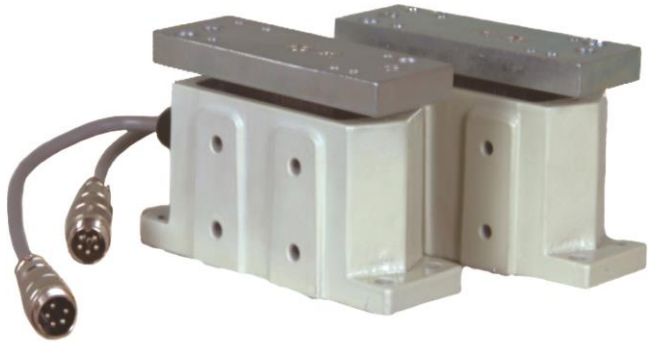
TC-608F 智能型定张力闭环控制器

TC-608F Intelligent Closed-loop Constant Tension Controller

使 用 说 明 书

USER MANUAL



CH-SYS

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1. 特点介绍 Features

本产品为我公司累积三十多年控制经验，结合最新研究成果，全新设计出两组独立驱动输出，可直接驱动磁粉/离合刹车及力矩电机。是性能优越、价格实惠的收/放卷定张力闭环控制器。

By more than 30-year experience in control field, together with the latest achievements on research, CH-SYS has developed the totally new product with two independent driving outputs, which can drive magnetic powder/clutch brake and torque motor directly. A winding/unwinding closed-loop constant tension controller with excellent performance and affordable price.

应用场合：Applications:

TC-608F 是专门为塑料、薄膜、涂层、电线、电缆、钢板、纺织、造纸等产业界，开发所需求 DC24 电源 96×96 外壳尺寸的高精度定张力闭环控制系统。

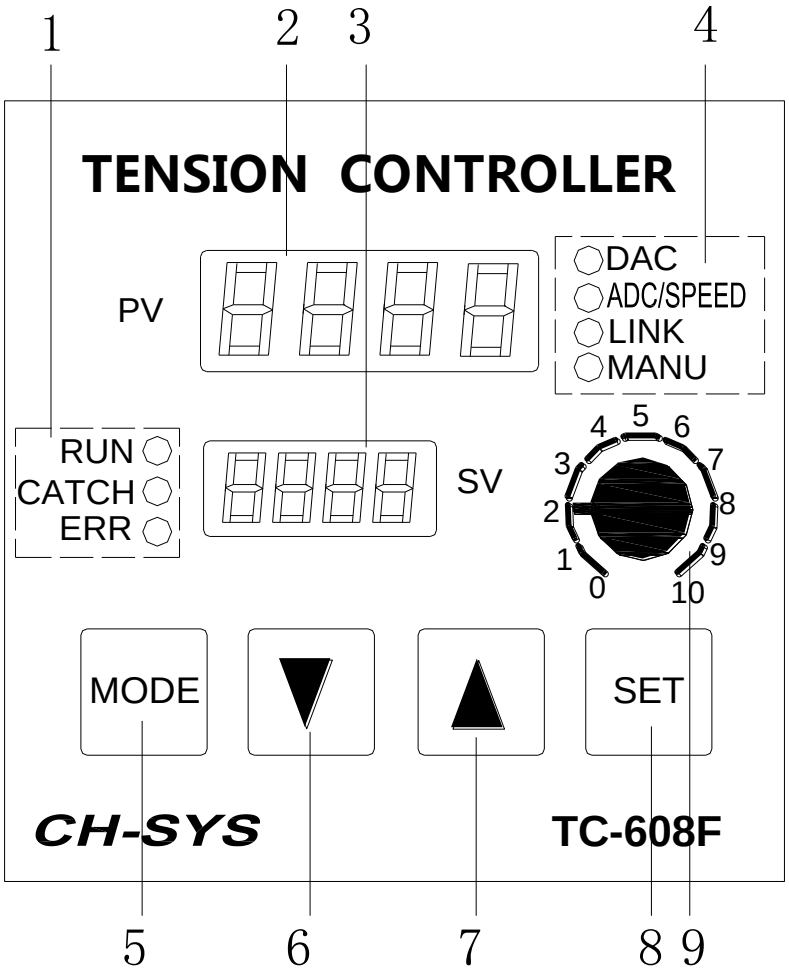
TC-608F is an ultrahigh-precision closed-loop constant tension control system with power supply DC24 and 96x96 housing dimensions, CH-SYS has developed for the plastics, thin film, coating, electric cord, cable, steel plate, textile, paper, and other industries.

特点说明 Features:

一、 采用创新型算法只用一个敏感度参数调整张力控制演算，让调试更加简单方便，且张力控制效果远胜于 PID 方式。
二、 采用通用的 96×96 外壳尺寸，方便固定安装。
三、 具备 14 位元分辨率高精度控制输出。
四、 选用桥式应变计方式传感器，极低温度系数和零点漂移，且精确度和线性度极高。
五、 按键式张力零点、线性校正，操作简单实用。
六、 内含高精度张力放大电路，张力传感器可直接接入。
七、 具有智能判别主速度变化情况，自动做加速、减速、停止机械惯量补偿功能。
八、 多级错误报警输出，可警告现场操作人员错误情况。
九、 具备二级通行密码权限保护，防止操作人员误操作。

1.Adopting innovative algorithm to adjust tensional control program by only one sensitivity parameter, which makes adjustment simpler and easier. Besides the tensional control effect is much better than PID method.
2.Adopting universal housing dimensions 96x96 easier for mounting.
3.Comes equipped with high-precision control system of 14 bit resolution.
4.Selecting the transducer by bridge type strain gauge, very low temperature coefficient and zero drift, and very high accuracy and linearity.
5.Tension zero and linear correction by button, which operates simply and practically.
6.Equipped with high-precision tension amplifying circuit, tensional transducer can be connected directly.
7.Completed with intelligent judge to master velocity change, then automatically process the function, likes acceleration, deceleration,stop mechanical inertia compensation.
8.Multi-class error alarm output, which give operator a warning about error statuses.
9.Equip with 2nd-class passcode protection of usage right, which can prevent from mis-operation.

2. 面板功能说明 Control Panel Description



1	运行状态指示灯 注1 Operation status indicator Note 1
2	实际张力/输出量/线速度显示 Actual tension/output/linear speed display
3	张力设定值显示 Tension setting display
4	显示状态指示灯 注2 Status indicator Note 2
5	参数进入键/张力校正模式进入 Parameter access key/enter tension correction mode
6	张力设定加键/参数内容修改 Tension setting increase key/change parameters
7	张力设定减键/参数内容修改 Tension setting decrease key/change parameters
8	参数内容ENTER/警报解除键 Enter parameters/alarm termination key
9	手动基准电压设定旋钮 Knob to set base voltage by manual

注1：运行状态LED灯指示说明

Note 1: LED lamp Indication for operation

RUN	运转指示灯 Operation indicator
CATCH	张力控制捕捉灯 Tension catching indicator
ERR	异常指示灯 Error indicator

注2：显示状态LED灯指示说明

Note 2: LED lamp Indication for status

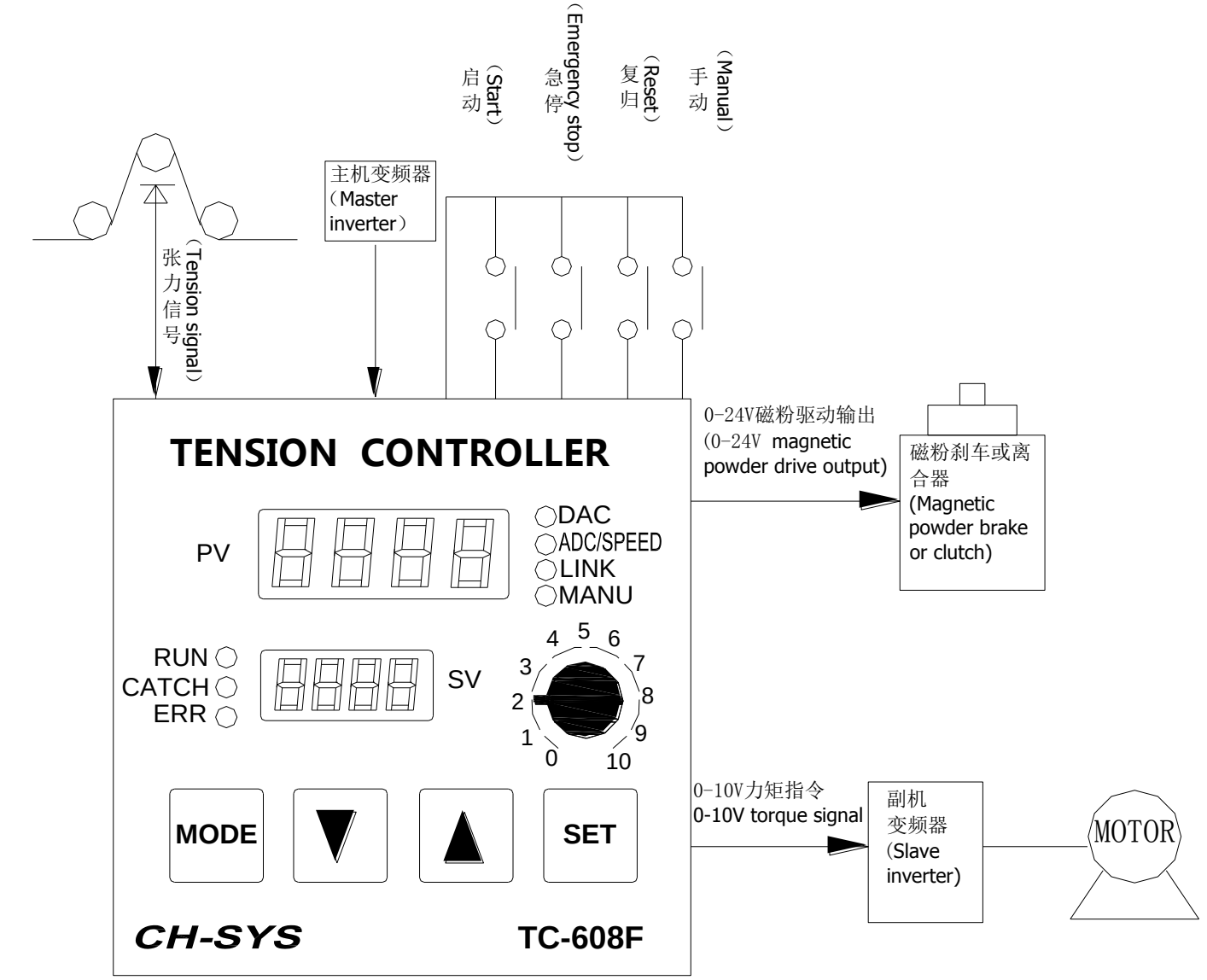
DAC	输出电压显示 Voltage output
ADC/SPEED	线速度显示 Linear speed
LINK	通讯指示灯 Communication indicator
MANU	手动状态 Manual status

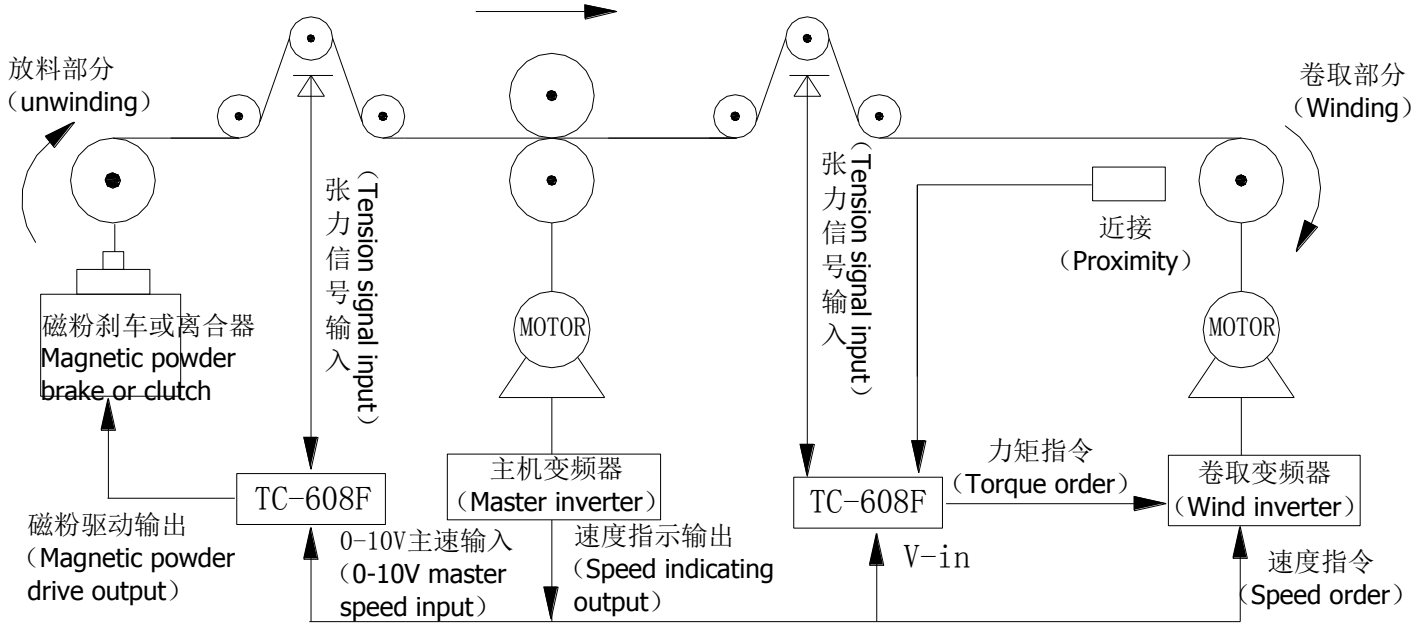
3. 输入输出状态查看操作流程 Flowchart for Checking Input/Output Status

4.电气特性 Electrical Characteristics

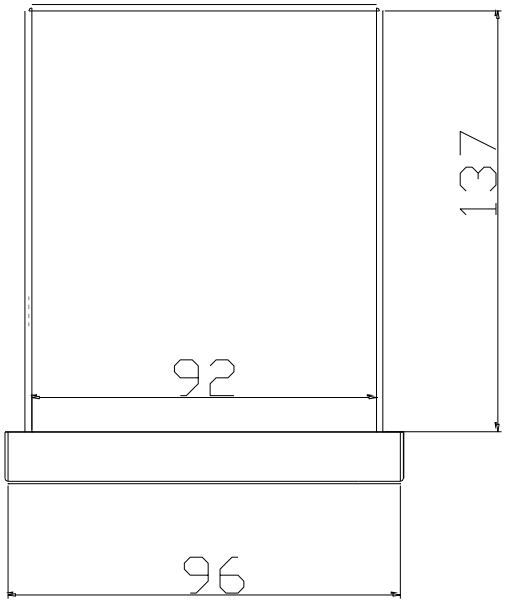
电源电压 Voltage	DC 24V 5A	
消耗功率 Power consumption	100W 以下 100W or less	
控制接点输入 Control contact input	NPN 输入 光藕合隔离 NPN input Photo coupling isolated	
张力检出器 EXC 电源供应 Tension detector EXC power supply	9.0V±5% DC 50mA	
张力检出器讯号输入 Tension detector signal input	桥式应变计 Bridge strain gauge	规格：5、10、20、30、50、100、250、450KG （低于 1KG ，特别说明） Specifications: 5,10,20,30,50,100,250,450KG （ please indicate if less than 1KG）
A/D 输入解析 A/D input analysis	张力入力:14 Bit Tension input:14 Bit	DC:0-20mv,0-30mv
	主速入力:12 Bit Master speed input:12 Bit	DC:0-10V
D/A 输出解析 D/A output analysis	张力控制输出 14 Bit Tension control output 14 Bit	DC:0-10V
继电器输出 Relay output	a 接点, 250V AC, ≦1A a contact, 250V AC, ≦1A	
磁粉驱动电压输出 Magnetic powder driven voltage output	0-24V、电流最大 3A 0-24V 、maximum electric current 3A	控制磁粉刹车或离合器 Control magnetic powder brake or clutch

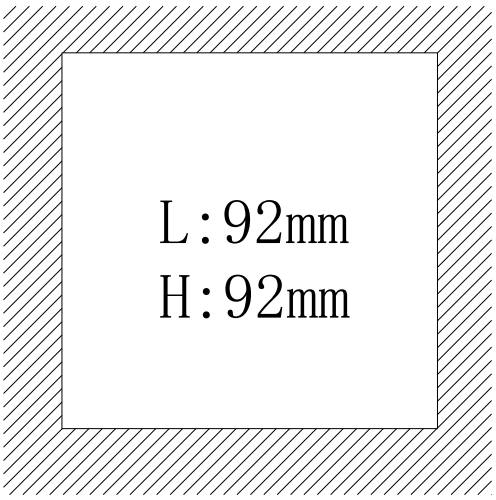
5. 工作示意图 Operation Diagram

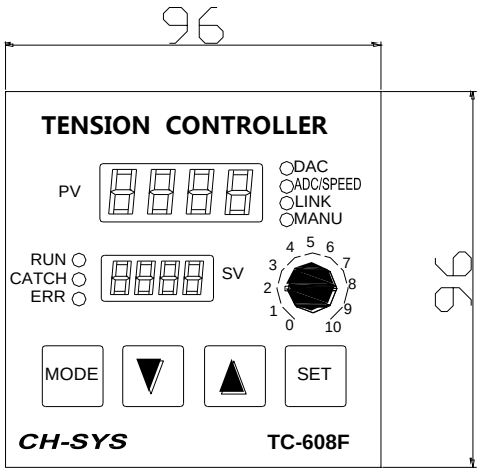


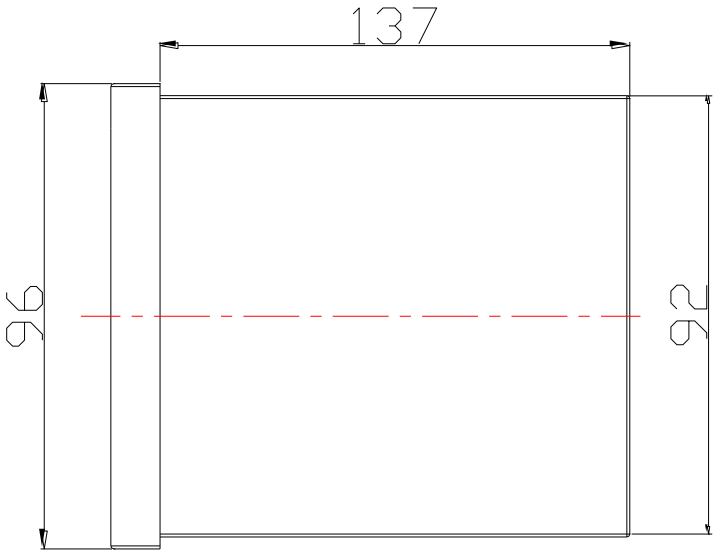


6. 外部尺寸及固定位置说明 External Dimensions and Fastening Positions





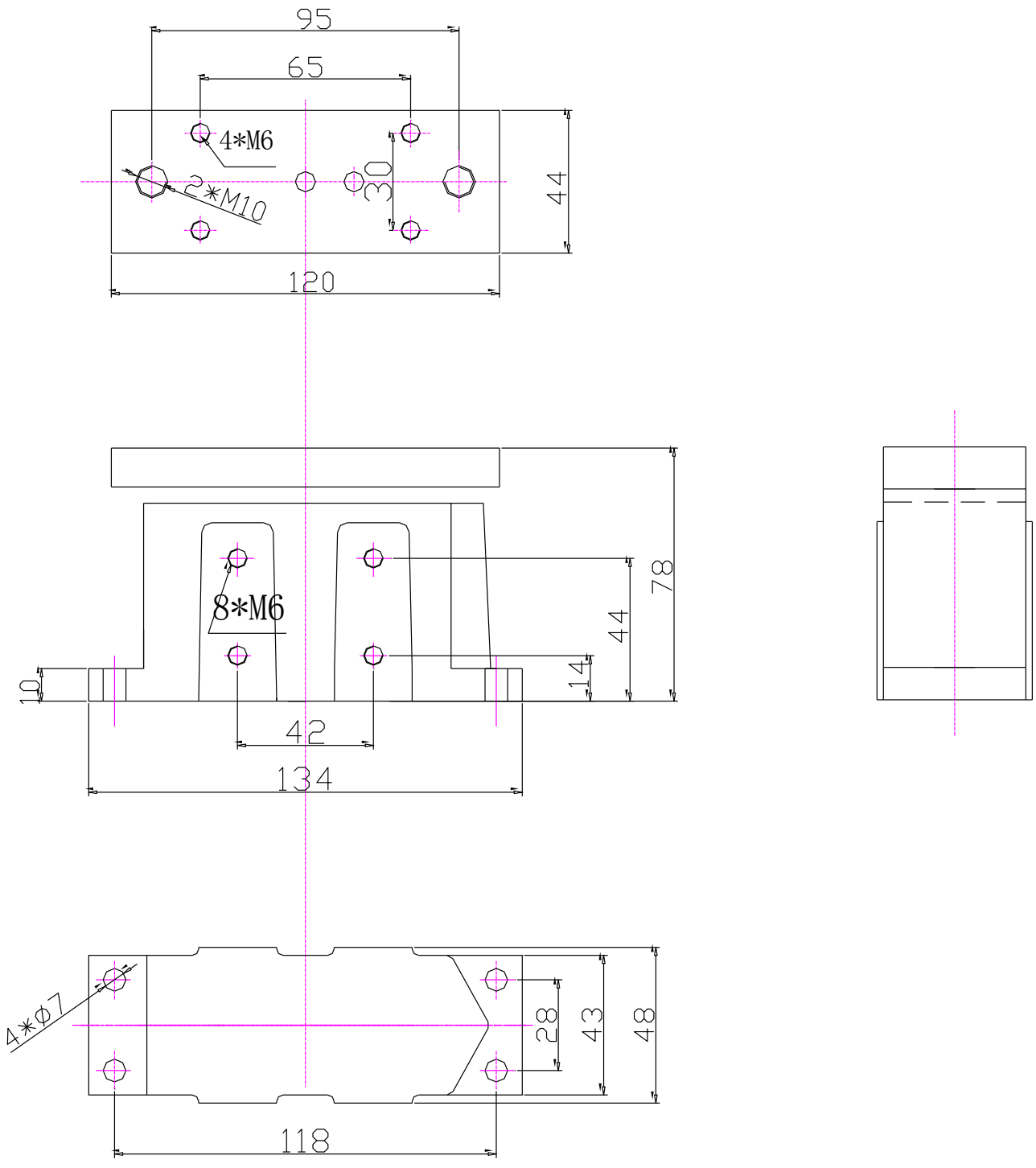




7. 张力检出器安装及接线方式 Tension Transducer installation & connections

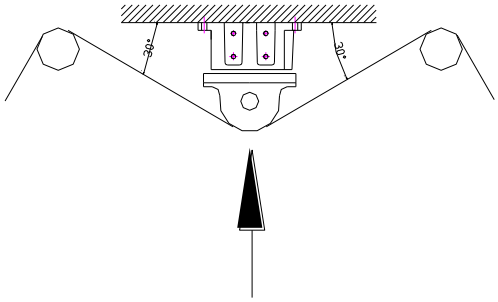
a)张力传感器安装尺寸图 Specifications for Tension Transducer Installation

单位：mm



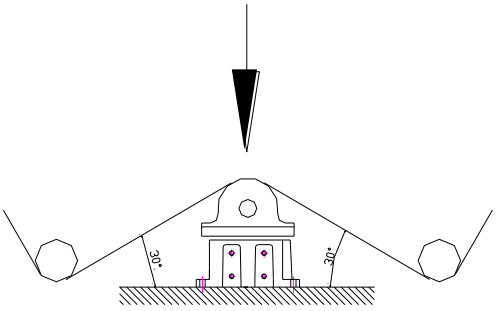
b)张力传感器安装注意事项 Notice for Tension Transducer installation

水平倒装时，安装在传感器上的罗拉自身重量，建议不超过传感器量程范围的20%，其它注意事项请参考水平安装方式说明。
（When horizontally, reversely installed, the weight of the roller installed on the transducer is recommended to not exceed 20% of the range that can be measured by the transducer. Please refer to the horizontal installation method for other points to note.
）



水平倒装
（Horizontal, reverse installation）

建议安装方式：张力传感器水平放置，上面固定罗拉且线材在罗拉上成120度夹角；在安装固定时请勿敲打、撞击，保证受力不超过传感器最大感测范围，生产使用时建议不超过最大量程的80%。
（Recommended installation method: Horizontally place the tension transducer. Fasten the roller with the wire forming a 120-degree angle over the roller. Do not hammer at the roller when fastening and ensure that the force it receives does not exceed its maximum measureable range. When manufactured and used, it is recommended that it does not exceed 80% of the maximum measureable range.
）



水平安装
（Horizontal installation）

垂直安装时，安装在传感器上的罗拉自身重量不超过传感器量程范围的20%，其它注意事项请参考水平安装方式。（When vertically installed, the weight of the roller installed on the transducer shall not exceed 20% of the range that can be measured by the transducer. Please refer to the horizontal installation method for other points to note.
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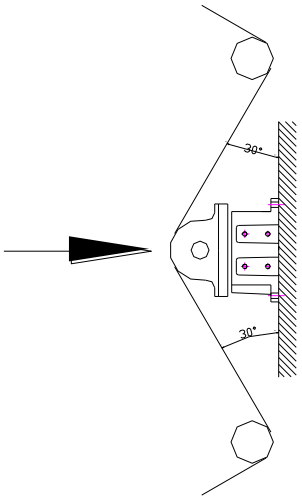
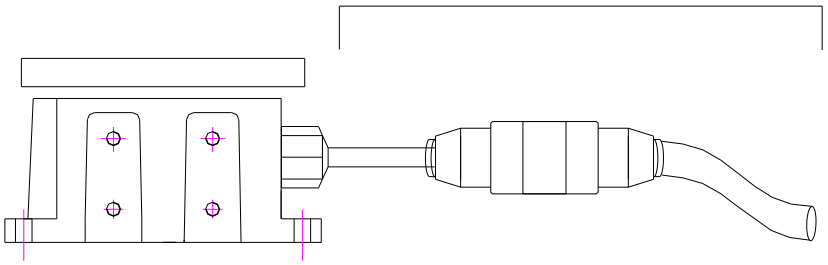


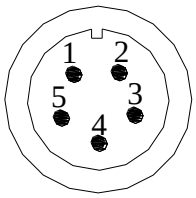
垂直安装
（Vertical installation）

c)张力传感器接线方式 Connections mode

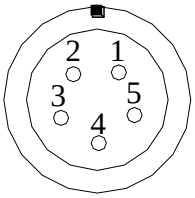
标准品出线部分长度为2M(可特别定制)
Standard cable length 2M (customized available upon request)



对插式接头方便维修更换
(Butt-connection type connector, easy for maintenance and replacement)



5PIN公头
(5 PIN male)



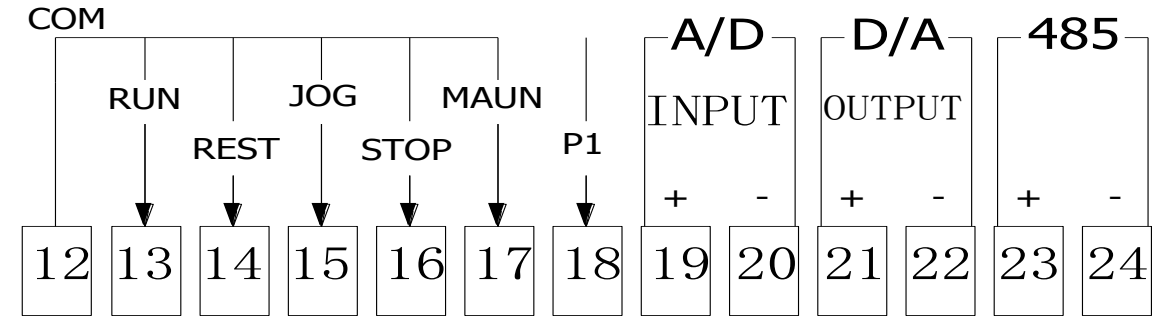
5PIN母头
(5 PIN male)

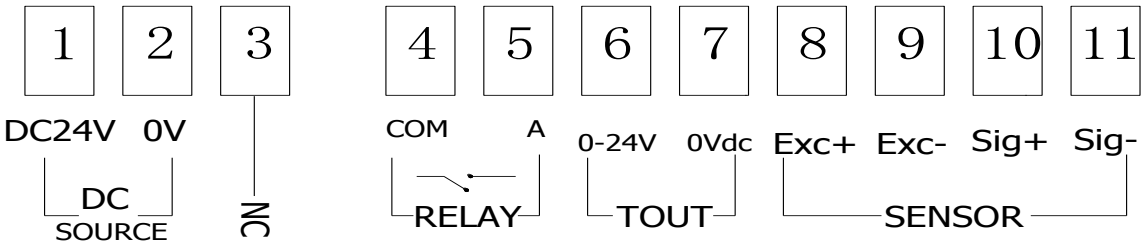
传感器接头接线方式:
(Connections of transducer)

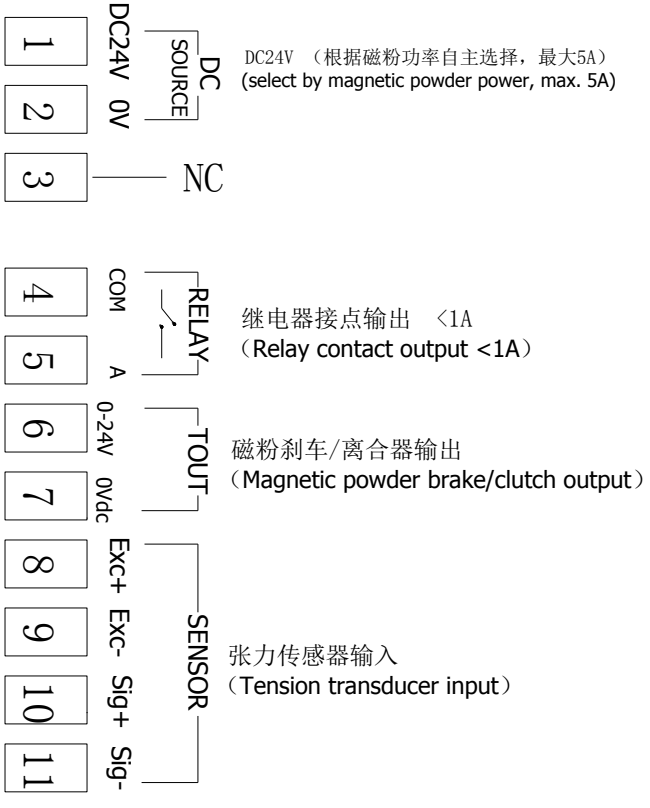
脚位(PIN)	出线颜色(Cable color)
1	红色(red)
2	黑色(black)
3	绿色(green)
4	白色(white)
5	屏蔽线(Shielded wire)

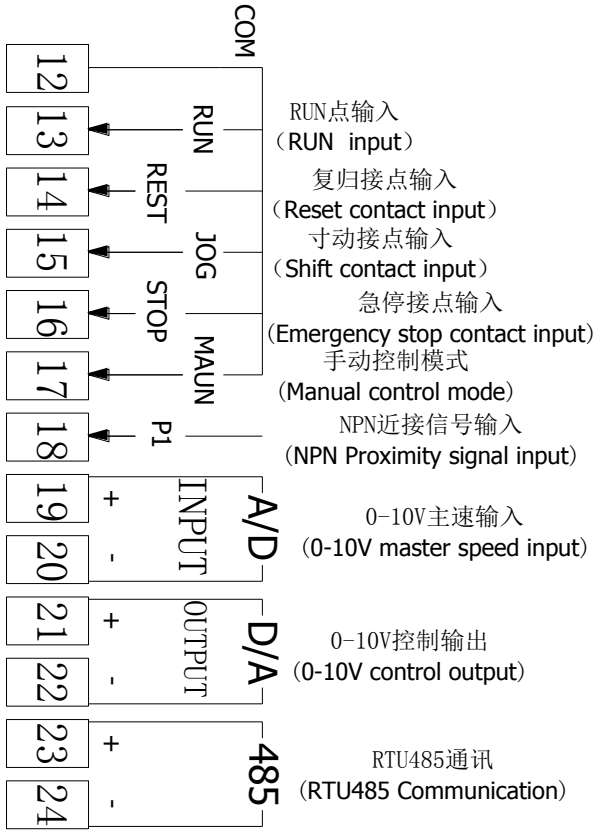
注：图中为标准品配置，其他需求可特别定制。
Note: All articles indicated here are standards, other customized available upon request.

8. 端子接线图及细节说明 Terminals Connection Diagram and Details









注：NC 端子、Exc-端子、0V 端子不可接至地或者机壳，以防损坏。

Note: Avoid any damage, NC contact, Exc-contact, 0V contact can’t be connected to ground or housing,

9. 张力校正模式 Tension Correction Mode

1.张力归零及校正重量（可参照下面张力校正操作流程）Reset the tension to zero and correct the weight (it may refer to below section about Tension correction procedure)

A) 张力校正模式进入 Entering the tension correction mode

在 RUN 点断开状态下，按下面板 MODE+SET 键 3 秒及以上，即进入张力校正模式。

When RUN is disconnected, press MODE+SET for at least 3 seconds to enter the tension correction mode.

B) 扣除辊轮毛重 Deducting the gross weight of the roller wheel

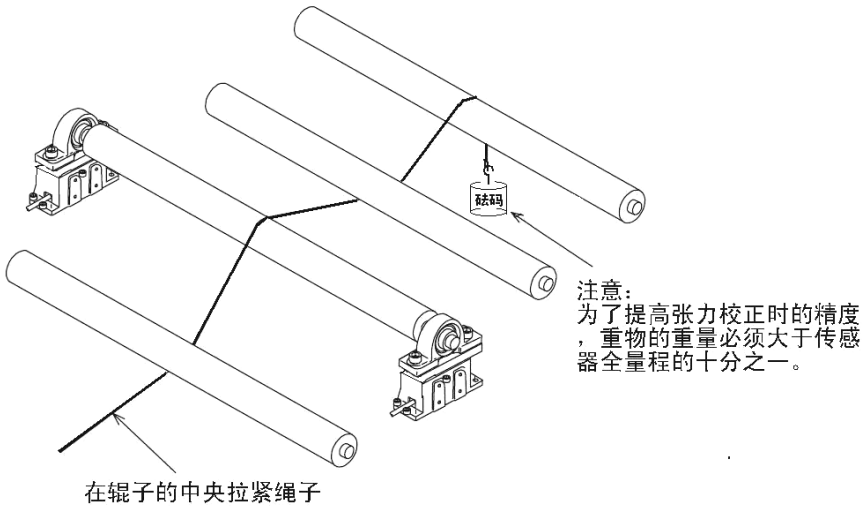
在进入张力校正模式后，下排 LED 灯将闪烁显示“ZERO”字样，表示在张力校正模式扣除毛重状态内，此时按 SET 一次即可自动将 PV 显示处数字归零

After entering the tension correction mode, “ZERO” will show in the LED lamp in the lower row, means the controller is now in the gross weight deducted status of the tension correction mode. Press SET once to reset the PV reading to zero.

C) 线性校正 Linear calibration

在控制器扣除毛重 OK 后，按住 MODE 键 3 秒及以上，控制器将进入线性校正状态，此时控制器下排 LED 灯将闪烁显示“SPAN”字样，此时将一已知重量物体按照走料方向悬挂在辊轮中间位置，如下图所示：

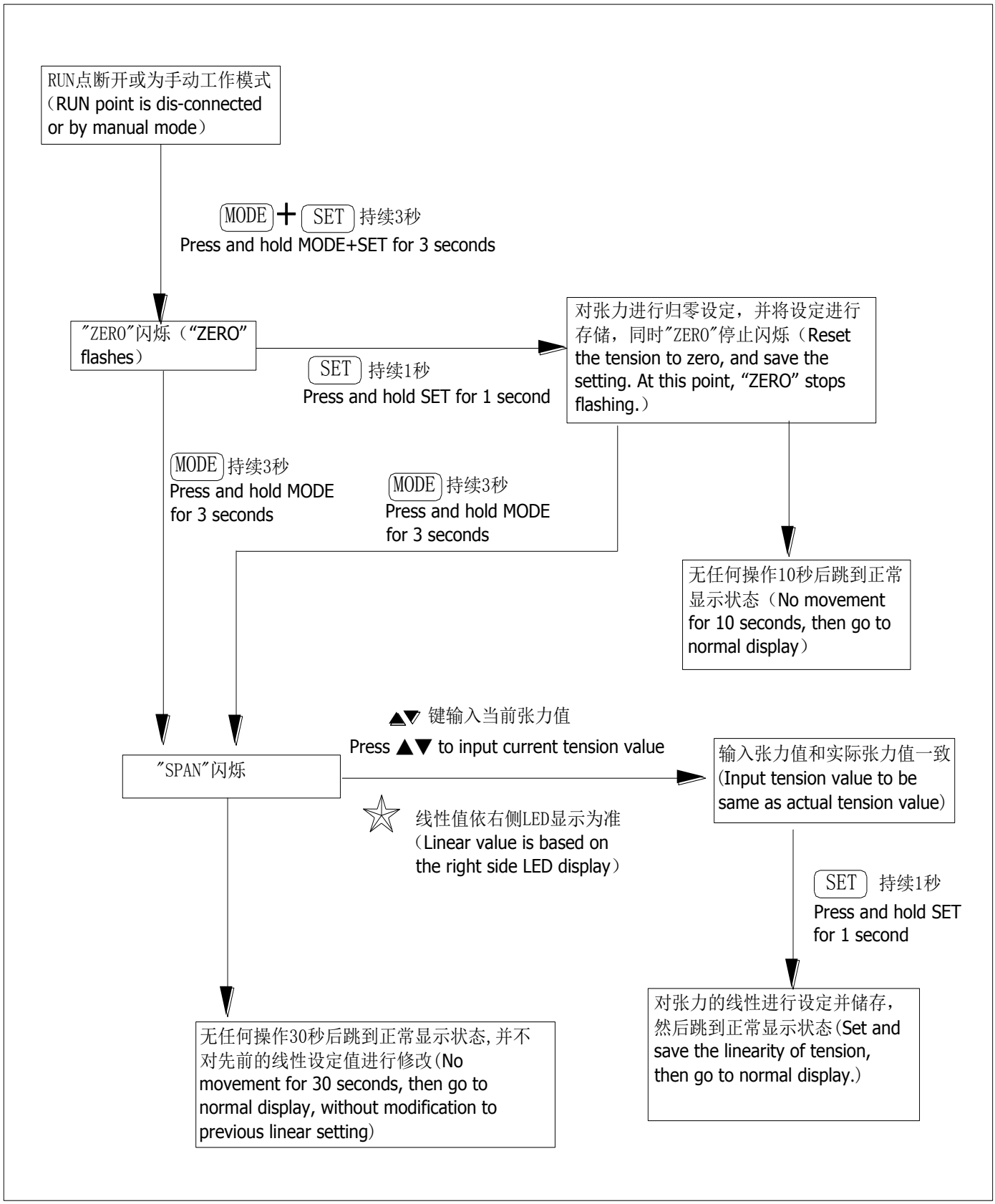
After deducting the gross weight, press and hold the MODE key for at least 3 seconds and the controller’s linear calibration function will be enabled and the LED lamp in the lower left row of the controller will show “SPAN”. Now hang a known heavy object in the middle of the roller wheel according to the moving direction of the material. Example as below:



此时使用面板▲或▼键修正线性值，直到右边 LED 灯显示数值与已知重量一致，按 SET 键确定则张力校正完成。

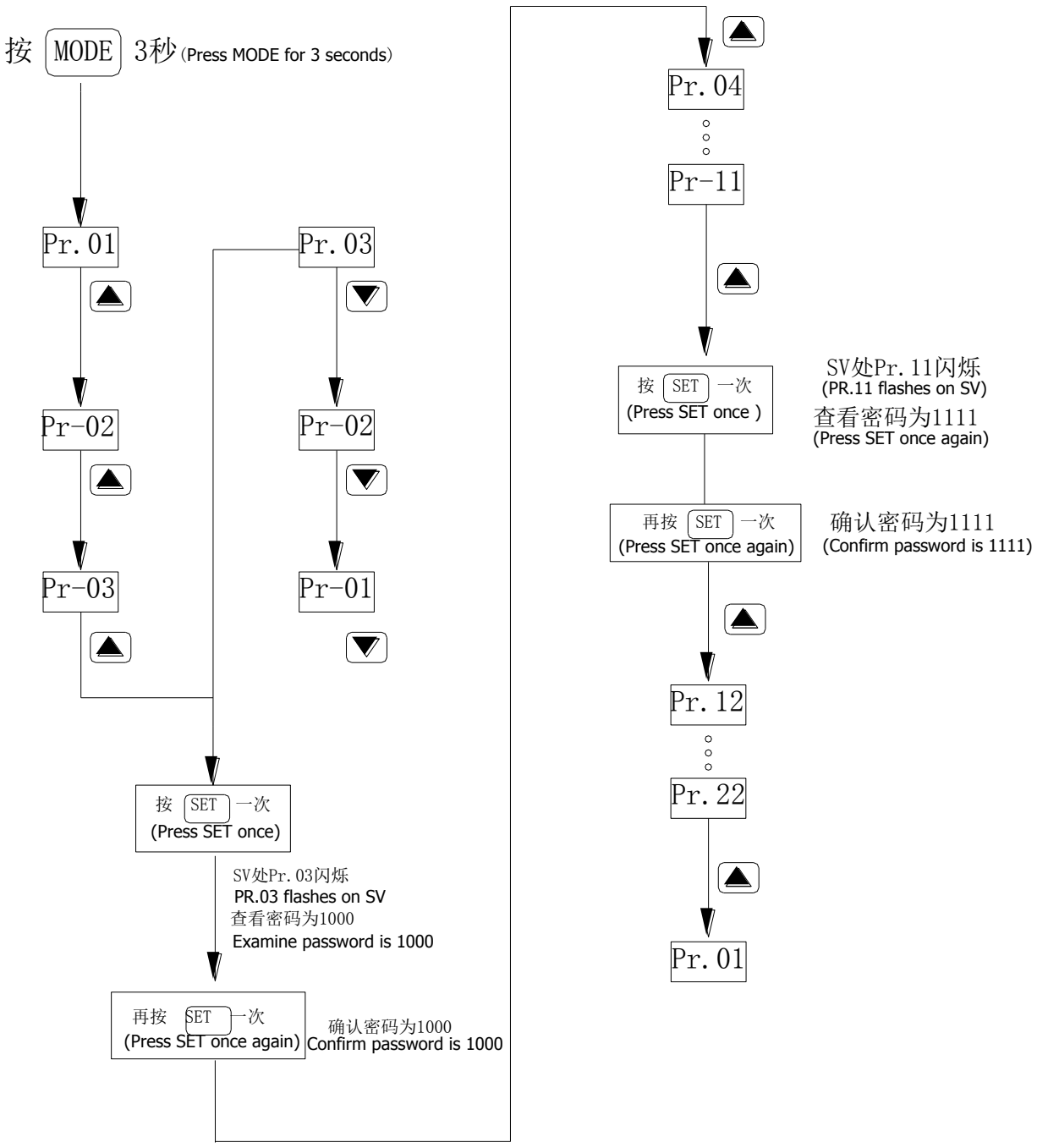
At this point, press ▲ or ▼ to correct the linearity value until the value shown in the right LED lamp is the same as that of the known weight. Press SET to complete the calibration process.

2. 张力校正操作流程图 Tension correction procedure



10. 参数修改模式 Parameters Change Mode

长按 MODE “3秒” 及以上,可进入参数
Press and hold MODE for at least 3 seconds to enter parameter



11.参数及详细内容说明 Parameters and Explanation

项次 Item	参数定义 Description	设定范围 Range	单位 Unit	出厂设定 Factory setting
开放操作参数族 Parameters for open operation				
Pr.01	主速输入 10V 对应最高线速度 Max. linear speed correspond to the master speed input 10V	0-999.9	m/min	100.0
Pr.02	复归启始输出电压值 Resets to the initial voltage output value	0-10.00	V	2.50
Pr.03	密码设定（密码正确后才能修改 Pr.03 以后的参数） Sets the password (Pr.03 and later can be changed only if the password is correct.)	0-9999	Digit	1000
演算参数族 Parameters for calculation				
Pr.04	张力修正敏感度系数 Sensitivity coefficient of tension correction	0.1-10.0	Digit	2.0
Pr.05	张力修正不感带 Irresponsive area when correcting the tension	0-100.00	Digit	0.05
Pr.06	积分演算代入最大电压 Max. voltage by accumulation substituted	0-1.000	V	0.010
Pr.07	D/A 输出上限值 The upper limit to D/A output	0-10.00	V	10.00
Pr.08	主速最低速度偏置电压 The bias voltage when the master runs at the min. speed	0-2.00	V	0.00
显示参数族 Parameters for display				
Pr.9	张力显示时间常数 Time constant for the tension indicating	0.01-10.00	秒 Sec.	1.00
Pr.10	显示与实际输出修正系数 Indicates correcting coefficient for actual output	0.800-3.000	K	1.000
Pr.11	密码设定（密码正确后才能修改 Pr.11 号以后参数） Sets the password (Pr.11 and later can be changed only if the password is correct.)	0-9999	Digit	1111

高级补偿参数族 Parameters for advanced compensation				
Pr.12	急停(STOP)点 ON 时,D/A 输出叠加电压设定 Sets the D/A output superimposed voltage when emergency stop (STOP) is switched on	0-10.00	V	0.20
Pr.13	收/放料选择 Selects between wind and unwind	0-1 0=收料 wind 1=放料 unwind		0
Pr.14	主速加速时,D/A 输出补偿百分比 D/A output compensation percentage when the master accelerates	0-70	%	14
Pr.15	主速减速时,D/A 输出补偿百分比 D/A output compensation percentage when the master decelerates	0-70	%	14
Pr.16	加/减速时,D/A 输出补偿延迟时间 Time delay for D/A output compensation when accelerates/decelerates	0.01-3.00	秒 Sec.	0.01
Pr.17	停车补偿百分比 Compensation percentage as machine stops	0-100	%	0
通讯参数族 Parameters for communication				
Pr.18	Modbus 地址 Modbus address	1-255	Digit	1
Pr.19	Modbus 波特率及通讯格式 Modbus Baud Rate and communication format	0-30	Digit	3
张力回授异常参数族 Parameters for abnormal tension feedback				
Pr.20	实际张力回授上限值 The upper limit to the actual tension feedback	0-999.9	Digit	110.0
Pr.21	实际张力回授下限值 The lower limit to the actual tension feedback	0-999.9	Digit	0.00
Pr.22	断线报警判断时间 Judging time for dis-connection alarm	0-100.0	秒 Sec.	0.00
Pr.23	张力小数点位置 Tension decimal point	0-3	Digit	2
Pr.24	张力补偿 P 值 Tension compensation P Gain	0.00-10.00	mv	1.00

参数详细内容说明 Explanation of parameters：

参数项次 Item	参数定义 Definition	参数内容说明 Explanation
开放操作参数族 Parameters for open operation		
Pr.01	主速输入 10V 对应最高线速度 Max. linear speed correspond to the master speed input 10V	主速输入 10V 对应最高线速度设定，当控制器线速度显示与实际不符合时，可调整此参数修正 Sets max. linear speed corresponding to the master speed input 10V. When the controller's linear speed reading does not match the actual speed, this parameter may be changed.
Pr.02	复归启始输出电压值 Resets to the initial voltage output value	此参数为 REST 点投入时，D/A 输出电压将被复归至参数设定值 When the REST is enabled, D/A output voltage will be reset to the pre-set value.
Pr.03	密码设定（密码更改后才能修改 Pr.3 以后的参数） Sets the password (Pr.05 and later can be changed only if the password is changed.)	出厂值:1000·通行密码需设为 1000,才可进入 Pr04-Pr11 参数进行变更，此项参数为保护参数.（注：此参数默认值为 1000，每次断电重启后必须按面板二次进行密码修改确认后方能进入后面的参数项） Factory setting: 1000. The password must be set at 1000 so that Pr04- Pr11 may be accessed and changed. This parameter is protected. (Note: the default value of this parameter is 1000. Every time as the power shut-down and re-power-on, it must press twice on the panel to process password confirmation, then entry into the other parameters afterward.)
演算参数族 Parameters for calculation		
Pr.04	张力修正敏感度系数 Sensitivity coefficient of tension correction	张力修正敏感度调整，当设定越大时，修正越快，易导致振荡，正常设定为 2.0 即可 Adjusts the tension correction sensitivity. The greater the setting, the quicker the correction, which tends to cause vibration. Normally, this parameter is set at 2.0.
Pr.05	张力修正不感带 Irresponsive area when correcting the tension	此参数为张力设定点,Digit 为控制修正不反应范围 · 单位：Kg/N/LB This parameter shows the pre-set tension. Digit is for adjusting the irresponsive range. Unit: Kg/N/LB

Pr.06	积分演算代入最大电压 Max. voltage by accumulation substituted	设定积分演算代入的最大电压修正量，设定越大，修正反应越快越灵敏！ Sets max. voltage correction when accumulation substituted. The greater the setting, the quicker and sharper the correction response!
Pr.07	D/A 输出上限值 The upper limit to D/A output	设定 D/A 输出上限值，以防止张力过大损坏材料 Sets the upper limit to D/A output to prevent excessive tension from damaging the material.
Pr.08	主速最低速度偏置电压 The bias voltage when the master runs at the min. speed	线速度最低速度偏置电压设定，当主速输入电压大于本参数设定值时控制器启动演算机制 Sets the bias voltage when the master runs at the min. linear speed. When the master speed voltage input is greater than this setting, the system will start the calculating mechanism.
显示参数族 Parameters for display		
Pr.9	张力显示时间常数 Time constant for the tension indicating	实际张力对应显示时间快慢设定 Sets the speed of time reading corresponds to the actual tension.
Pr.10	显示与实际输出修正系数 Indicates correcting coefficient for actual output	D/A 输出显示会因磁粉线性不一致,输出显示会有不一致现象，可由此参数设定一致性 The D/A output reading will be inconsistent because the magnetic powder linearity is inconsistent. This parameter may be used to ensure consistency.
张力退绕参数族 Parameters for tension unwind		
Pr.11	密码设定（密码更改后才能修改 Pr.11 号以后参数） Sets the password (Pr.11 and later can be changed only if the password is changed.)	出厂值:1111·通行密码需设为 1111,才可进入 Pr12-Pr22 参数进行设定,此项参数为保护参数.（注：此参数默认值为 1111，每次断电重启后必须按面板二次进行密码修改确认后方能进入后面的参数项） Factory setting: 1111. The access password must be set at 1111 in order to access and change Pr12- Pr22. This parameter is protected. (Note: the default value of this parameter is 1111. Every time as the power shut-down and re-power-on, it must press twice on the panel to process password confirmation, then entry into the other parameters afterward.)
高级补偿参数族 Parameters for advanced compensation		
Pr.12	急停(STOP)点 ON 时,D/A	此参数为 STOP 点投入使用时，D/A 电压将叠加此电

	输出叠加电压设定 Sets the D/A output superimposed voltage when emergency stop (STOP) is switched on	压后输出，同时 D/A 将停止 PID 演算 When STOP is enabled, the D/A voltage will be output after this voltage is superimposed on it and D/A will stop PID calculating.
Pr.13	收/放料选择 Selects between wind and unwind	0:卷取 1:放料 可设定 TC-608F 是使用于卷取或放料控制模态 0: Wind 1: Unwind Selects between the wind and unwind control mode for TC-608F.
Pr.14	主速加速时,D/A 输出补偿百分比 D/A output compensation percentage when the master accelerates	捲取工作模式加速时，增加张力百分比； 放料工作模式加速时,减少张力输出百分比。 To increase the tension percentage, when accelerating while winding; to decrease the tension output percentage, when accelerating while unwinding.
Pr.15	主速减速时,D/A 输出补偿百分比 D/A output compensation percentage when the master decelerates	捲取工作模式减速时，减少张力百分比； 放料工作模式减速时，增加张力输出百分比。 To decrease the tension percentage, when decelerating while winding; to increase the tension output percentage, when decelerating while unwinding.
Pr.16	加速/减速时,D/A 输出补偿延迟时间 Time delay for D/A output compensation when accelerates/decelerates	加减速补偿延迟时间，配合主速加减速时间设定 Sets the time delay of compensation, according to the time when the master accelerates/decelerates.
Pr.17	停车补偿百分比 Compensation percentage as machine stops	当主速输入电压<PR.08 参数设定电压值时，控制器进入停车模式，同时 LED 灯闪烁亮起，此时输出电压会减去相应补偿百分比电压。 When the master input voltage is smaller than the voltage set by PR.08, the controller enters the mode of machine stops, meanwhile LED flashes, at which time the output voltage will deduct the corresponding voltage by compensation percentage.
通讯参数族 Parameters for communication		
Pr.18	Modbus 地址 Modbus address	RS485 通讯位址设定 Sets RS485 communication address

Pr.19	Modbus 波特率及通讯格式设定 Modbus Baud Rate and communication format	通讯格式 Communication format	波特率 Baud Rate
		8/N/2	1:2400/2:4800/3:9600/4:19200/5:38400
		8/0/2	6:2400/7:4800/8:9600/9:19200/10:38400
		8/E/2	11:2400/12:4800/13:9600/14:19200/15:38400
		8/N/1	16:2400/17:4800/18:9600/19:19200/20:38400
		8/0/1	21:2400/22:4800/23:9600/24:19200/25:38400
		8/E/1	26:2400/27:4800/28:9600/29:19200/30:38400
张力回授异常参数族 Parameters for abnormal tension feedback			
Pr.20	实际张力回授上限值 The upper limit to the actual tension feedback	回授张力上限值设定，当回授张力大于此上限时，继电器常开点闭合 Sets the upper limit to the tension feedback. When the tension feedback is greater than this limit, NO point of the relay will close.	
Pr.21	实际张力回授下限值 The lower limit to the actual tension feedback	回授张力下限值设定，当回授张力低于此下限时，继电器常开点闭合，当设定为 0.00 时则报警取消。 Sets the lower limit to the tension feedback. When the tension feedback is smaller than this limit, NO point of the relay will close. Alarm call off as set at 0.00.	
Pr.22	断线判断时间 Judging time for dis-connection	当此参数设定为 2.0 秒时，去判断 P1（第 18 脚）是否有近接信号输入，若无则表示断线异常！ 注 1 Set this parameter at 2.0 sec.to judge P1 (Pin 18) if there is proximity signal input, if no, means dis-connection abnormally. Note 1	
Pr.23	张力小数点设定 Tension decimal point	当张力实际需要设定不同小数点显示时，可设定此参数更改 When the tension of the actual need to set different decimal display, this parameter can be set to change	
Pr.24	张力补偿 P 偿 Tension compensation P Gain	当瞬间惯量太大时，请设定此参数进行修正 When the moment of inertia is too big, please set this parameter correction	

注 1：当 PR.22 参数设定为 0.0 时，断线报警功能将失效！

Note 1: Set PR.22 at 0.0, function of dis-connection alarm is in vain.

MODBUS RTU 通讯寄存器地址说明

Explanation of MODBUS RTU communication registers address

MODBUS No.	參數編號 Parameter No.	內容說明 Description	R/W
0		張力顯示值 Tension reading	R
1		主速讀入值 Master speed reading	R
2		輸出電壓值 Output voltage	R
3		錯誤碼 Error code	R
4		張力設定值 Tension setting	R/W
5	PR01	10V 对应最高速度設定,m/min Maximum speed setting corresponding to 10V, m/min	R/W
6	PR02	複歸啟始電壓設定 Resets to the initial voltage setting	R/W
7	PR03	密碼設定 1 Sets password 1	R/W
8	PR04	敏感度調整 Adjusts the sensitivity	R/W
9	PR05	不感帶 The irresponsive area	R/W
10	PR06	积分代入电压设定 Sets accumulation substituted voltage	R/W
11	PR07	D/A 最高上限值 The upper limit to the D/A	R/W
12	PR08	最低速度偏置電壓 The bias voltage when the master runs at the minimum speed	R/W
13	PR09	張力顯示時間 The time to indicate the tension	R/W
14	PR10	磁粉 0-24V 輸出顯示 K 值 K value for Magnetic powder 0-24V output and indication	R/W
15	PR11	密碼設定 2 Sets password 2	R/W
16	PR12	急停補償偏置電壓 Compensation bias voltage as emergency stop	R/W
17	PR13	收/放料選擇 Selects between wind and unwind	R/W
18	PR14	加速補償百分比 Acceleration compensation percentage	R/W
19	PR15	減速補償百分比 Deceleration compensation percentage	R/W
20	PR16	加/減速補償延遲時間 Time delay as acceleration/deceleration compensation	R/W
21	PR17	停车补偿百分比 Compensation percentage as machine stops	R/W
22	PR18	MODBUS Address	R/W
23	PR19	MODBUS Baud Rate	R/W
24	PR20	回授上限值 The upper limit to the feedback	R/W
25	PR21	回授下限值 The lower limit to the feedback	R/W
26	PR22	断线判断时间 Judging time for dis-connection	R/W
27	PR23	张力小数点位置 Tension decimal point	R/W
28	PR24	张力补偿 P 值 Tension compensation P Gain	R/W

12. 错误状态说明 Error Statuses

TC-608F 内部有一套完善的故障判断机制，根据现场出现错误情况作出相对应错误提示: TC-608F has a sound built-in self-evaluation mechanism that can present corresponding error messages based on the error condition on the shop floor:

代码 Code	对应状态 Corresponding status	说　　明 Description
ERR1	HI	D/A 输出至 Pr.07，张力不变化超过 2 秒 As D/A output to PR.07, the tension no change exceeds two seconds.
ERR2	LO	D/A 输出至 0V，张力不变化超过 2 秒 As D/A output to 0V, the tension no change exceeds two seconds
ERR3	OP	磁粉输出异常 Abnormal magnetic powder output
ERR4	断线报警 Dis-connection Alarm	PR.22 设定时间到时，P1 信号未进入到控制器，则出现报警异常 Time is up to PR.22 setting, but P1 signal does not enter into controller, then presents Alarm abnormally.
ERR5	当前实际张力 Current actual tension	实际张力值超过了 PR.20 最大张力设定值 Actual tension is greater than that set by Pr. 20.
	当前实际张力 Current actual tension	实际张力值低于 PR.21 最小张力设定值 Actual tension is smaller than that set by Pr. 21.

注：当控制器出现上述错误状况时，按 SET 健 2 秒及以上即可解除，若警报未正确排除时，控制器会重复报警提醒！

Note: In the event of any of the above errors, press SET for at least two seconds to eliminate the error. If the alarm is not correctly removed, the controller will repeatedly sound the alarm!

13.现场调试操作步骤 Shop Floor Operating and Adjusting Procedures

一、送电前确认 Check-up before power-on

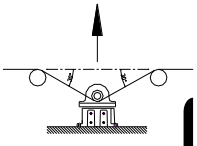
NO.	说明 Description	OK	NG	备注 Remark
1	DC24V 输入端子 1.2 脚 DC24V input Pins 1 and 2 of terminal			注 1 Note 1
2	张力传感器输入 Tension transducer input			注 2 Note 2
3	多功能接点（RUN、STOP、REST、MANU、PID/OFF） Multi-function contact(RUN、STOP、REST、MANU、PID/OFF)			注 3 Note 3
4	D/A 模拟输出 D/A analog output			注 4 Note 4
5	A/D 模拟输入 A/D analog input			注 5 Note 5
6	磁粉输出 Magnetic powder output			注 6 Note 6
7	继电器接点输出 Relay contact output			注 7 Note 7

注 1：测量确认电源电压是为直流 24V，5A。

Note 1: Examine and ensure if power voltage is by DC24V, 5A.

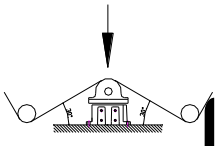
注 2： 张力传感器接线请参考第 12 页接线图示，标配传感器颜色定义：

Note 2: Please refer to the diagram on page 12 for the wiring for the tension transducer. Definitions of colors:



反拉受力 Pull force

红色线 Red wire---Exc+
黑色线 Black wire---Exc-
绿色线 Green wire---SIG+
白色线 White wire---SIG-



正压受力 Push force

红色线 Red wire---Exc+
黑色线 Black wire---Exc-
白色线 White wire---SIG+
绿色线 Green wire---SIG-

注 3：确保多功能接点 RUN、STOP、RESET、PID/OFF、MANU 和 COM 点为干接点或者 NPN 输入方式。

Note 3: Ensure multi-function contact RUN、STOP、RESET、PID/OFF、MANU and COM are dry contact or by NPN input.

注 4：请检查连接至 D/A 输出的变频器、直流调速器等执行驱动单元的输入阻抗是否至少大于 1K 欧姆。

Note 4: Examine if input resistance of actuating drive unit, such as inverter, DC speed regulator, etc., which connects to D/A output is greater than 1K OHM.

注 5：检查 A/D 主速输入信号是否为 0-10V 直流指令。

Note 5: Examine if A/D master speed input signal is 0-10V DC order.

注 6：使用磁粉刹车或离合器时接上磁粉输出端子(0-24V、0Vdc)。并确保磁粉输出不会出现短路情况(建议在磁粉输出端安装保险丝)。

Note 6: Connects magnetic powder output terminal (0-24V、0Vdc) when use magnetic powder brakes or clutch, and ensure no short on magnetic powder output.(suggestion: put a fuse at magnetic powder output end)

注 7：确保通过继电器接点（COM、A）之间的电流不超过 1A。

Note 7: Ensure the electric current thru Relay contact（COM、A）is smaller than 1A.

二. 通电测试 Power-on test

经由送电前检测完成后，即可进行电源投入，电源投入时 TC-608F 的 LED 数码显示需全亮后才能再执行后续设定程序步骤（此时，暂不能直接投入运行，会有力矩过大危险）

After the pre-power-on test is completed, Power may be turned on. After which, all the TC-608F LED numeric indicators must light up and the subsequent setting steps are performed (at this point, the controller cannot operate, or the torque may be excessively high).

1. RUN 点投入测试 Enabling RUN

短接接线端子的第 12(COM)脚与 13(RUN)脚，控制器进入运行状态，面板 RUN 灯闪烁亮起，RUN 点亮起时，可作下叙简单测试。

Short the pins of the 12th (COM) and 13th (RUN) of the terminal and the controller enters the operation mode and the RUN lamp on the panel flashes. When the RUN lamp is lit, perform the following simple tests.

2. A/D 输入测试 A/D input test

端子第 19 脚、第 20 脚 A/D INPUT 输入 DC 0-10V，即 A/D 主速输入至控制器，将 LED 显示状态切换到 A/D 显示状态，此时查看数值显示是否正常，若没有请检查主速输入部分接线。**注：不使用主速时请将 Pr.08(主速最低速度偏置电压)设为 0.00。**

Inputs DC 0-10V to pins of 19th and 20th of terminal for A/D INPUT, i.e. A/D master speed inputs to the controller. Switch LED display status to A/D display status and check if reading value is normal. Check the connection of the master speed input if the reading value is abnormal. **Note: Please set Pr.08 (the bias voltage when the master runs at the minimum speed)at 0.00 if not use the master speed.**

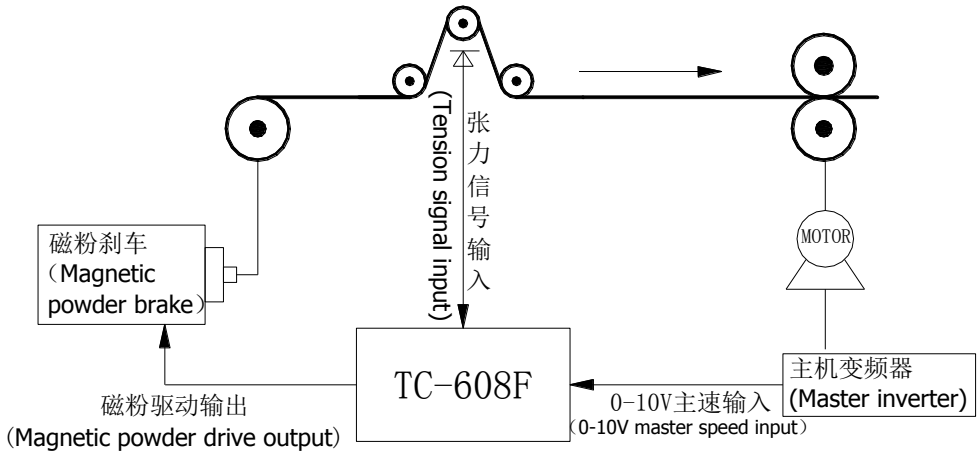
3. 手动 D/A 及磁粉控制输出测试 Manual D/A and magnetic powder control output test

把 MANU 功能接点和 COM 点短接时，控制器即进入手动控制模式，同时对应按键上方的 LED 灯亮起，此时输出电压完全取决于面板 VR 旋钮控制，但注意 VR 旋钮的最大电压仍受限于参数 PR.07（**张力修正 D/A 输出最高上限值**）！旋转 VR 测试 D/A 输出(第 21 脚、第 22 脚)电压是否与右边 LED（D/A 显示模式）一致

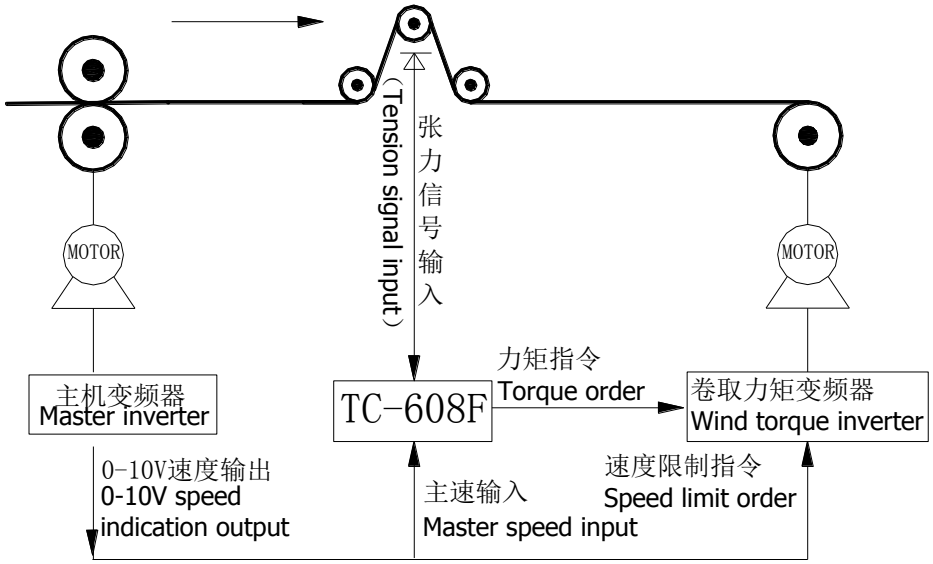
Short MANU function contact and COM point, the controller enters the manual mode and the LED lamp above the corresponding key is lit. Now the output voltage is totally controlled by VR knob on the panel. Note that the maximum voltage of VR knob cannot exceed that set by **PR.07 (the upper limit to D/A output when correcting the tension)**. Turn the VR to find out whether D/A output (Pin 21、Pin 22) voltage is the same as shown in the LED (D/A indication mode) on the right.

三. 控制方块图 Control Block Graph

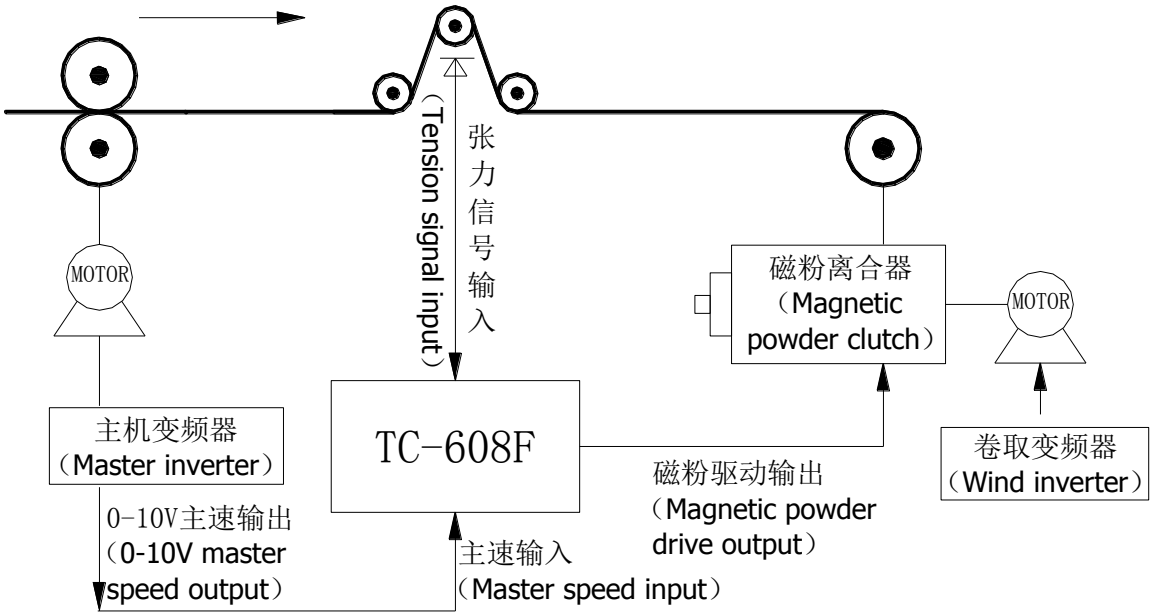
A.用作磁粉刹车放料（Used in magnetic powder brake unwind）



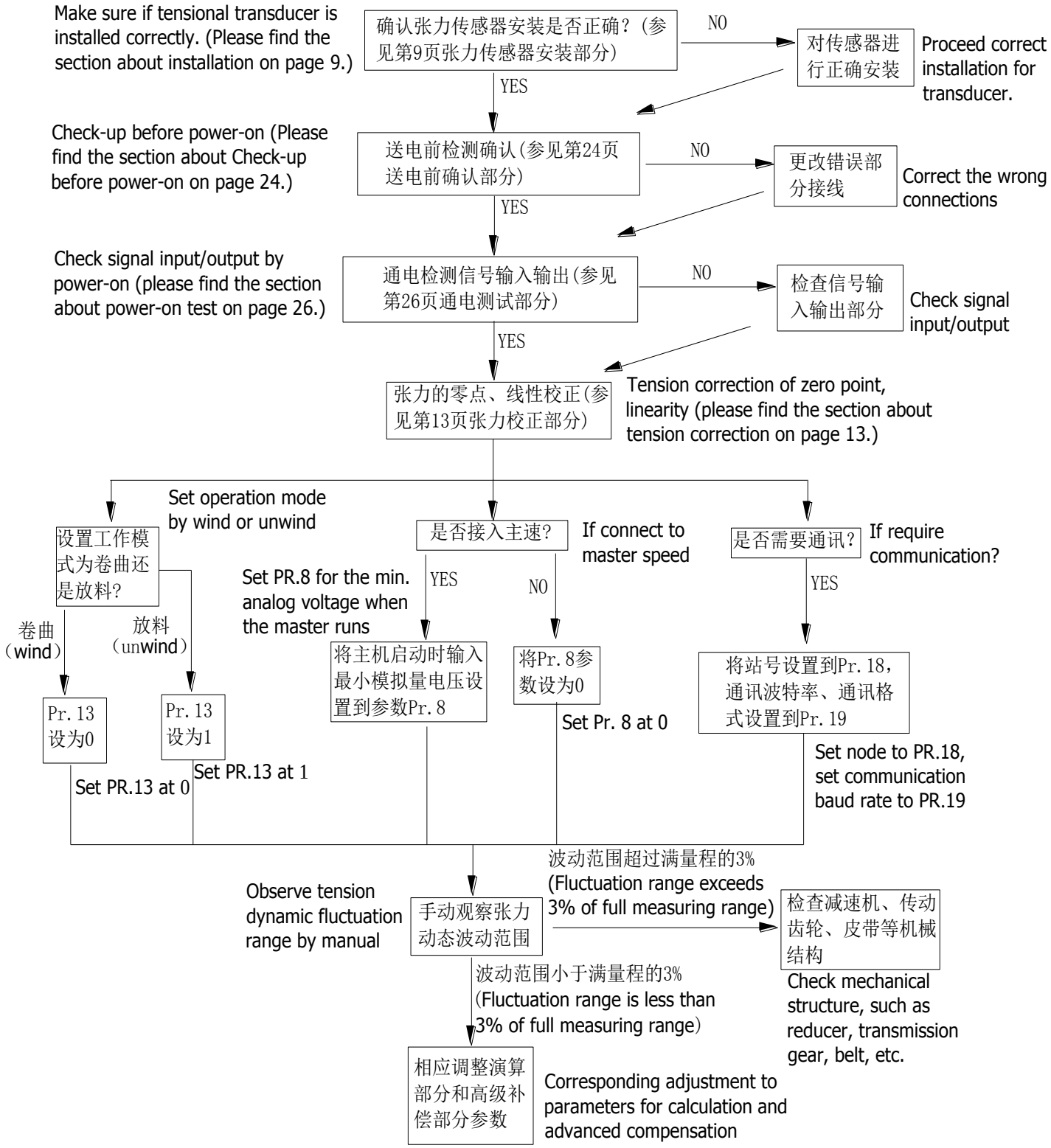
B.力矩电机卷取（Torque motor winding）



C.磁粉离合器收料（Magnetic powder clutch winding）



四．控制器基本参数设定流程图 Basic parameters setting procedure of controller



注：参数的进入和设置详见第 14 页参数进入操作部分。

Note: Entry and setting parameters, please find the section of Parameters Change Mode on page 14.

14. 故障排除 Troubleshooting

故障现象 Failure	故障内容 Description	故障可能原因 Possible causes
ERR1	D/A 输出至 PR.07 超过 2 秒 D/A output to PR.07 exceeds two seconds	1. 材料存在断带现象。 2. 磁粉或者磁粉离合器没有刹车力。 3. 卷曲电机力矩不足。 4. 控制器没有接收到张力传感器信号。 1.Strip breaking 2.Magnetic powder or magnetic powder clutch no brake force 3.Insufficient torque of winding motor 4.Signal of tension transducer is not received by controller
ERR2	D/A 输出至 0V 超过 2 秒 D/A output to 0V exceeds two seconds	1.磁粉或者磁粉离合器卡死无法转动。 2.张力传感器输入信号异常。 1. Magnetic powder or magnetic powder clutch is locked and can't rotate. 2. Signal input problem on tension ransducer
ERR3	磁粉输出异常 Abnormal output on magnetic powder	1. 磁粉输出部分存在短路。 2. 磁粉的额定电流超过 3A。 1. Short on magnetic powder output 2. Nominal electric current of magnetic powder exceeds 3A
ERR4	断线报警 Dis-connection Alarm	1.请检查近接信号是否进入到 18 脚? 2.检查 PR.22 参数是否设定过小? 1. Please check if proximity signal enters to Pin 18? 2. Check if the setting value of PR.22 is too small?

ERR5	实际张力值超过了最大张力设定值 Pr.20 或者低于最小张力设定值 Pr.21 Actual tension value is greater than max. tension value by Pr.20 or is smaller than min. tension value by Pr.21	最大张力设定值（Pr.20）设定过小，或者最小张力设定值（Pr.21）设定过大。 Value set too small on max. tension (Pr.20) or set too big on min. tension (Pr.21)
张力波动过大 **Too big Fluctuation of Tension**	手动时张力波动，而自动运行时实际张力的波动范围过大 Fluctuation of tension is smaller on manual operation, but the fluctuating range of actual tension will be too big on automatic operation	适当的降低敏感度系数（Pr.04）。 Properly reduce sensitivity coefficient (Pr.04)