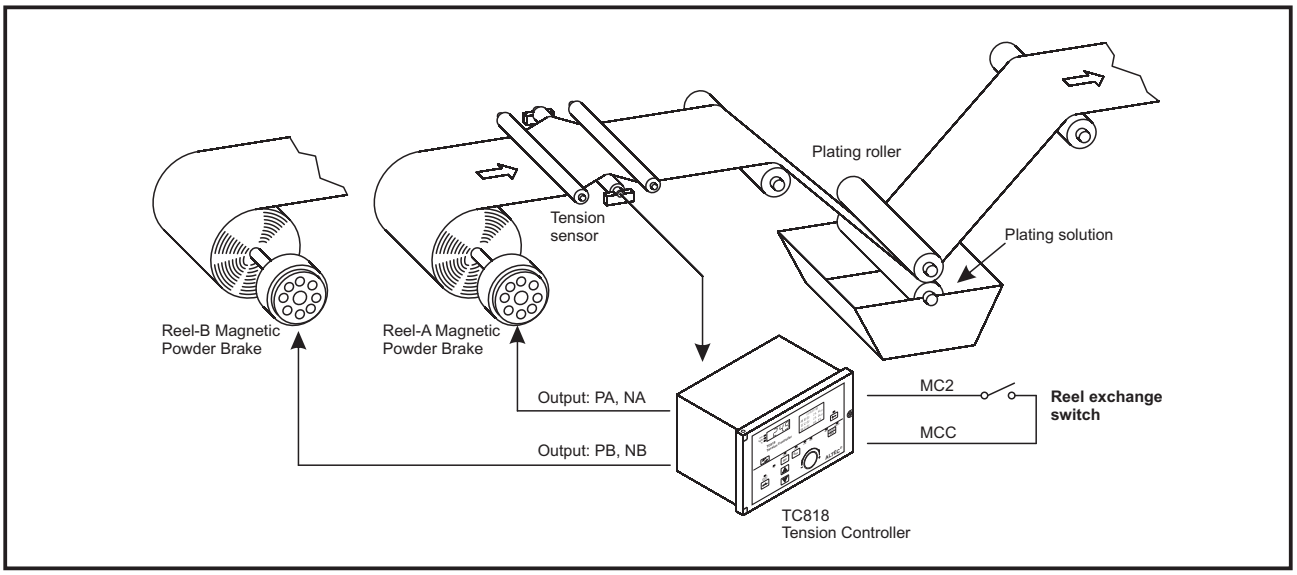
Run/Stop Process: **Start output selector** is 'OFF'



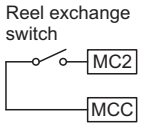
Run/Stop Process: **Start output selector** is 'ON'

4.2.4 Reel exchange

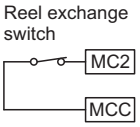
In the two-reel operation tension systems, the reel exchange is controlled by the **Reel exchange switch**. This function is applicable when material on reel is over or full.



4.2.4.1 Reel exchange switch



Switch OFF: Reel A is active



Switch ON: Reel B is active

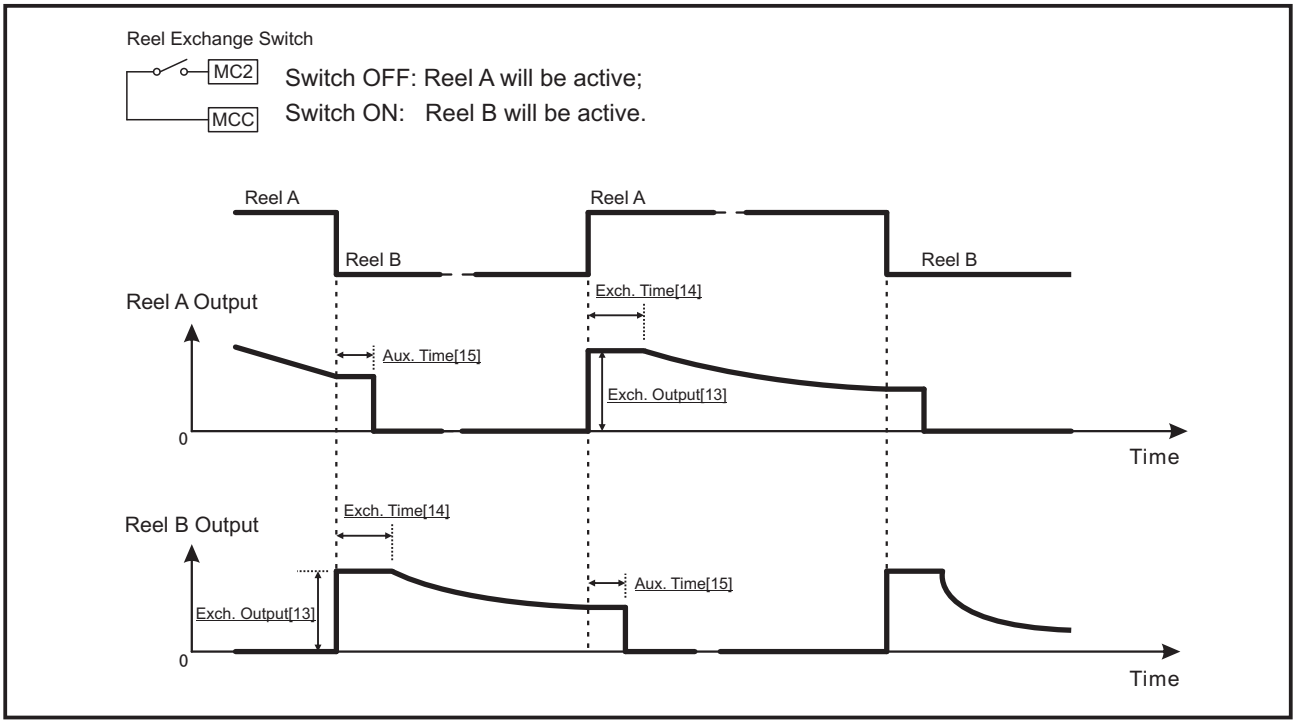
The reel exchange function is controlled by the switch which is connected to terminal MC2 and MCC. When the switch is OFF, Reel-A will be active while the switch is ON, Reel-B will be active. See the figure above.

4.2.4.2 The exchange process

Suppose that Reel A is connected with **Main Output A** and Reel B is connected with **Main Output B**.

In unwind systems(**Wind Mode[40]**=**Unwind**), suppose that Reel A is running, at this time, turns the Reel exchange switch from OFF to ON, the output on reel A will be kept and lasts for **Aux. Time[15]**. At the same time, the pre-setted **Exch. Out[13]** will be applied to reel B, when the **Exch. Time[14]** times up, the automatic closed loop control starts.

If turning the Reel exchange switch from ON to OFF, this switches reel B to reel A, just reverse the above process. The figure on the next page illustrates the process clearly.



Reel Exchange

4.2.5 Acceleration and Deceleration

Acceleration

The acceleration operation is controlled by the **Accel. button** which is connected between MC3 and MCC.

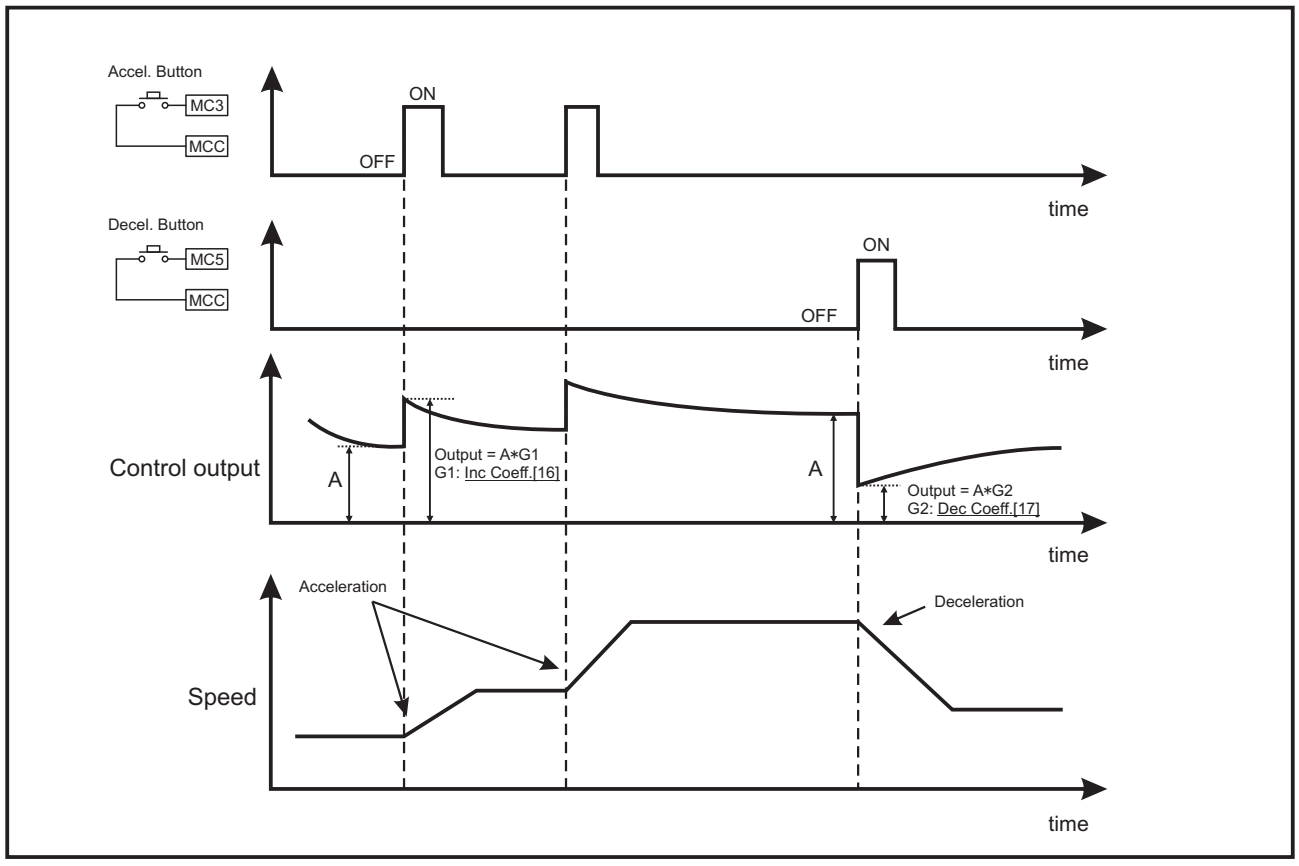
Once the **Accel. button** is pressed, the output before pressing the button times **Inc Coeff.[16]** will be the control output, this speeds up the system.

Deceleration

The deceleration operation is controlled by the **Decel. button** which is connected between MC5 and MCC.

Once the **Decel. button** is pressed, the output before pressing the button times **Dec Coeff.[17]** will be the control output, this speeds down the system.

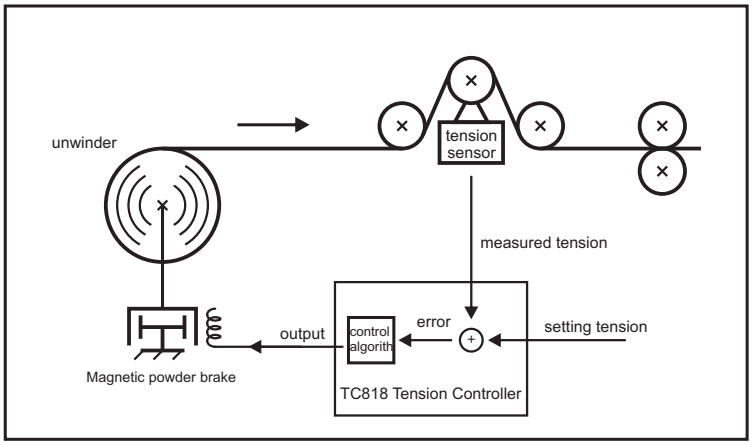
Note: The acceleration and deceleration operation does not works in the reel exchange, system holding and starting states.



Accel./Decel. operation

4.2.6 Setting of PI

In automatic mode, the stability and control precision of the tension system is affected by proportional band, integral time and dead band, if the system is not stable, alter the value of the Prop. Band[05], Inte. Time[06] and Dead Band[07] properly.



The controller compares the measured tension with the setting tension, and regulates the output with the PI algorithm to make them the same.

Therefore, appropriate setting of the proportion band, integral time and dead band is very important.

4.2.6.1 Proportional band

```
05. Prop.  Band
  PROP=   150.0kg

Esc:Confirm/Exit
```

The controller alters the output using the proportion of the error between the setting tension and the measured tension, value range: 0.1~999.9.
The smaller proportional band, the faster response but oscillation and un-stability.
The greater proportional band, the slower response and more stable.

Generally, set the value to 2-3 times measurement range.

4.2.6.2 Integral time

```
06. Inte.  Time
  INTT=     1.0S

Esc:Confirm/Exit
```

The integral time is used to cancel the static error, value range: 0.1~10.0 seconds.
The smaller integral time, the faster response but oscillation and un-stability.
The greater integral time, the slower response and more stable.

Generally, set **Inte. Time[06]** to 1.0 seconds.

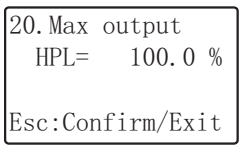
4.2.6.3 Dead band

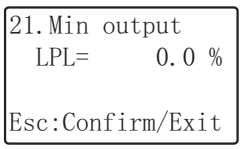
```
07. Dead Band
  DB=       5.0kg

Esc:Confirm/Exit
```

The greater dead band, the more stable, but slow response.

Generally, set **Dead Band[07]** as 0.5 to 1.0 times setting tension.

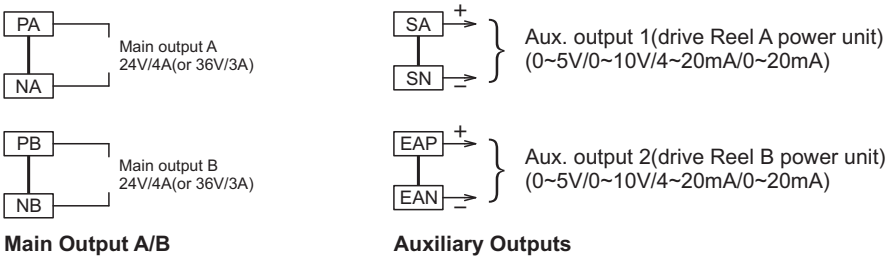
4.2.7 Output limit

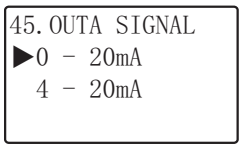


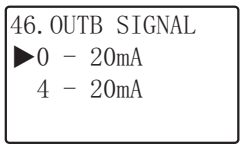


The parameters **Max output[20]** and **Min output[21]** limits the maximum (upper limit) and minimum (lower limit) value of the output. According to the specific devices, set the proper value for these parameters.

4.2.8 Output signal







The controller provides two pairs of output signals: **Main output A/B** and the **Aux. Output 1**/**Aux. Output 2**. The dual 0~24V/4A is intended for driving powder brake/clutches which connected with reel A and reel B, the reel exchange function for the two outputs are available. The other two auxiliary outputs can be 0~5V, 0~10V, 4~20mA or 0~20mA, the signal can be used to drive inverter, torque motor driver or other drive mechanisms.

When using the inverter(or other) as the drive mechanism, connect the reel A drive mechanism with SA and SN; Connect the reel B drive mechanism with EAP and EAN.

If the input signal required by the drive mechanism is 0~5V, a 250 ohm resistor must connected in parallel with the output terminals.
If the input signal required by the drive mechanism is 0~10V, a 500 ohm resistor must connected in parallel with the output terminals.

Note:
By default, there are already two 500 ohm resistors connected in parallel with **Aux. Output 1** and **Aux. Output 2**, the default output signal is 0~5V. If 0~10V is required, just clip a resistor; If 0~20mA or 4~20mA are required, clip the two resistors.

Resistors R1 and R2 are connected with Aux. Output 1; R3 and R4 are connected with Aux. Output 2. (See the figure on page 11 for the position of these resistors)

```
43.OUT2 Mode
  Sync Output
▶Output B
  PV Transmit
```

The function of Main Output B and Aux. Output 2 can be configured with OUT2
Sync Output, the signal on Reel A and Reel B will be the same.
Output B, independent signal for Reel B.
PV Transmit, the signal on Reel A and Reel B will be the same.

4.2.9 Alarm

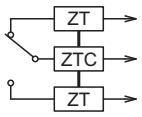
```
04.Alarm Value
  AL1=     0.0kg

Esc:Confirm/Exit
```

```
44.ALARM Mode
▶High-alarm
  Low-alarm
  Run-alarm
```

There are three options available for **ALARM Mode[44]**:
High-alarm
If PV (measured tension) > **Alarm Value[04]**, the tension alarm relay will be 'ON' and the indicator **ALM** will be lit.

Low-alarm
If PV (measured tension) < **Alarm Value[04]**, the tension alarm relay will be 'ON' and the indicator **ALM** will be lit.

Run-alarm
When the tension system starts running, the tension alarm relay will be 'ON' and the indicator **ALM** will be lit. This feature can be used to control several tension controller running synchronously.



Tension alarm output

4.2.10 Action mode

```
41.Action Mode
▶Reverse Ctrl
  Direct Ctrl
```

This parameter control the feedback mode of the tension system:
Reverse Ctrl: When PV (measured tension) > SV (setting tension), the output decreases, also known as **negative feedback**;

Direct Ctrl: When the PV (measured tension) > SV (setting tension), the output increases, also known as **positive feedback**.

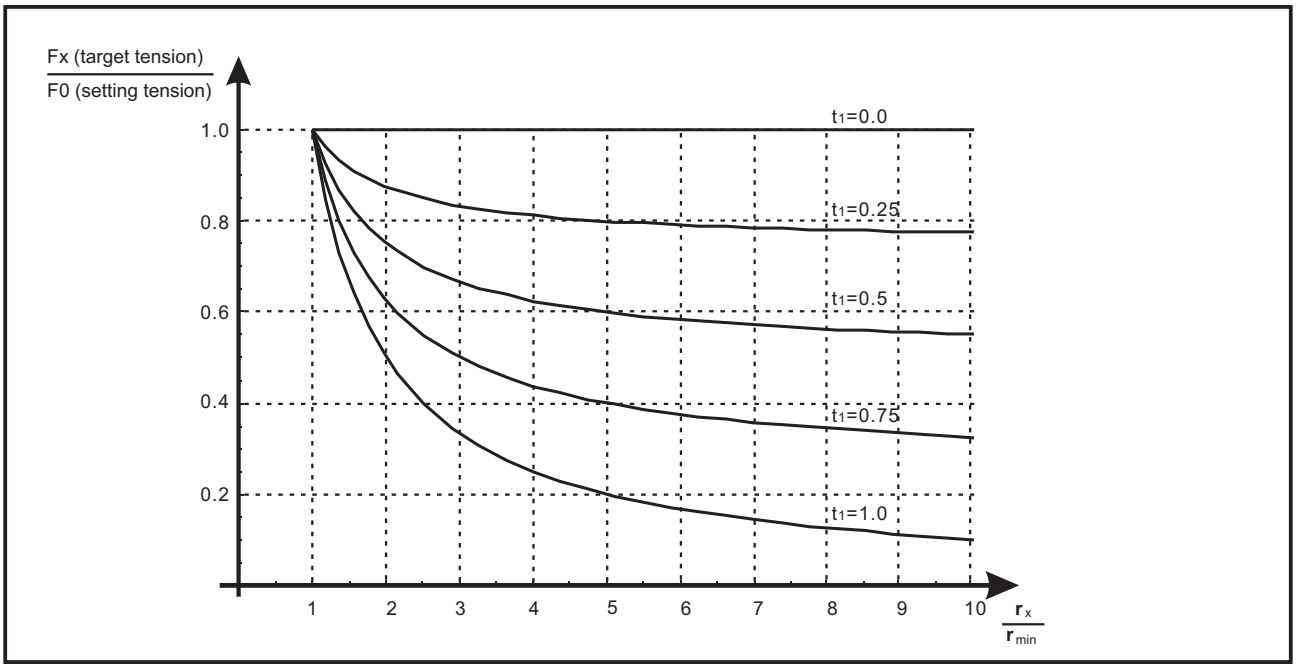
4.3 Taper tension control

4.3.1 Introduction

In winding systems, decreasing the tension while the winder radius increases is called taper tension control, this can make the inner of the winder tighten and the outer of the winder loosen, thus avoid slipping.

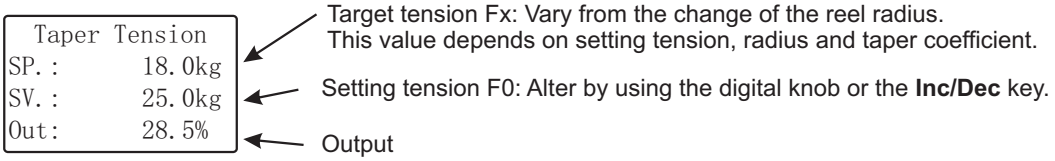
This function can be enabled by setting the **Ctrl Mode[30]** to **Taper tension**.
The greater **Taper t1[31]** coefficient, the greater change of the tension while increasing of the reel radius. If the **Taper t1[31]** equals to 0, the controller will perform the constant tension control.

In unwind systems, set **Ctrl Mode[30]** to **Constant ctrl**.



Taper tension control

4.3.2 Taper tension screen



Note: The measured tension can be viewed on the 7-seg display when the **kg/N** indicator is lit.

Please debug by stepping through these steps:

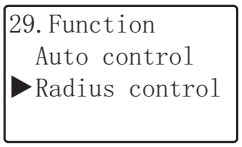
1. Check if the measurement of tension is correct, if not, go to chapter 4.
2. Check if the mounting and connection of the proximity switch is correct, check the output signal of the proximity switch.
3. Set the radius measurement related parameters to proper values.
4. First use manual operation and check whether the measured radius is right, if not, go to step [2].
5. Set the proper value for **Taper t1[31]** and starts, ensure that the desired control precision is achieved.

5 Diameter Tension Control

5.1 Introduction

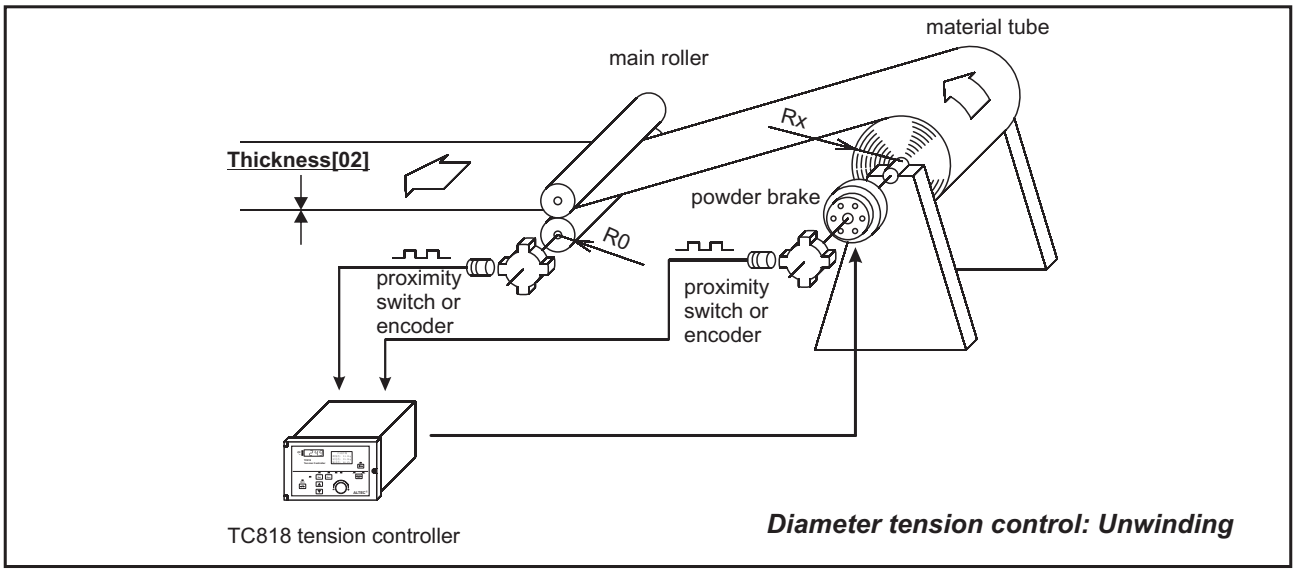
In some special cases, it is not convenient to mount tension sensor or the requirement of the precision of tension is not very high. In these cases, the TC818 could be configured as diameter tension controller.

To run TC818 as a diameter tension controller, scroll to **Function[29]** and choose **Radius control**, as the following figure illustrates.



The highlights of the diameter tension control system:
- Do not need to mount tension sensors.
- The mechanism is much simpler and the mounting is much easier.
- The taper tension control can be accomplished conveniently.

This function is especially suitable for rewind and material splitting machines in printing, packaging, printing and dyeing industries, etc.

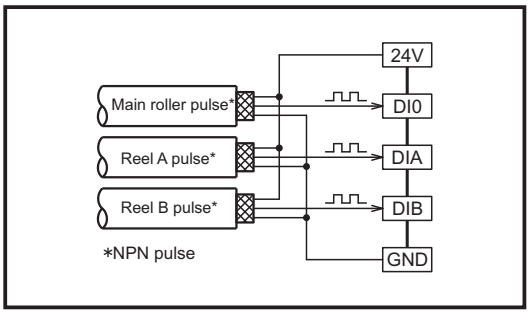


Diameter tension control: Unwinding

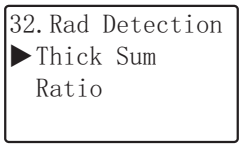
The TC818 continuously monitors the pulses on the main roller and material tube, then use these data to calculate the radius of the material tube. Using the tube radius, setting value, rated **torque[39]** of the powder brake and the built-in algorithm, the controller regulates the output to accomplish the control of the web tension.

5.2 Roll radius monitoring

5.2.1 Proximity switch and encoder connections



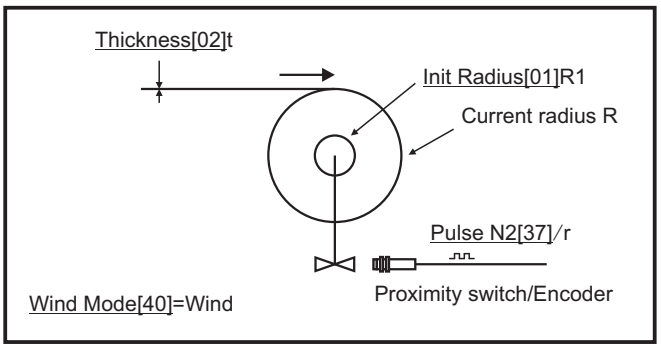
5.2.2 Methods of measurement



There are two methods available for monitoring the roll radius: **Thick Sum** and Ratio.

According to the configuration of the encoder, please choose the proper method for the specific system.

5.2.2.1 Thick Sum



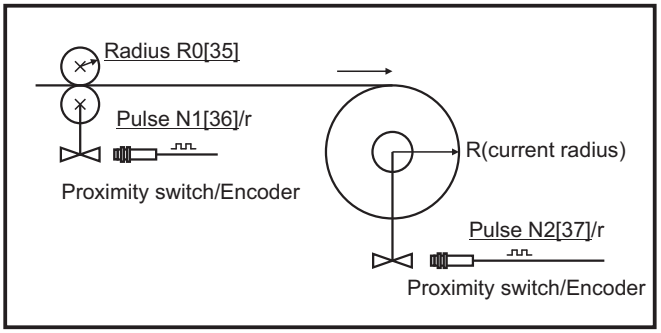
The controller counts the pulses generated by the proximity switch which mounted on the material roll, with the total pulses N and Init Radius[01] R1, the roll radius R can be got according to the following formula:

Wind: R = R1 + t*(N/N2)
Unwind: R = R1 - t*(N/N2)

R: Current roll radius
R1: **Init Radius[01]**
t: Material **Thickness[02]**
N: Total pulses
N2: **Pulse N2[37]**/r

The “Thick Sum” method will use the following parameters:
1. Init Radius[01] The initial radius, this value can be reset when in password screen by pressing **LOCK** key, the radius will be reset to Init Radius[01] automatically when reel exchange is performs.
2. Thickness[02] The real thickness of the material(web), in mm.
3. Max Radius[33] The maximum radius of the roll, set the proper value according to the real condition.
4. Min Radius[34] The minimum radius of the roll, set the proper value according to the real condition.
5. Pulse N2[37] Pulses/revolution of the material roll.
6. Calc Cycle[38] When the sum of pulses reach Calc Cycle[38], the calculation of radius will be updated once.
7. Wind Mode[40] This affect the behavior of increment and decrement of radius, in winding systems, radius increases while in unwinding system, radius decreases.

5.2.2.2 Ratio



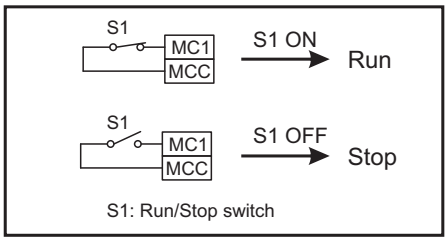
When using this monitoring method, the controller counts the pulses generated by the proximity switches which mounted on the material roll and main roll(i.e. the tension sensing roller), the radius of the material will be calculated automatically with the setting parameters. Thickness[02] and Wind Mode［40］ are not used in ratio method.

The following parameters must be set properly:
1. Max Radius[33] The maximum radius of the roll, set the proper value according to real condition.
2. Min Radius[34] The minimum radius of the roll, set the proper value according to real condition.
3. Radius R0[35] The radius of the tension sensing roller.
4. Pulse N1[36] Pulses/revolution of the tension sensing roller.
5. Pulse N2[37] Pulses/revolution of the material roll.
6. Calc Cycle[38] When the sum of the pulses reach Calc Cycle[38], the calculation of radius will be updated once.

Calc Cycle[38] affects the interval and precision of the radius calculation, the greater value, the more precision but longer interval.

5.3 Basic operations

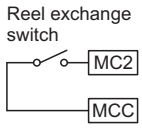
5.3.1 Run/Stop control



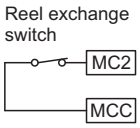
The run and stop operation is controlled by the **Start/Stop Switch(S1)** connected to MC1 and MCC.

For details of run/stop operation, please refer to “4.2.3 Run and Stop”.

5.3.2 Reel exchange



Switch OFF: Reel A is active



Switch ON: Reel B is active

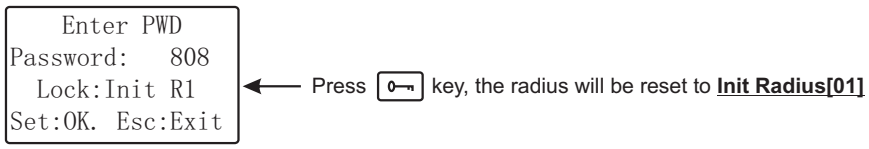
The reel exchange function is controlled by the switch which is connected to terminal MC2 and MCC. When the switch is OFF, Reel-A will be active while the switch is ON, Reel-B will be active.

For details of reel exchange operation, please refer to “4.2.4 Reel exchange”.

5.3.3 Reset radius

The radius value must be reset after making a replacement of the roll.

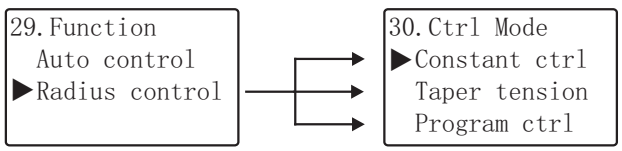
To reset the radius to the setting initial radius, follow the below steps:
1. Press **Set** key to enter the [Enter PWD] screen and set the password to 808.
2. Press **Lock** key, the radius will be reset.



Note: The radius will be reset to **Init Radius[01]** automatically when the controller performs the reel exchange operation.

5.3.4 Control mode

After setting **Function[29]** to **Radius control**, the user can select 3 kinds of **Ctrl Mode[30]**: **Constant ctrl**, **Taper tension** and **Program ctrl**, these control mode can be used in particular applications respectively.

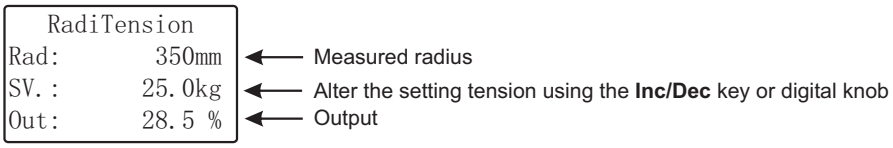


Select function

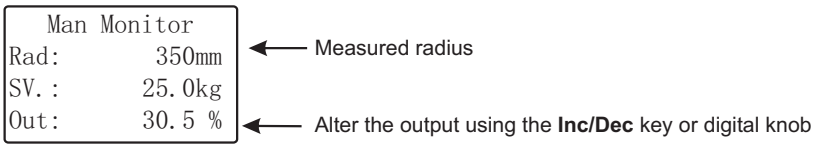
Select control mode

5.4 Constant tension control

5.4.1 Automatic mode



5.4.2 Manual mode



Note: When switching from automatic mode to manual mode, the controller will smooth the transition automatically.

5.4.3 Debug steps

1. Make sure that the mounting and connection of the proximity switch/encoder is correct, and check if the proximity switch/encoder works correctly.
2. Set proper values for the constant tension control related parameters.
   (1). Set **Function[29]** to **Radius control**.
   Set **Ctrl Mode[30]** to **Constant ctrl**.
   Set **Count Mode[32]** to **Thick Sum** or **Ratio**.
   (2). Set proper values for the radius measurement parameters, see **5.2 Roll radius monitoring**.
   (3). Set **Torque[39]** according to the actual brake/clutch.
   (4). Set proper values for parameters 08-15.
3. Operate in manual mode to test if the measurement of the radius is correct, if not, goto step 2.
4. Adjust the output manually, after the tension of the web is stable, switch to automatic mode, the controller will smooth the transition automatically.

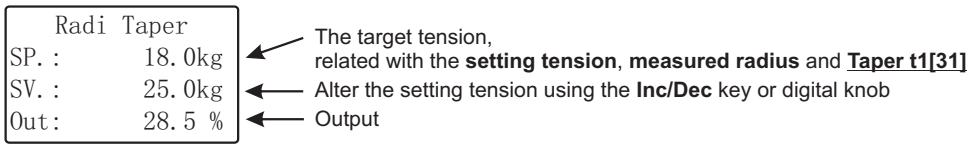
5.5 Taper tension control

The taper tension control function can also be accomplished in radius tension control systems.

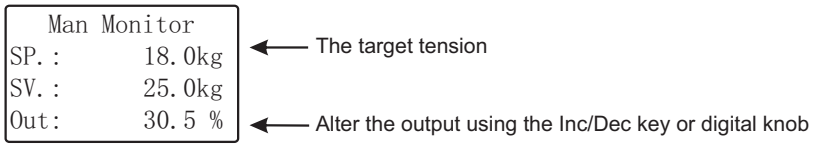
The greater value for **Taper t1[31]**, the greater change of the tension while increasing of the reel radius. If the **Taper t1[31]** equals to 0, the controller will perform the constant tension control.

The controller should be set as **Constant ctrl** mode in unwinding applications.
For the relationship between **target tension**, **setting tension** and the taper coefficient **Taper t1[31]**, please refer to "4.3. Taper tension control".

5.5.1 Automatic mode



5.5.2 Manual mode

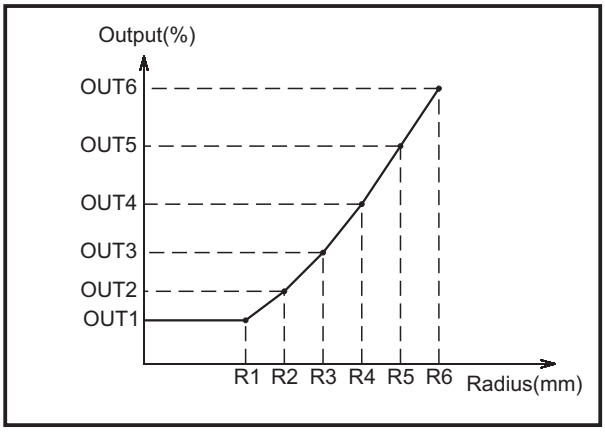


Note: When switching from automatic mode to manual mode, the controller will smooth the transition automatically.

5.5.3 Debug steps

1. Make sure that the mounting and connection of the proximity switch/encoder is correct, and check if the proximity switch/encoder works correctly.
2. Set proper values for the taper tension control related parameters.
   (1). Set **Function[29]** to **Radius control**.
   Set **Ctrl Mode[30]** to **Taper tension**.
   (2). Set proper values for the radius measurement parameters, see **5.2 Roll radius monitoring**.
   (3). Set **Torque[39]** according to the actual brake/clutch.
   (4). Set proper values for **Taper t1[31]**.
   (5). Set proper values for parameters 08-15.
3. Operate in manual mode to test if the measurement of the radius is correct, if not, goto step 2.
4. Adjust the taper coefficient **Taper t1[31]** and the output, after the tension of the web is stable, switch to automatic mode, the controller will smooth the transition automatically.

5.6 Program tension control



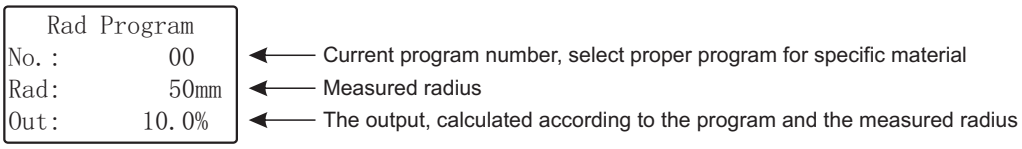
Radius-output program

The program tension control is a special application of the diameter tension control. According to the pre-set programs and the change of roll diameter, the controller increases/decreases the output power to achieve tension control purpose.

In this control mode, do not need to set the rated **Torque[39]** of the powder brake.

To use the program tension control mode, set **Ctrl Mode[30]** to **Program ctrl**.

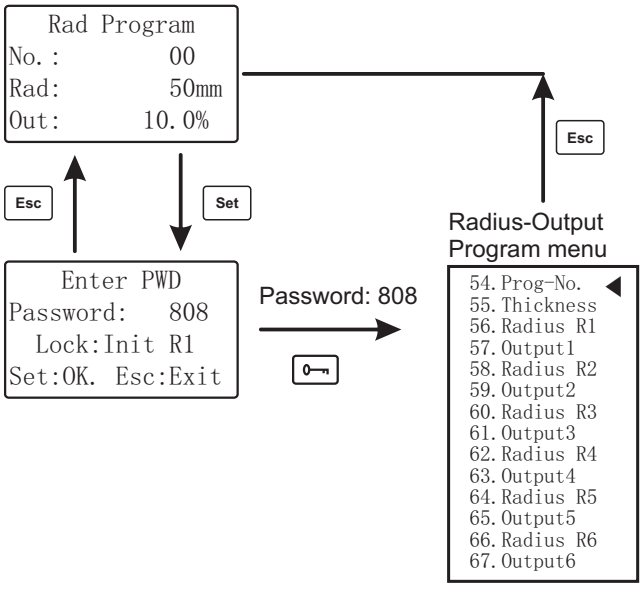
5.6.1 Operation screen



Note: The measured radius can be viewed in the 7-seg LED display while the 'mm' indicator is lit.

5.6.2 Accessing program parameters

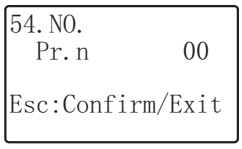
To view and modify the radius-output program, follow the below steps:
1. Make sure that the controller works in program control mode (if not, set **Ctrl Mode[30]** to **Program ctrl**).
2. Press **Set** key to enter the [Enter PWD] screen and set the password to 808.
3. Press **Lock** key, the program parameter list appears.



5.6.3 Introduction to program parameters

Each program consists of six points, each point is a radius-output pair. The TC818 tension controller can store 10 programs in its non-volatile memory.

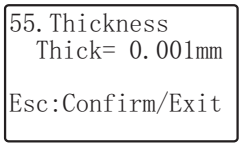
5.6.3.1 Program number



When need to perform the program tension control for several kinds of material on the same machine, one can set several program for each web material for later using.

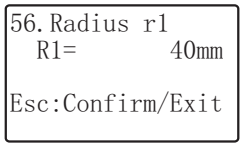
The TC818 can store 10 pre-set programs, number from 00 to 09.

5.6.3.2 Thickness



The thickness of the web, this value affects the precision of the radius measurement, it must set exactly.

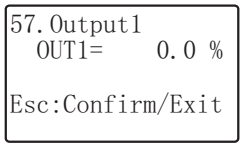
5.6.3.3 Radius Rn



The radius value in the radius-output pair, these radius and the outputs associated with them determine the shape the program.

There are 6 radius: **Radius r1[56]** to **Radius r6[66]**
Adjustable Range: **Min Radius[34]** to **Max Radius[33]**
The setting of radius must meet the condition: R1≤R2≤R3≤R4≤R5≤R6.

5.6.3.4 Output n



The output value associated with the Radius r(n).

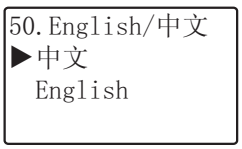
There are 6 outputs: **Output1[57]** - **Output5[67]**
Adjustable Range: 0~100.0%

5.6.4 Debug steps

1. Make sure that the mounting and connection of the proximity switch/encoder is correct, and check if the proximity switch/encoder works correctly.
2. Set proper values for the program control related parameters.
   (1). Set **Function[29]** to **Radius control**.
   Set **Ctrl Mode[30]** to **Program ctrl**.
   (2). Set proper values for the radius measurement parameters, see **5.2 Roll radius monitoring**.
   (3). Set proper values for radius-output program.
   (4). Set proper values for parameters 08-15.
3. Operate in manual mode to test if the measurement of the radius is correct, if not, goto step 2.
4. Setup the radius-output program according to the practical requirements, after everything works fine, switch to automatic mode.

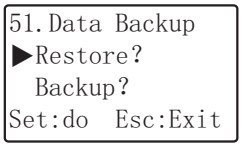
6 Additional functions

6.1 Language



The controller has two built-in language: Chinese and English,
to change the language:
(1) Scroll to English中文[50] and press **Set** to enter
(2) Select the language
(3) Press **Esc** to confirm & exit

6.2 Parameters backup

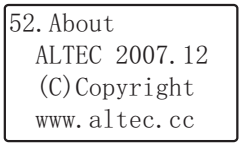


This function can make a backup for the current parameter values. When necessary (such as parameter settings confusion), the parameters can be restored to the backup values.

Note: Once the installation and testing of the tension system is complete and the tension system works normally, the “backup” function should be executed.

The “Restore” operation will restore the parameter value to the last backup value.

6.3 About infos



7 Serial communications

7.1 Overview

Digital Communication allows the controller to communicate with a PC or a networked computer system.

The RS232 standard allows a single instrument to be connected to a PC, a Programmable Logic Controller, or a similar devices using a cable length of less than 15m.

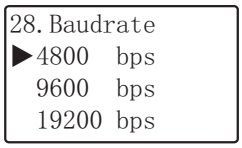
The RS485 standard allows one or more instruments to be connected(multi-dropped) using a two wire connection, with cable length of less than 1200m. 31 Instruments and one "Master" may be connected in this way.

RS485 is recommended for plant installation.

7.2 Data format

1 start bit
7 data bits
even parity
1 stop bit

7.3 Baud rate



7.4 Control characters

ASCII-HEX	Control Sign	Comments	ASCII-HEX	Control sign	Comments
02	<STX>	Start of text	30	0	
03	<ETX>	End of text	31	1	
04	<EOT>	End of transmission	32	2	
05	<ENQ>	Enquiry	33	3	
06	<ACK>	Positive acknowledge	34	4	
15	<NAK>	Negative acknowledge	35	5	
20		Space	36	6	
2D	-	Minus sign	37	7	
2E	.	Decimal point	38	8	
3E	>	Greater than	39	9	

7.5 Reading Data from the Instrument

To read data, a 'poll' message is issued to the instrument. This message takes the following format:

[EOT](ADR_H)(ADR_H)(ADR_L)(ADR_L)(C1)(C2)**[ENQ]**

Each item in the above description represents a single ASCII character. The items in bold type and square brackets are control characters used to frame the message, whose values may be determined by reference to the table on the previous page. The bracketed item in normal type have the following significance:

ADR_H The first digit of the instrument address, the ADR_H is sent twice, as a validation mechanism.
e.g. '1'(31 HEX) for instrument address 12.
'0'(30 HEX) for instrument address 01.

ADR_L The second digit of the instrument address, the ADR_L is sent twice, as a validation mechanism.
e.g. '2'(32 HEX) for instrument address 12.
'1'(31 HEX) for instrument address 01.

C1 The first character of the mnemonic for the parameter being accessed, e.g. 'P' for Process Variable.

C2 The second character of the mnemonic for the parameter being accessed, e.g. 'V' for Process Variable.

If the instrument receives the message correctly and the mnemonic is valid it will reply with:

[STX](C1)(C2)<DATA>**[EXT]**(BCC)

C1, C2 Echo of the mnemonic from the poll message.

DATA The value of the parameter in a given display format.
e.g. 99.9, 1.2, -999, >1234 etc.

BCC This is a block checksum that is generated for data validation. It is computed by XORing(exclusive or) all the characters after and excluding the STX, and including the ETX. Note that it may take the value of 'EOT' and care must be take when writing a protocol driver to ensure that this is not seen as an 'End of Transmission' sequence.

Example of a Parameter Read

For example, when reading PV(i.e. measured tension) from instrument at address 01, the following sequence of character will be sent and received:

Host:

ASCII:	EOT	0	0	1	1	P	V	ENQ
HEX:	04	30	30	31	31	50	56	05

If the measured tension is 24.8 Kg at address 01, the instrument returns:

Instrument:

ASCII:	STX	P	V		2	4	.	8	ETX	BCC
HEX:	02	50	56	20	32	34	2E	38	03	35

7.6 Writing Data to the Instrument

To write data, a 'select' message is issued to the instrument. This message takes the following format:

[EOT](ADR_H)(ADR_H)(ADR_L)(ADR_L)**[STX]**(C1) (C2)<DATA>**[ETX]**(BCC)

Each item in the above description represents a single ASCII character. The items in bold type and square brackets are control characters used to frame the message, whose values may be determined by reference to the table on Page 1. The bracketed item in normal type have the following significance:

ADR_H The first digit of the instrument address, the ADR_H is sent twice, as a validation mechanism.
e.g. '1'(31 HEX) for instrument address 12.
'0'(30 HEX) for instrument address 01.

ADR_L The second digit of the instrument address, the ADR_L is sent twice, as a validation mechanism.
e.g. '2'(32 HEX) for instrument address 12.
'1'(31 HEX) for instrument address 01.

C1 The first character of the mnemonic for the parameter being accessed, e.g. 'P' for Process Variable.

C2 The second character of the mnemonic for the parameter being accessed, e.g. 'V' for Process Variable.

DATA The value of the parameter in a given display format. e.g. 99.9,1.2, -999, >1234 etc.

BCC This is a block checksum that is generated for data validation. It is computed by XORing(exclusive or) all the characters after and excluding the STX, and including the ETX.

If a parity or a address format error is detected, the instrument will not reply. Otherwise, the instrument will reply with either:

[NAK] Failed to write:BCC is incorrect, or Parameter not available or not configured, or Parameter is read only, or attempt has been made to read a parameter that is outside limits.

OR

[ACK] Parameter write was successful.

Example of a Parameter Write

For example, when writing a value of 15.0Kg to the SV(setting tension) to an instrument at address 01, the following sequence of character will be sent and received:

Host:

ASCII:	EOT	0	0	1	1	STX	S	L	1	5	.	0	ETX	BCC
HEX:	04	30	30	31	31	02	53	4C	31	35	2E	30	03	06

If the modification of SV was successful, the instrument returns:

Instrument:

ASCII:	ACK
HEX:	06

7.7 Communication Parameters List

SN	Order	ASCII/HEX	Parameter	Adjustable Range
1	PV	50 56	Process Value (Read only)	
2	OP	4F 50	Output (Read only)	0~100.0%
3	SP	53 50	Current target tension	Read only
4	SL	53 4C	Setting value	SPH~SPL
5	RX	52 58	Measured Radius	
6	R0	52 30	Init Radius	
7	T0	54 30	Thickness	0.001~1.000mm
8	F0	46 30	Start frequency	01~100Hz
9	A0	41 30	Tension alarm value	0.0~999.9Kg
10	XP	58 50	Proportional band	0.1~999.9Kg
11	TI	54 49	Integral time	0.1~10.0 sec.
12	DB	44 42	Dead Band	0.1~999.9kg
13	PN	50 4E	Start Output	0.0~100.0%
14	GN	47 4E	Start Gain	50~200%
15	TN	54 4E	Start Time	0.1~25.0 sec.
16	PF	50 46	Stop Gain	01~400%
17	TF	54 46	Stop Time	0.1~25.0 sec.
18	PC	50 43	Reel exchange output	0.0~100.0%
19	TC	54 43	Reel exchange time	0.1~25.0 sec.
20	TS	54 53	Aux Time	0.1~25.0 sec.
21	C I	43 49	Acceleration coefficient	0.50~2.00
22	CD	43 44	Deceleration coefficient	0.50~2.00
23	NO	4E 4F	Program Number	00~09
24	th	74 68	Thickness	0.001~1.000mm
25	r1	72 31	Radius 1	
26	o1	6F 31	Output 1	0.0~100.0%
27	r2	72 32	Radius 2	
28	o2	6F 32	Output 2	0.0~100.0%
...	...	...	...	...
29	r6	72 36	Radius 6	
30	o6	6F 36	Output 6	0.0~100.0%
31	#1	23 31	Control output ON/OFF	
32	#2	23 32	Automaic/Manual switch	
33	#3	23 33	Switch status	Read only

1.The output can be altered in manual mode.
2.Output ON/OFF: #1=0000 output ON
#1=0001 output OFF
3.Auto/Manual switching: #2=0000 Automatic mode
#2=0001 Manual mode
4.Switch status: #3, This parameter is read only, the return value(<256) will be converted to an 8-bits binary number, the status of each switch is corresponding to each bit in the binary number. i.e. when a bit is 1, the corresponding switch is ON; when a bit is 0, the corresponding switch is OFF. As the following table illustrated.

Bit	B7	B6	B5	B4	B3	B2	B1	B0
Switch			MC6	MC5	MC4	MC3	MC2	MC1

8 Appendices

8.1 Parameters screen

01. Init Radius R1= 50mm Esc Confirm/Exit	02. Thickness Thick= 0.020mm Esc:Confirm/Exit	03. Start Freq. F0= 01Hz Esc:Confirm/Exit	04. Alarm Value AL1= 0.0kg Esc:Confirm/Exit	05. Prop. Band PROP= 200.0kg Esc:Confirm/Exit
06. Inte. Time INTT= 1.0S Esc:Confirm/Exit	07. Dead Band DB= 8.0kg Esc:Confirm/Exit	08. Start Output P.on= 0.0 % Esc:Confirm/Exit	09. START Gain G.on= 50 % Esc:Confirm/Exit	10. Start Time T.on= 0.1S Esc:Confirm/Exit
11. Stop Gain G.st= 100 % Esc:Confirm/Exit	12. Stop Time T.st= 0.1S Esc:Confirm/Exit	13. Exch. Output P.ch= 0.0 % Esc:Confirm/Exit	14. Exch. Time T.ch= 0.1S Esc:Confirm/Exit	15. Aux Time T.aux= 0.1S Esc:Confirm/Exit
16. Inc coeff. C.inc= 1.00 Esc:Confirm/Exit	17. Dec coeff. C.dec= 1.00 Esc:Confirm/Exit	18. Max Setvalue SPH= 50.0kg Esc:Confirm/Exit	19. Min Setvalue SPL= 0.0kg Esc:Confirm/Exit	20. Max output HPL= 100.0 % Esc:Confirm/Exit
21. Min output LPL= 0.0 % Esc:Confirm/Exit	22. Left Offset OFST-L 0.0kg Esc:Confirm/Exit	23. Right Offset OFST-R 0.0kg Esc:Confirm/Exit	24. Sensor Select Left Right ▶Left and Right	25. Unit Select ▶kg N
26. Signal Range ▶ ±30 mV ±300 mV	27. Comms Addr ADDR= 9.9 Esc:Confirm/Exit	28. Baudrate ▶4800 bps 9600 bps 19200 bps	29. Function ▶Auto control Radius control	30. Ctrl Mode ▶Constant ctrl Taper tension Program ctrl
31. Taper t1 t1= 1.00 Esc:Confirm/Exit	32. Rad Detection ▶Thick Sum Ratio	33. Max Radius R.max= 500mm Esc:Confirm/Exit	34. Min Radius R.min= 40mm Esc:Confirm/Exit	35. Radius R0 R0= 50mm Esc:Confirm/Exit
36. Pulse N1 N1= 01 Esc:Confirm/Exit	37. Pulse N2 N2= 01 Esc:Confirm/Exit	38. Calc Cycle CNT= 20 Esc:Confirm/Exit	39. Torque M= 50Nm Esc:Confirm/Exit	40. Wind Mode ▶Wind Unwind
41. Action Mode ▶Reverse Ctrl Direct Ctrl	42. Sync. Mode ▶Disable Enable	43. OUT2 Mode Sync Output ▶Output B PV Transmit	44. ALARM Mode ▶High-alarm Low-alarm Run-alarm	45. OUTA SIGNAL ▶0 - 20mA 4 - 20mA
46. OUTB SIGNAL ▶0 - 20mA 4 - 20mA	47. In Filter FIL= 3.00 Esc:Confirm/Exit	48. Zero cali. P1= 0.0kg Do? Set:do Esc:Exit	49. Span Cali. P2= 50.0kg Do? Set:do Esc:Exit	50. English/中文 ▶中文 English

8.2 Troubleshooting

Appearance of failure	Possible malfunction	Solution
The controller does not work after powered on	Power fails or fuse fused.	The power supply is 110-264 VAC. 1. Check the connection of power supply. 2. Replace new fuse(4A).
Measurement fails, display “A/D error”	A/D IC damaged	In need of repair
Measurement fails, display “sigl error”	1. Signal range and sensor do not match 2. Sensor fails or incorrect connection.	1.Select the right range for Signal[26] 2.Check the connections and signal, replace new sensor.
Measurement fails, display “over range”	1. Invalid calibration 2. Sensor fails or incorrect connection 3. Bad value for Sensor[24].	1.Recalibrate 2.Check connections and signal, replace new sensor. 3.Set Sensor[24] according to real condition.
Not stable in manual and automatic mode	1. Tension sensing roller out of roundness, bearing damaged, roller bended. 2. Bad clutch/brake or driver 3. Signal fails or incorrect calibration	1. Reinstall 2. Use the appropriate drive unit 3. Use the appropriate sensor and recalibrate
Stable in manual mode but not stable in automatic mode	1. Bad type of tension sensor. 2. Bad type of clutch, brake or driver. 3. Bad value for Prop. Band[05], Inte. Time[06] and Dead Band[07]	1. Use the appropriate sensor and recalibrate 2. Use the appropriate drive unit 3. Alter the value of these three parameters
Incorrect calculation of radius	1.The setting of radius calc. related parameter is incorrect. 2.Wrong proximity switch/encoder. 3.proxmity switch/encoder damaged or incorrect connection.	1.Set proper values for the radius calc. related parameters. 2.Use proximity switch or encoder with NPN signal 3.Check connection or replace new proximity switch or encoder
No output	1. Output has been turned off 2. Output short-circuit protection 3. Incorrect connection of Reel A and Reel B	1.Press the **OUTPUT ON/OFF button** to turn on 2.Switch power off, switch on after 30 seconds 3.Connect the drive unit properly
The keys and digital knob do not work	Keypad has been locked	Check the **Lock** indicator, if the indicator is on, the keypad is locked. Press **LOCK** key to unlock.
The controller does not start after MC1 is on	1. Sync. Mode[42] is enabled. 2. Bad value for Action Mode[41].	1. Disable the Sync. Mode[42] function. The proximity switch must be mounted on the main reel while enabled and set right value for Start Freq.[03]. 2. Set right value for Action Mode[41].
Can't switch to automatic mode	The automatic/manual switching is disabled when error appears 1.The measured tension is incorrect 2.Keypad locked	1. Check sensor, connections, parameters and recalibrate until getting the correct measurement 2. Keypad locked, press **LOCK** key to unlock.
Tension too high or too low after restarting	1. MC1 is on when system stop 2. MC4 is off, output memory is disabled	1. Keep the MC1 off before stopping 2. keep the MC4 on
Setting tension(SV) changes after switching from manual mode to automatic mode	While switching the controller from manual mode to automatic mode, the measured tension before switching will be used as the setting tension for automatic control	This is normal, it makes the smooth transition.

8.3 Technical specifications

Tension Inputs	1. Micro-displacement based tension sensor(signal range: 200mV, power supply: 5VDC) 2. Strain gauge based tension sensor(signal range: 20mV, power supply: 10VDC) 3. 2K Potentiometer
Radius Detection	Proximity switch or encoder, NPN signal, maximum frequency 15KHz
Measurement Precision	±0.2%FS±1 digit
Sample Rate	100ms
Control Algorithm	PI(Proportional Integral)
Main Outputs	Dual 24V/4A(or 36V/3A), drive magnetic powder brake/clutch
Auxiliary Outputs	Dual 0~20mA, drive inverter or Electric-Pneumatic converter
Alarm	Relay, Normally Open, 3A/250V AC
Communications	RS232, RS485
Dimensions	246(W)x154(H)x156.5(D)mm
Power Supply	92~240VAC, 50/60 Hz

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