LOTUS100 Series
Specialized Electronic Let-Off and Take-Up Servo Drive
User Manual

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Preface

Thank you for purchasing the LOTUS100 series specialized electronic let-off and take-up servo drive.

Read this manual thoroughly to ensure correct and safe use.

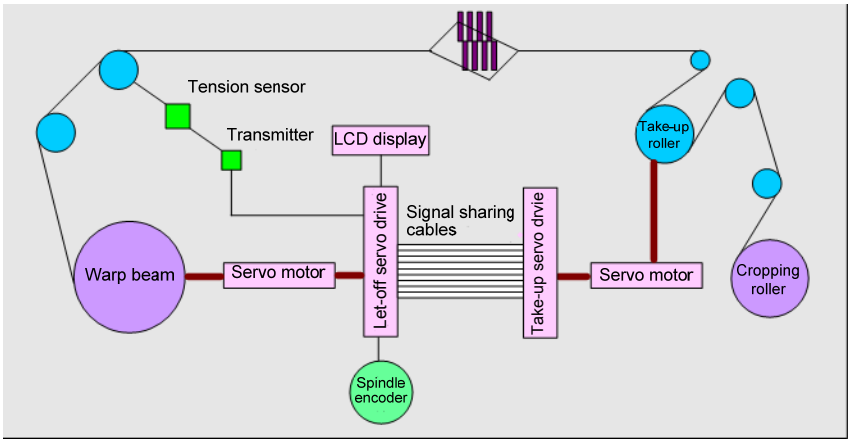
If you are an equipment manufacturer, forward this manual to the end user.

The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.

The LOTUS100 series specialized electronic let-off and take-up servo drive is a specialized integrated system independently developed by Shenzhen Inovance Technology Co., Ltd. based on its own advanced servo drive and motor technologies and electronic let-off and take-up process. The LOTUS100, with highly integrated modular structure and new appearance design, adopts the ARM7(32-bit) high-performance industrial micro-processor and advanced weaving process, and is applicable to various complex environments. In addition, with use of the AC permanent magnetic servo motor and high-precision encoder, the high-efficient smooth power supply is provided.

The basic principle of electronic let-off and take-off is as follows:

After receiving the rotational speed and position signals from the spindle encoder synchronous with the spindle, the system chooses the angle range of the spindle, and samples and amplifies the analog electrical signal from the tension sensor, and then converts the analog signal to digital signal. Then, the system compares the sampled tension and set tension to obtain the tension deviation. Together based on the take-up compensation and amount, the system computes the tension correction result, performs PID adjustment, and drives the warp shaft of the weaving machine to rotate. Meanwhile, the system performs parameter auto-tuning along with change of the warp beam radius to ensure constant tension of the warp thread during let-off.



■ Product Checking

Upon unpacking, check the items described in the following table.

Check Item	Description
Whether the delivered product is consistent with your order	The box contains the equipment, certificate of conformity, user manual and warranty card. Confirm the model according to the servo motor and servo drive nameplates.
Whether the product is damaged during transportation	Check the overall appearance of the product. If there is any omission or damage, contact Inovance or your supplier immediately.
Whether there is foreign objects inside the product	Shake the product to check whether screws inside the drive become loose or disconnected.
Whether the rotating shaft of the servo motor rotates smoothly	If the shaft of the servo motor can be rotated manually, it is normal. The servo motor configured with a power-off brake, however, cannot be rotated manually.

■ Safety Precautions

1. The cables between the servo drive and the servo motor must not be in large tension.
2. Lock all screws of the servo drive.
3. Ensure that the motor shaft and the pivot rod of the equipment are connected in the core.
4. Before running of the mechanical equipment, ensure that all parameters are set correctly. Otherwise, the equipment may be out of control or damaged.
5. Before running of the mechanical equipment, ensure that the emergency stop component can be started at any time.
6. Do not touch any rotating component during running of the motor. Failure to comply will result in personal injury.
7. Do not touch the internal of the servo drive or motor. Failure to comply will result in electric shock.
8. After the servo drive is powered off, wait at least two minutes, and then you can touch the servo drive. Failure to comply will result in electric shock.
9. After the servo drive is powered off, wait at least 30 seconds, and then you can restart it. Otherwise, restart will fail.
10. Check that all wiring terminals are locked and no bare cable is exposed. Failure to comply will result in electric shock.

■ Installation and Maintenance Precautions

1. Only specified qualified maintenance engineers can perform the installation and maintenance. Modification on the servo drive without prior permission is not allowed.

2. Maintenance or repair can be performed only when the servo drive or motor is in stop state.

3. Wiring can be performed only when the servo drive or motor is in stop state.

4. Only certified parts can be used during installation and maintenance.

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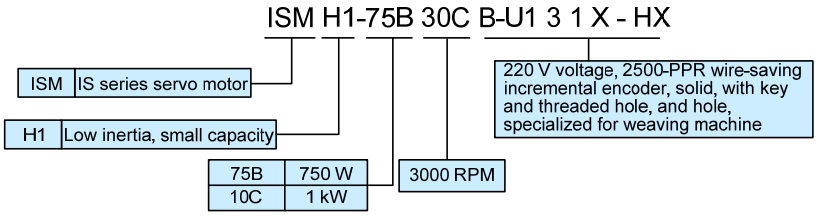
Chapter 1 Selection and Installation of Servo System

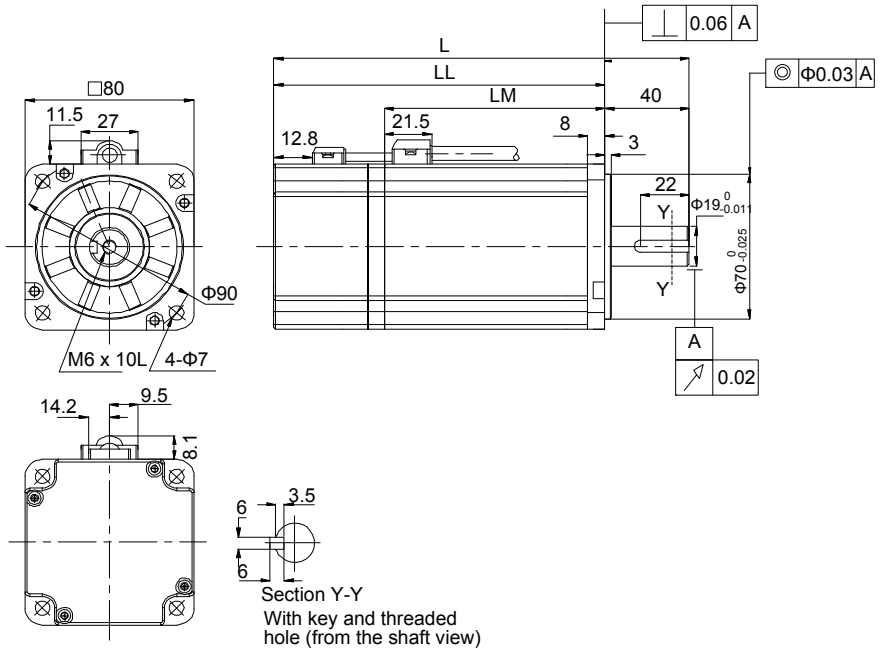
1.1 Designation Rules of the Servo Motor

Figure 1-1 Designation rules of the servo motor



1.2 Overall Dimensions of the Servo Motor

Figure 1-2 Overall dimensions of the servo motor



Pay attention to the following precautions during use of the servo motor:
The cables, especially cable outlets or connections, must not bear the torque or vertical load due to external bending force or self weight.

The bending radius of cables must be as large as possible.

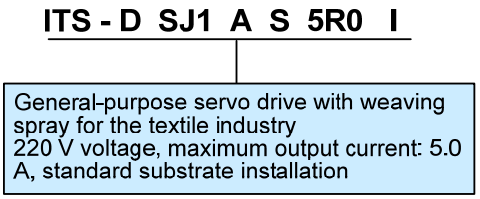
The load at radial direction and shaft direction of the motor shaft during installation and running must be within the specifications.

When the coupling component is installed to or removed from the motor shaft, the shaft end must not be directly hammered because such an operation will damage the encoder on the other end.

The motor shaft must be aligned correctly according to the requirements. Poor alignment will result in vibration or damage to the bearing.

1.3 Designation Rules of the Servo Drive

Figure 1-3 Designation rules of the servo drive

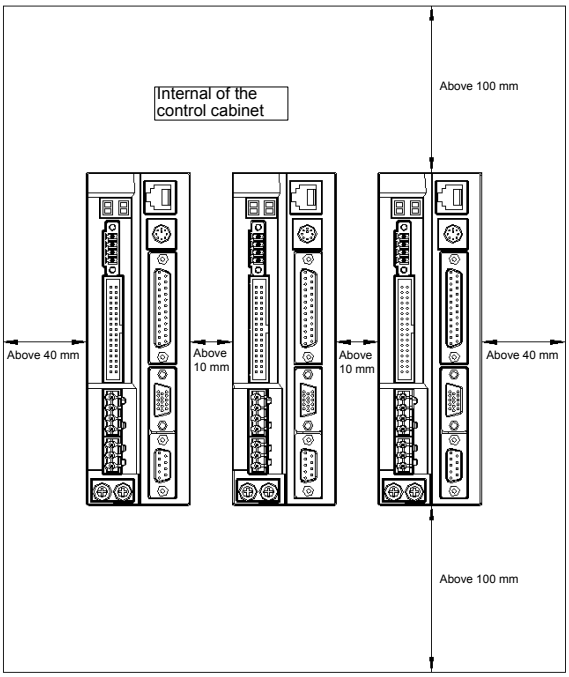


1.4 Installation Requirements of the Servo Drive

As shown in the following figure, the servo drive must be installed vertical to the wall.

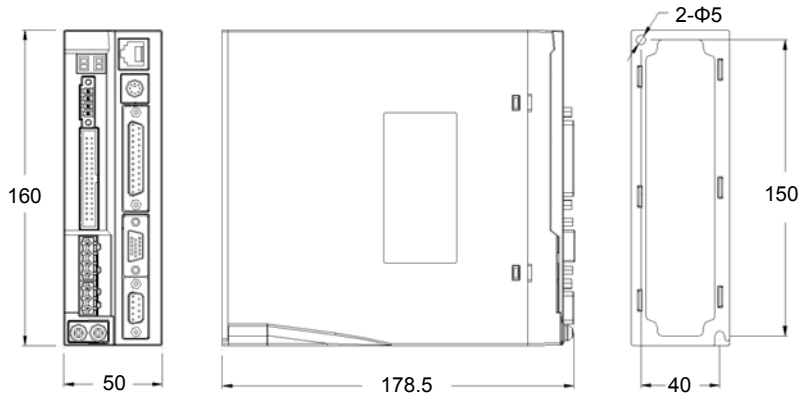
Use natural air cooling or fan cooling for the servo drive. The installation direction must not be changed.

Figure 1-4 Installation requirements of the servo drive



1.5 Overall Dimensions of the Servo Drive

Figure 1-5 Overall dimensions of the servo drive



Pay attention to the following precautions during installation of the servo drive:

1. Install the servo drive vertical to the wall, making its front panel faces outward.
2. As shown in the above figure, keep sufficient clearances around the servo drive to ensure cooling by cooling fans or natural convection.
3. When installing multiple servo drives side by side, keep at least 10 mm between two servo drives (if installation space is limited, such clearance between servo drives can be ignored) and at least 40 mm above and below each servo drive.
4. Ensure that the power supply of the weaving machine has been cut off before installation.
5. Add sufficient lubricating oil to the mechanical gear.
6. Install a cooling fan on the top of the servo drive to maintain the ambient temperature of the servo drive inside the cabinet.

Chapter 2 Wiring and Configuration

2.1 Wiring of the Main Circuit

Figure 2-1 Wiring terminals of the servo drive

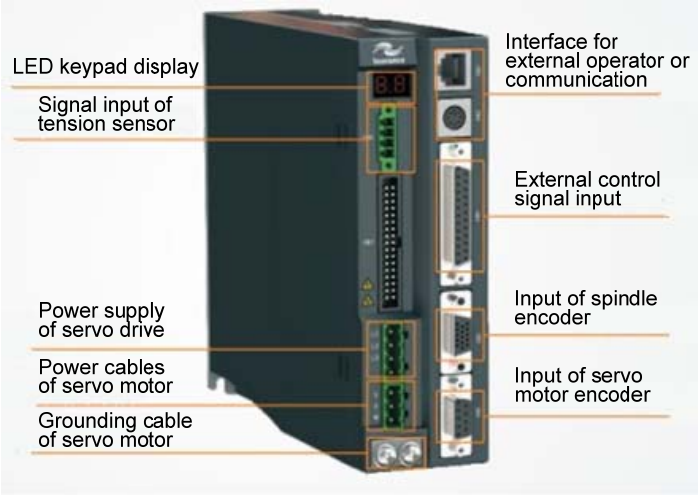


Figure 2-2 Signal cable description of the spindle encoder

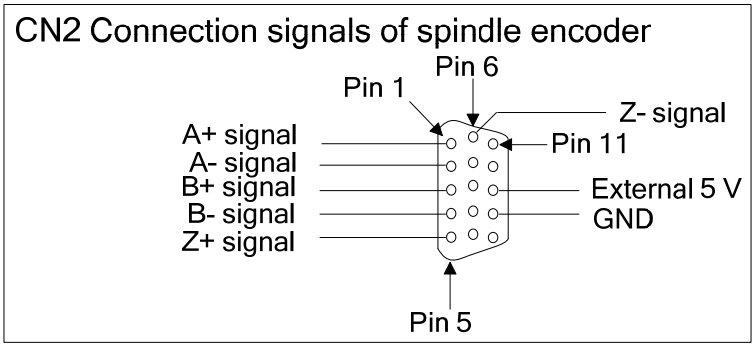
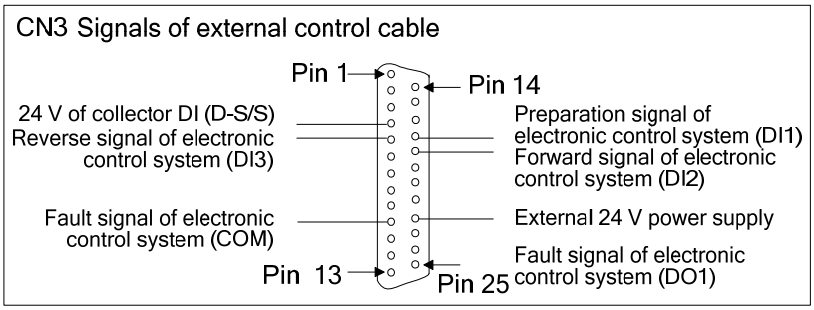


Figure 2-3 Control cable description of the servo drive



2.2 Cable Connection

External operator cable: Connects to the operator.

Servo communication cable: Carries out communication between the motor and the servo drive. Pin 4 (485+) and pin 5 (485-) connects to the servo drive.

Servo control cable: Connects the control system, as shown in Figure 2-3.

Spindle encoder input cable: Uses differential signals, as shown in Figure 2-2.

Motor encoder cable: Provides common connectors and DB9 connector on the servo drive side.

Motor power cables: Connects the servo motor, as shown in Figure 2-1.

External power cables: Uses single-phase 220 V or three-phase 220 V.

Signal sharing cables: Connect multiple servo drives together.

Sensor cable: Connects the tension sensor and inputs the tension signal.

Pay attention to the following precautions:
Ensure that no bare cable is exposed. Otherwise, current leakage or short circuit may occur, resulting in personal injury.

Ensure that all connectors are fixed to prevent open circuit.

2.3 Configuration Description

Table 2-1 Configuration description

	Servo Drive	Servo Motor	Tension Sensor	LCD Operator	Keypad	Spindle Encoder	Cable
Single let-off single take-up	2	2	1	1		1	Cables for two-servo drive connection
Dual let-off	2	2	2	1		1	Cables for two-servo drive connection
Dual let-off single take-up	3	3	2	1		1	Cables for three-servo drive connection
Single let-off	1	1	1	Optional	1	1	N/A
Single take-up	1	1	N/A	Optional	1	1	N/A

Figure 2-4 Appearance of configured products

Chapter 3 Use of the LCD Operator

3.1 User Interfaces and Keys

3.1.1 Startup Page

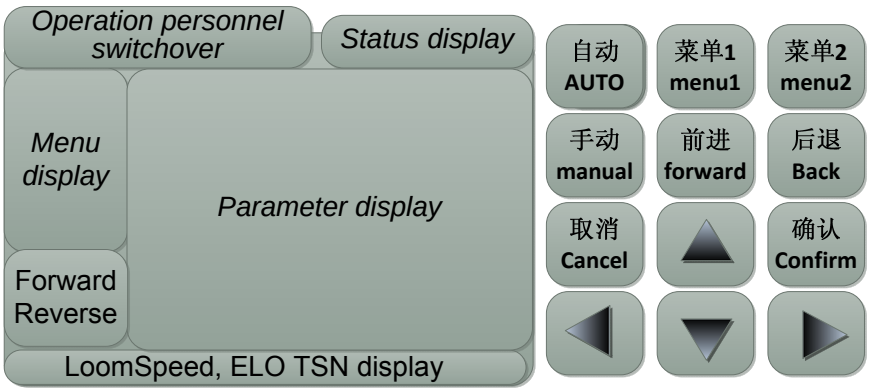
After the system stays at the startup interface for 3s, you can switch to the main interface.

3.1.2 Area Division of the Main Interface

- Operation personnel switchover: Opertr, Tech, Admin
- Status display: Manual, AUTO
- Menu display: (Opertr): ELO, ETU

  (Tech) ELO, ETU, Setup

  (Admin) ELO, ETU, Setup
- Forward, Back: The two keys are available in the manual state to determine the directions of let-off and take-up.
- Parameter display: Displays all parameters of the let-off and take-up servo drives.
- Spindle rotational speed and let-off tension display: Displays the rotational speed of the weaving machine and tension of the let-off servo drive.



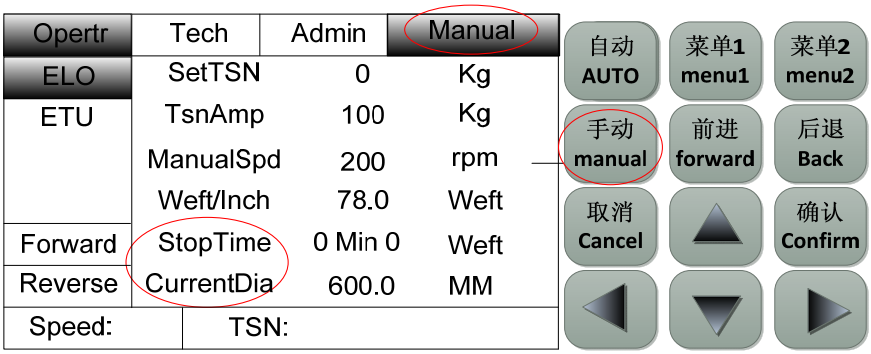
3.1.3 Description of Function Keys

1. 

After you press 

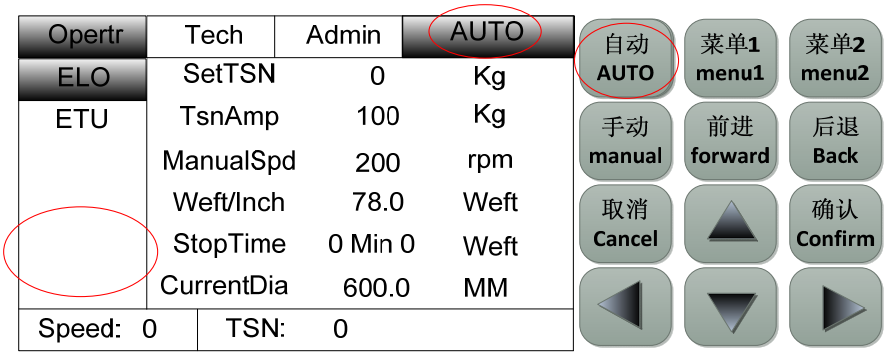
, the servo drive enters the manual state, and you can modify the

parameters of the servo drive, and adjust the tension of the warp thread by pressing 前进 forward and 后退 Back.



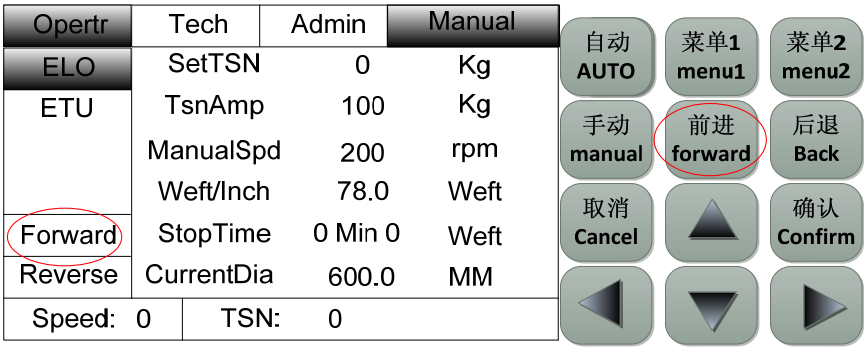
2. 自动 AUTO

After you press 自动 AUTO, the system enters the automatic state, and the weaving machine can run at high speed. In the automatic state, parameters cannot be modified, and keys 前进 forward and 后退 Back on the operator become unavailable.



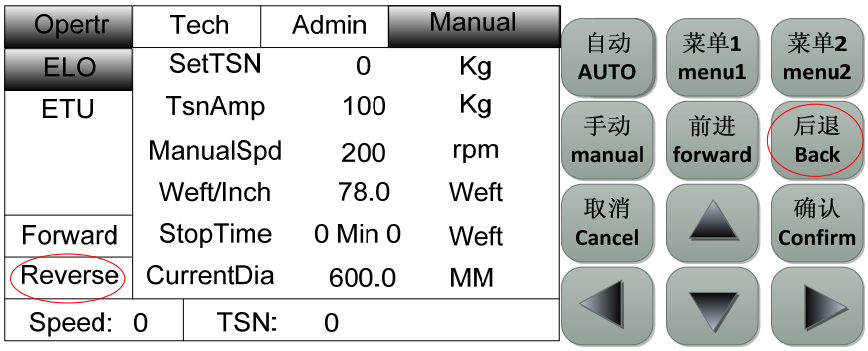
3. 前进 forward

In the manual state, press 前进 forward, and the servo drive instructs the servo motor to rotate in the forward direction (consistent with the forward direction set for the motor).



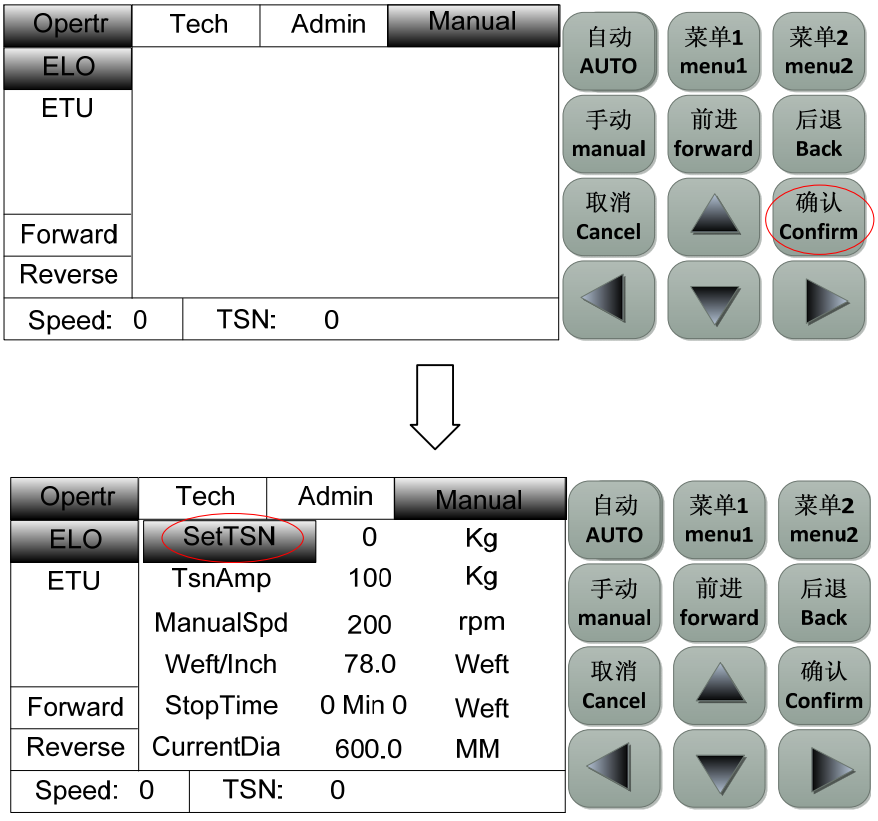
4. 后退 Back

In the manual state, press 后退 Back, and the servo drive instructs the servo motor to rotate in the reverse direction (related to the forward direction set for the motor).

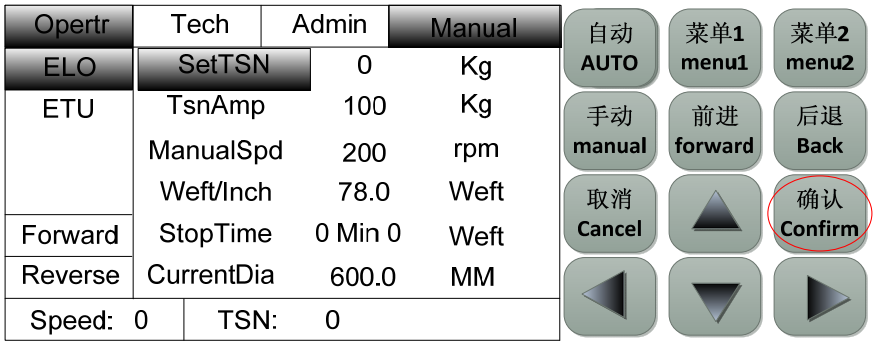


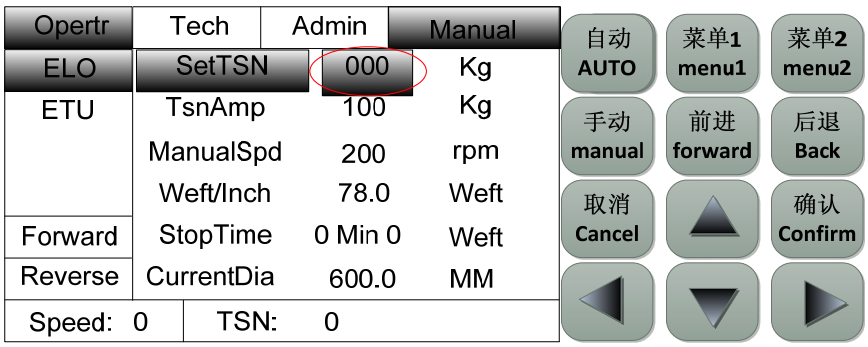
5. 确认 Confirm

1) When "ELO" or "ETU" is highlighted, you can press 确认 Confirm to switch to the corresponding parameter display area.



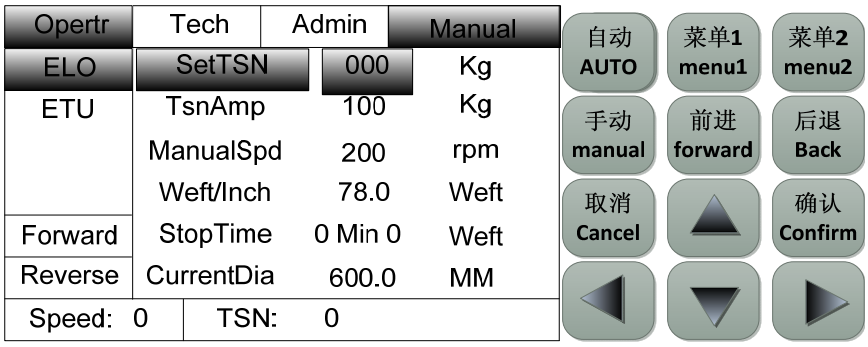
2) When a parameter in the parameter display area is highlighted, you can press 确认 Confirm to display the value of this parameter.

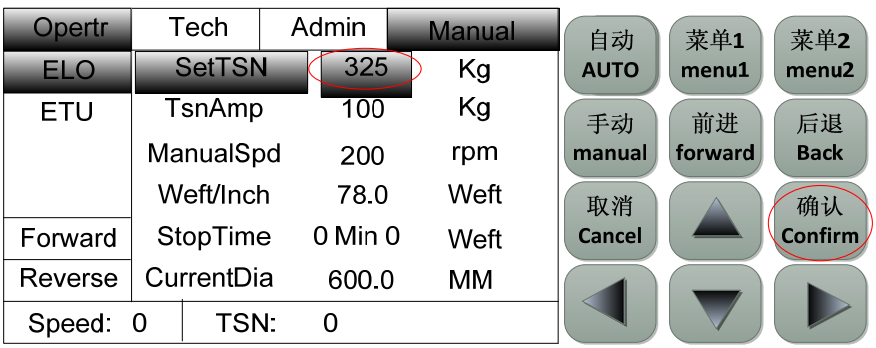




3) After modifying this parameter, you can press 

to save the modification.

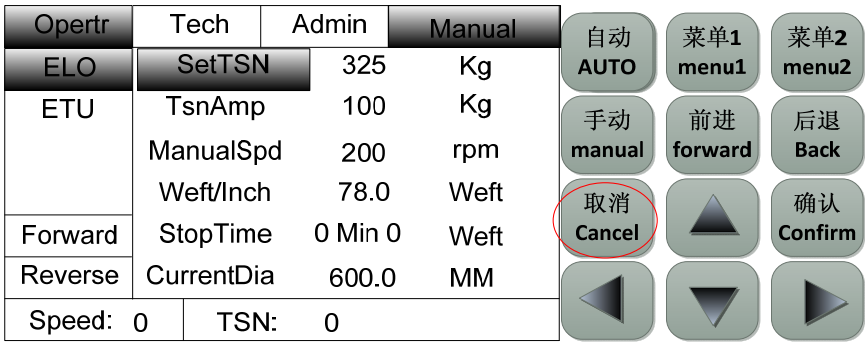


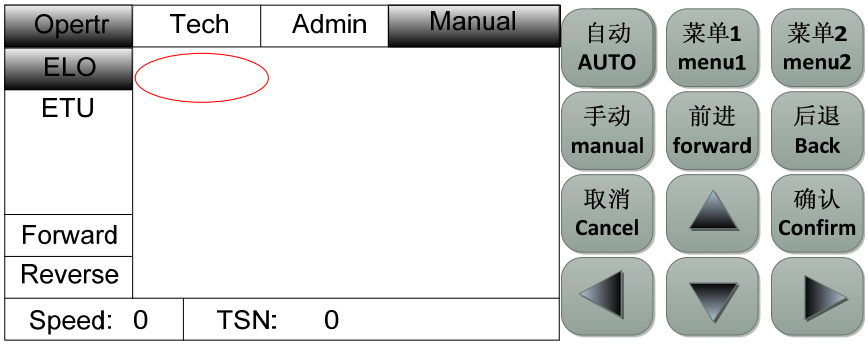


6. 取消 Cancel

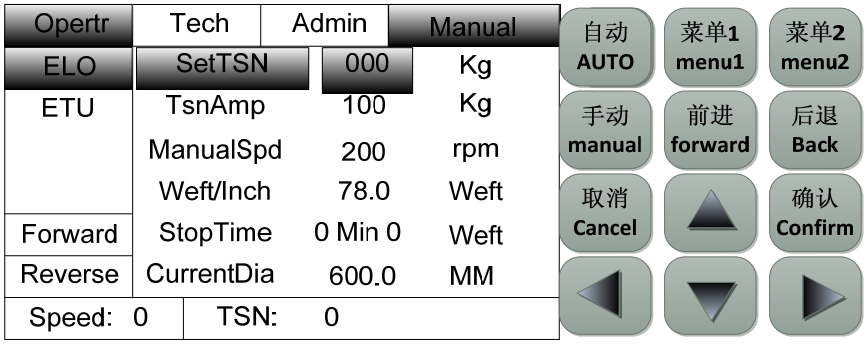
1) When "ELO" or "ETU" is highlighted, after you press 取消 Cancel, the menu returns to "Opertr", "Tech, Admin".

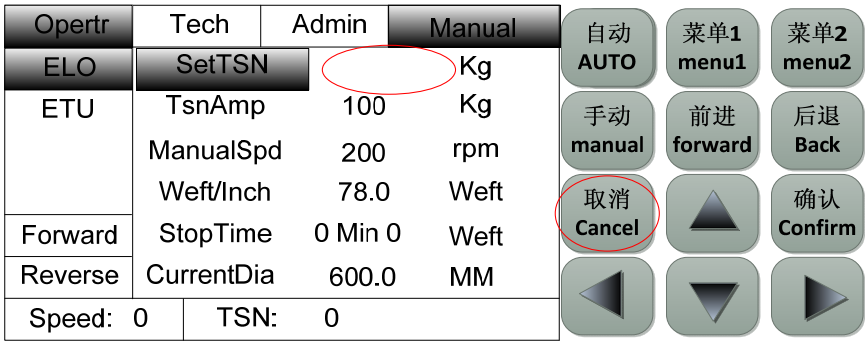
2) When a parameter in the parameter display area is highlighted, after you press 取消 Cancel, the menu returns to "ELO" or "ETU".





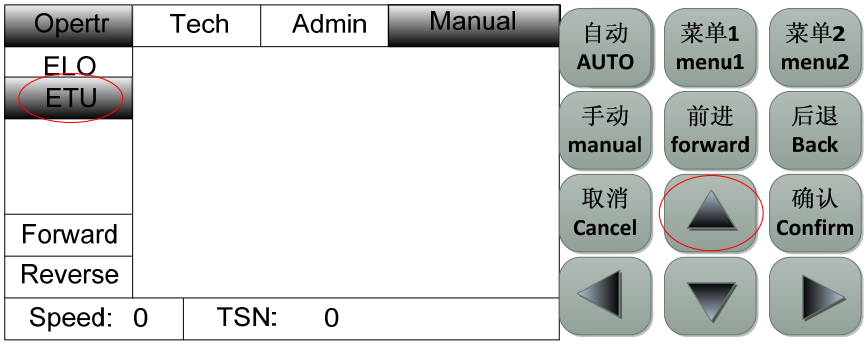
3) When the parameter value is displayed, after you press 取消 Cancel, the menu returns to the corresponding parameter name.

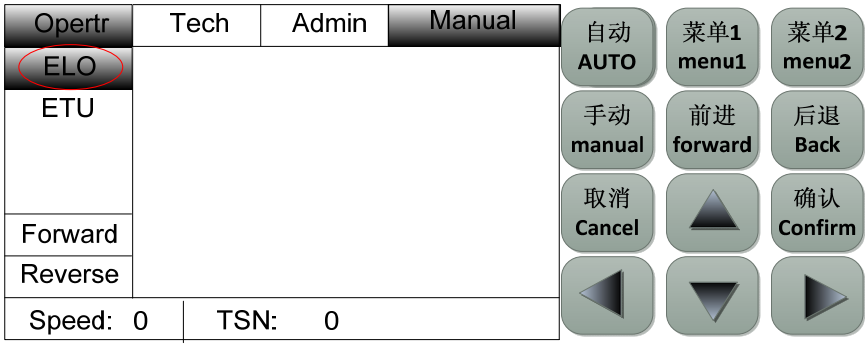




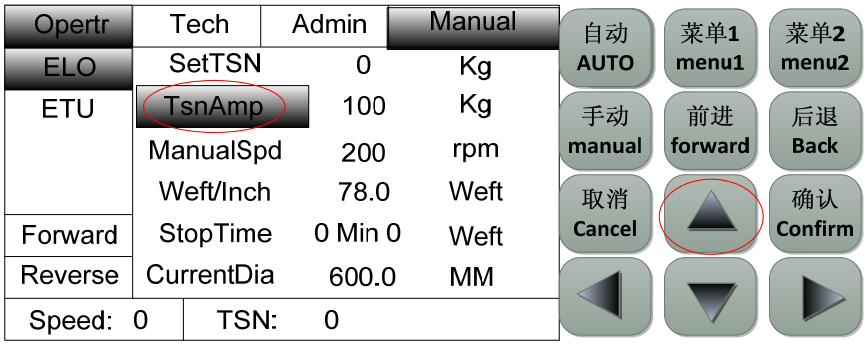
7. 

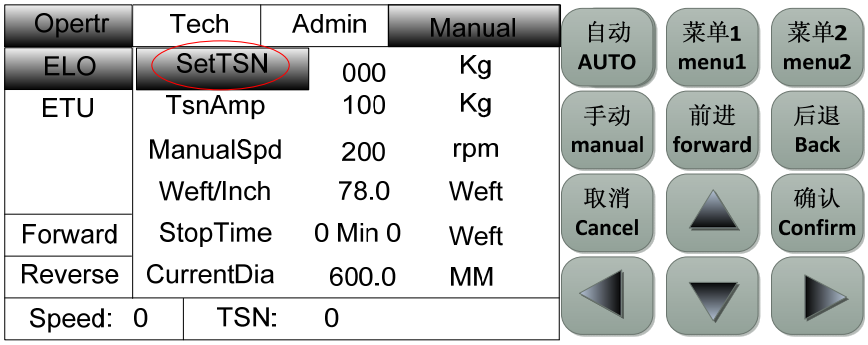
1) When "ELO" or "ETU" is highlighted, after you press  , the system goes to the previous menu.



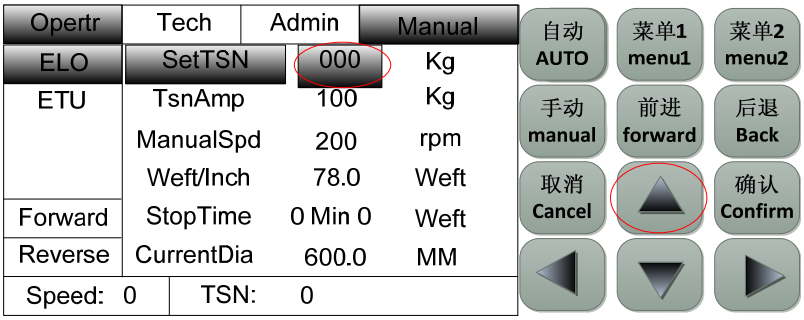


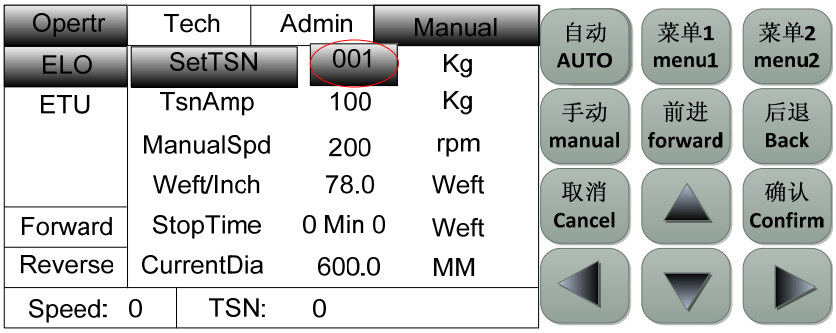
2) When a parameter in the parameter display area is highlighted, you can press  to move to the previous parameter.





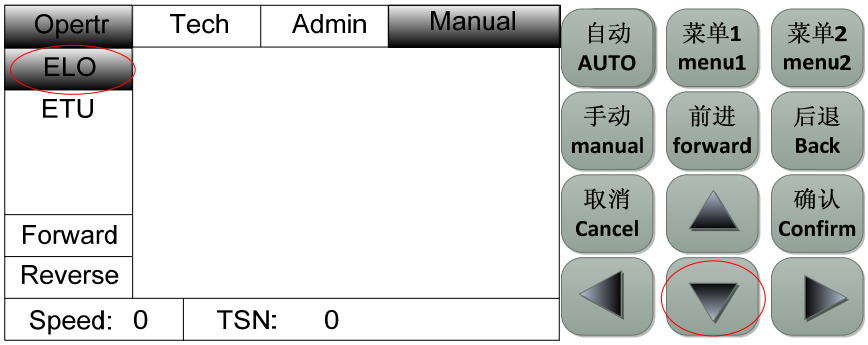
3) When the parameter value is displayed, you can press  to change the value within 1-2…-9-0-1 circularly.

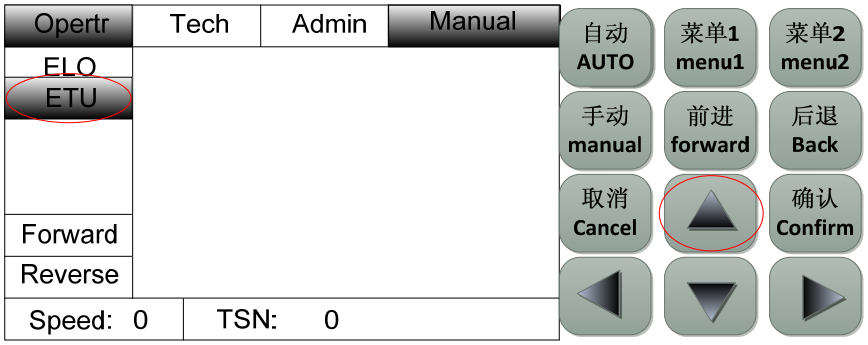




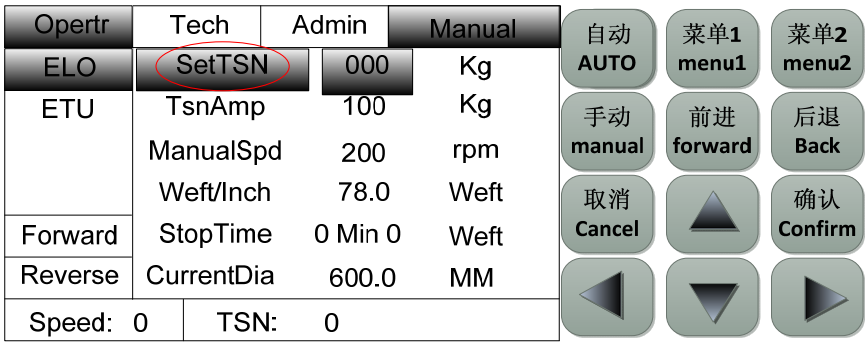
8. 

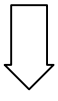
1) When "ELO" or "ETU" is highlighted, after you press  , the system goes to the next menu.

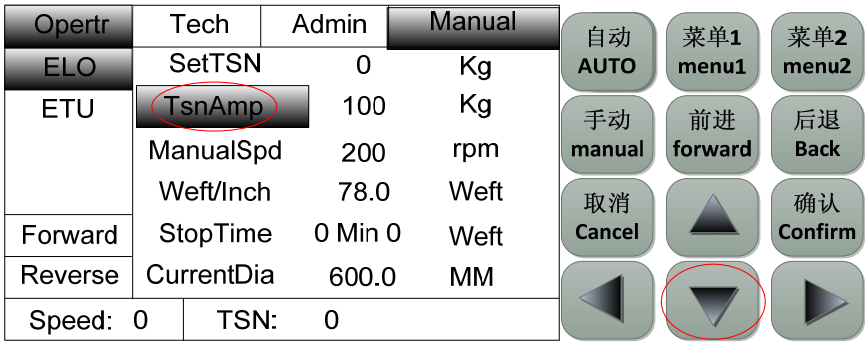




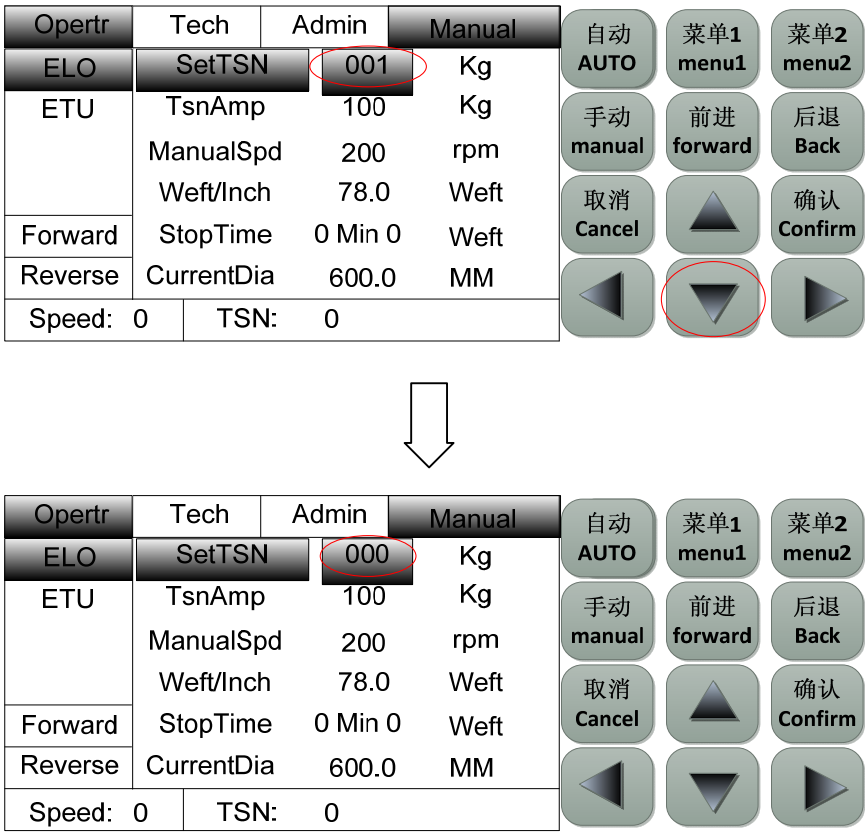
2) When a parameter in the parameter display area is highlighted, you can press  to move to the next parameter.







3) When the parameter value is displayed, you can press  to change the value within 1-0…9-8…1 circularly.



9. 

1. When "Opertr", "Tech", or "Admin" is highlighted, you can press  to move to the left menu.

2. When a parameter in the parameter display area is highlighted, you can press  to turn to the next parameter display page.

3) When the parameter value is displayed, you can press  to move to the parameter.

10. 

1. When "Opertr", "Tech", or "Admin" is highlighted, you can press  to move to the right menu.

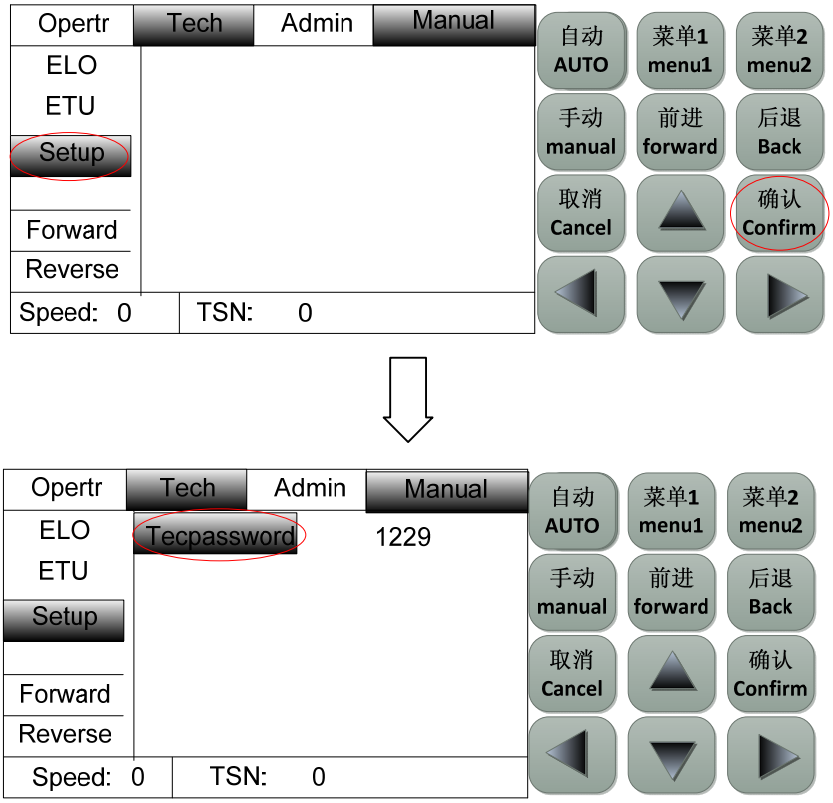
2. When a parameter in the parameter display area is highlighted, you can press  to go to the previous parameter display page.

3.1.4 Setting on the Technician Page

When "Tech" is highlighted, you can press 

to switch to the corresponding function display area.

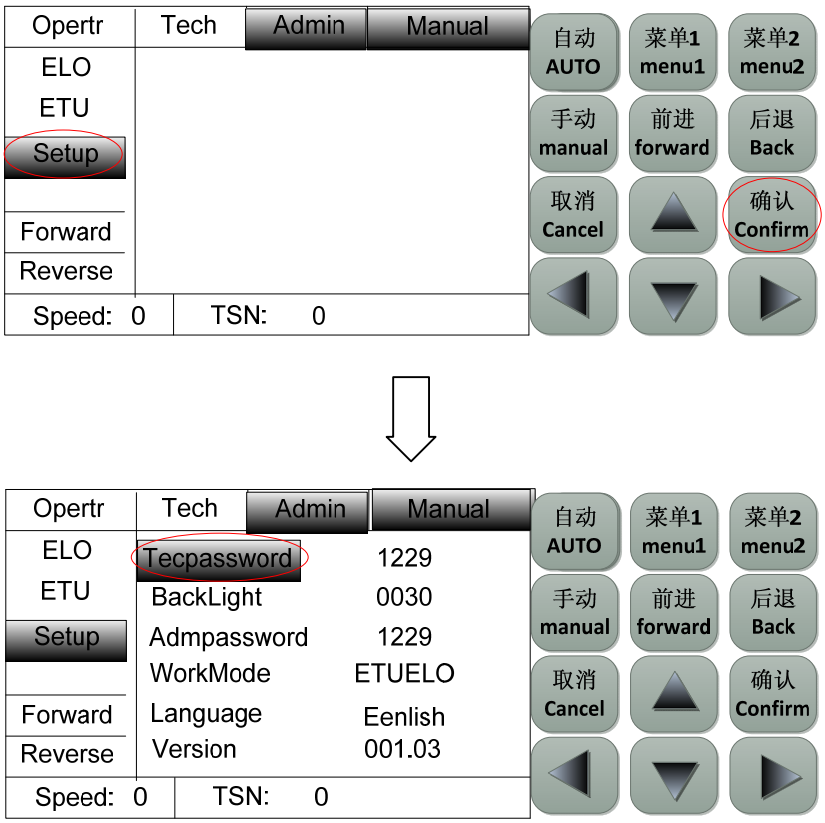
You can change the technician password in this area.



3.1.5 Setting on the Admin Page

When "Admin" is highlighted, you can press 

to switch to the corresponding function display area.

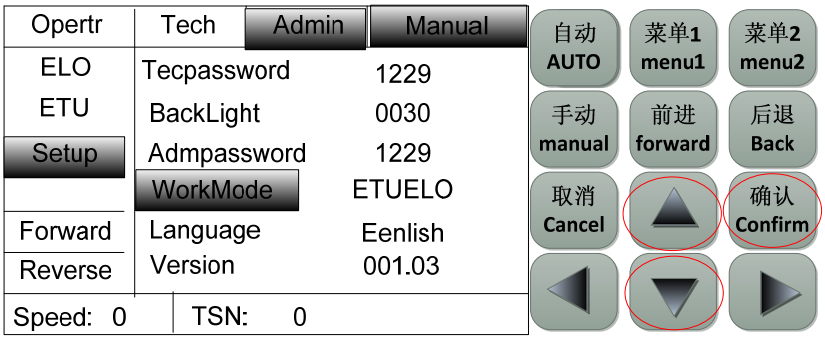


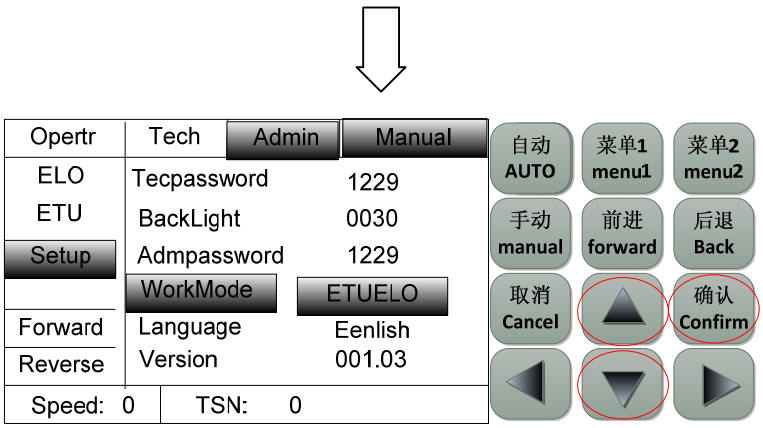
On the "Setup" menu, you can set the following parameters:

- Tecpassword: Set the technician password again.
- Backlight: Sets the backlight of the LCD operator.
- Admpassword: Set the administrator password again.
- WorkMode: Switch over between the let-off and take-up modes.

Five modes are supported, single let-off single take-up, dual let-off , dual let-off single take-up, single take-up, and single let-off.

Press  or  to switch to "WorkMode". Press  to switch to "Single let-off single take-up". Then, you can press  or  to switch between modes. Select the required mode and then press  , and the modification is successful. You can press  to exit without saving the modification.





3.2 Parameter Display Description

The following part describes the parameter display in manual state (parameter modification and manual forward and reverse operations are supported. Note that in the automatic state, parameter modification and manual forward and reverse operations are not supported.

Take the single let-off and single take-up mode in the manual state as an example.

1. Display for operator ("Opertr")

Let-off interface:

Opertr	Tech	Admin	Manual	
ELO	SetTSN		0	Kg
ETU	TsnAmp		100	Kg
	ManualSpd		200	rpm
	Weft/Inch		58.0	weft
Forward	StopTime	0 Min	**0**	weft
Reverse	CurrentDia		600.0	MM
Speed: 0	TSN: 0			

Take-up interface:

Opertr	Tech	Admin	Manual	
ELO	SetTSN		0	Kg
ETU	TsnAmp		100	Kg
	ManualSpd		200	rpm
	Weft/Inch		58.0	weft
Forward	StopTime	0 Min	**0**	weft
Reverse	CurrentDia		600.0	MM
Speed: 0	TSN: 0			

2. Display for technician ("Tech")
Page 1 of let-off interface:

Opertr	Tech	Admin	Manual	
ELO	SetTSN		0	Kg
ETU	TsnAmp		100	Kg
Setup	ManualSpd		200	rpm
	Weft/Inch		58.0	Weft
Forward	CurrentDia		600.0	MM
Reverse	FullDiam		670.0	MM
Speed: 0	TSN: 0			

Page 2 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	GearRatio	1900	
ETU	EncdrPulse	1440	Pulse
Setup	EncdrAngle	0	Angle
	LetoffDir	0	
Forward	EncdrDir	0	
Reverse	WeftUnit		Inch
Speed: 0	TSN: 0		

Page 3 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	LoomSpeed	500	rpm
ETU	WeaveShrink	100	%
Setup	MeasRange	300	Kg
	SLAjtRate	100	%
Forward	MotorSpeed	100	rpm
Reverse	ErrCoder	100	
Speed: 0	TSN: 0		

Page 4 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	Arrange		ON
ETU	Forward		ON
Setup	Reverse		ON
	ManualFwd		ON
Forward	ManualRev		ON
Reverse	Error		OFF
Speed: 0	TSN: 0		

Page 5 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	StopTime	0Min	0W
ETU	CompIntvl		0 Min
Setup	StopComp1		0 Wefts
	StopComp2		0 Wefts
Forward	StopComp3		0 Wefts
Reverse	StopComp4		0 Wefts
Speed: 0	TSN: 0		

Page 6 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	StopComp5		0 Wefts
ETU	StopComp6		0 Wefts
Setup	StopComp7		0 Wefts
	StopComp8		0 Wefts
Forward	StopComp9		0 Wefts
Reverse	StopComp10		0 Wefts
Speed: 0	TSN: 0		

Page 1 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	WeftDen		0 Weft/In
ETU	RollDiam		0 mm
Setup	GearRatio		0
	EncdrPulse		0 Pulse
Forward	EncdrAngle		0 Angle
Reverse	EncdrDir		0
Speed: 0	TSN: 0		

Page 2 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	TakeUpDir	0	
ETU	WeftUnit	Inch	
Setup	WeaveShrink	100 %	
	SlAjtRate	100 %	
Forward	MotorSpeed	0	
Reverse	ErrCode	0	
Speed: 0	TSN: 0		

Page 3 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	Arrange		ON
ETU	Forward		ON
Setup	Reverse		ON
	ManualFwd		ON
Forward	ManualRev		ON
Reverse	Error		OFF
Speed: 0	TSN: 0		

Page 4 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	Arrange		ON
ETU	Forward		ON
Setup	Reverse		ON
	ManualFwd		ON
Forward	ManualRev		ON
Reverse	Error		OFF
Speed: 0	TSN: 0		

Page 5 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	StopComp4		0 Wefts
ETU	StopComp5		0 Wefts
Setup	StopComp6		0 Wefts
	StopComp7		0 Wefts
Forward	StopComp8		0 Wefts
Reverse	StopComp9		0 Wefts
Speed: 0	TSN: 0		

Page 6 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	StopComp10		0 Wefts
ETU	StartComp1		1.0 Wefts
Setup	StartComp2		1.0 Wefts
	StartComp3		1.0 Wefts
Forward	StartComp4		1.0 Wefts
Reverse	StartComp5		1.0 Wefts
Speed: 0	TSN: 0		

Page 7 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	StartComp6		1.0 Wefts
ETU	StartComp7		1.0 Wefts
Setup	StartComp8		1.0 Wefts
	StartComp9		1.0 Wefts
Forward	StartComp10		1.0 Wefts
Reverse			
Speed: 0	TSN: 0		

Setting interface:

Opertr	Tech	Admin	Manual
ELO	TecPassword		1229
ETU			
Setup			
Forward			
Reverse			
Speed: 0	TSN: 0		

3. Display for administrator ("Admin")
Page 1 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	MotorSpeed		0 rpm
ETU	TsnFdback		0 Kg
Setup	SenFdback		1 mv
	ZSigAngle		0 Angle
Forward	SetAngle		0 Angle
Reverse	EncdrAngle		0 Angle
Speed: 0	TSN: 0		

Page 2 of let-off interface:

Opertr	Tech	Admin	Manual
ELO	PnFactor		800
ETU	TiTime		800
Setup	TSNFilter		15
	ComStation#		1
Forward	BaudRate		19200
Reverse	ServoVer		311.13
Speed: 0	TSN: 0		

Page 1 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	MotorSpeed		0
ETU	ZSigAngle		0 Angle
Setup	SetAngle		0 Angle
	EncdrAngle		0 Angle
Forward	ComStation#		0
Reverse	BuadRate		
Speed: 0	TSN: 0		

Page 2 of take-up interface:

Opertr	Tech	Admin	Manual
ELO	ServoVer		311.13
ETU			
Setup			
Forward			
Reverse			
Speed: 0	TSN: 0		

Setting interface:

Opertr	Tech	Admin	Manual
ELO	TecPassWord		1229
ETU	BackLight		0030
Setup	AdmPassword		1229
	WorkMode		ETUELO
Forward	Language		English
Reverse	Version		001,02
Speed: 0	TSN: 0		

Chapter 4 Function Description and Trial Running

4.1 Basic Functions of Electronic Let-Off and Take-Up

1. Follow-up (forward and reverse weft finding): In the position mode, the servo drive traces the change of the spindle encoder. Each time the spindle encoder rotates one revolution, the warp beam runs two-weft distance based on the weft density. The forward and reverse buttons of the water jet weaving machine are actually follow-up operations rather than manual forward and reverse operations.

2. Manual forward and reverse: These operations are supported in the speed mode. Manual forward run and reverse run can be performed by pressing keys on the operator, via communication or input terminal. You can set the rotational speed of the motor during manual running. The forward direction of the let-off servo drive is the lead-out direction of the warp thread.

3. Stop: In the normal speed state, the preparation signal disappears, and the servo drive stops immediately.

4. Normal speed: For the water jet weaving machine, after you press the preparation button, the servo drive performs stop compensation. Then, after you press the forward button, the servo drive enters the normal speed state. The let-off servo drive adjusts the speed based on feedback from the tension sensor.

5. Stop compensation: When you press the preparation button again after the system switches from normal speed to stop, the let-off and take-up servo drives moves the corresponding compensation weft quantity corresponding to the stop time. Stop compensation is performed after you press the preparation button. If you press the forward button at this moment, ER.917 is reported. The system returns to the normal state 30 ms after the stop compensation is completed, and then you can press the preparation button to enter the normal speed state. Therefore, wait 1.5s after pressing the preparation button, and then press the forward button.

When the LCD operator is used, on the "Tech" interface, stop compensation is determined by the stop compensation interval (unit: minute) and a total of 10 groups of compensation amount (unit: 0.1% weft). When the stop time is set to 1 minute, the compensation value is considered as 1 when the actual stop time exceeds 1 minute; when the stop time is set to 3 minutes, the compensation value is considered as 3 when the actual stop time exceeds 3 minutes. The actual compensation values can be set only by professional personnel of the textile factory by modifying "StopComp".

6. Weaving shrink rate: The cloth is flexible, and the weft density of the cloth just weaved may deform to a certain extent. When the cloth restores after a while, the weft density becomes a little different. The deformity degree depends on the materials, and you can set the weaving shrink rate to reduce the effect of the weft density change. This function is used mainly at the normal speed to perform fine adjustment on the weft density. On the "Tech" interface on the LCD operator, modify the value of "WeaveShrink".

7. Slow-speed adjustment rate (SlAjtRate): This parameter is set to eliminate uneven density after forward running and reverse running at slow speed and forward and reverse weft finding, and adjust the feed amount during forward running at non-normal speed.

4.2 Trial Running

To ensure normal and safe trial running, perform the following items before the trial running. If any problem is found, contact Inovance for technical support.

1. Check that the wiring is correct.

Sensor cables (from top to bottom): PE, 24V, out, 0V

Control signal cables: The wiring in the transition box is correct. 24V and 0V are respectively connected to 18A and 18B of the transformer. Preparation signals DI and COM are connected

to the normally open (NO) contact of the preparation contactor (if the NO contact is connected to a 220 V power cable, remove the power cable).

Servo drive power cables: Connects to the 220 V power supply from the control cabinet.

Cables between servo drive and servo motor: The power cables (U, V, W, and PE) and the encoder cable are connected securely.

Spindle encoder cable: The spindle encoder cable is connected securely.

2. Connect the LCD operator, and check the signals by pressing keys (Forward, Reverse, Arrange, Err).

Opertr	Tech	Admin	Manual
ELO	Arrange		ON
ETU	Forward		ON
Setup	Reverse		ON
	ManualFwd		ON
Forward	ManualRev		ON
Reverse	Err		ON
Speed:	TSN:		

3. Perform the jog operations on the let-off and take-up servo drives by using the LCD operator.

In the manual state, when you press 前进 forward, the take-up servo drive moves in the forward direction (tightening cloth), and the let-off servo drive moves in the forward direction (loosening cloth); when you press 后退 Back, the take-up servo drive moves in the reverse direction (loosening cloth), and the let-off servo drive moves in the reverse direction (tightening cloth).

4. Set the tension value, tension amplitude, weft density, warp beam radius, and spindle angle based on the cloth tension.

5. Press "Arrange", and then press "Forward" on the operator to start running at normal speed. After two to three minutes, the tension value becomes stable.

6. Set the stop compensation parameters based on the stop time.

Chapter 5 Maintenance and Troubleshooting

5.1 Maintenance and Check

5.1.1 Check on the Servo Motor

The AC servo motor has no brush, and you only need to perform simple daily check. The check period listed in the following table is only reference, and you need to determine a proper period based on the usage condition and environment.

Note

Do not dismantle the motor for maintenance or check.

Table 5-1 Check items of the servo motor

Check Item	Check Period	Description	Remarks
Vibration and noise	Daily	Sound the vibration and noise based on the experience.	The vibration and noise is as usual.
Insulation resistance	At least once each year	Disconnect the motor from the servo drive, and use a 500-V megger to measure the insulation resistance (between motor power cables UVW and the motor housing). If the resistance is larger than 10 MΩ, it is normal.	If the insulation resistance is smaller than 10 MΩ, contact Inovance for technical support.
Oil seal replacement	At least once per 5000 hours	Remove the servo motor from the mechanism and replace the oil seal.	Required only for the servo motor with an oil seal.
Overall check	At least once per 20,000 hours or five years	Contact Inovance to perform the overall check.	Do not dismantle the servo motor yourself.

5.1.2 Check of the Servo Drive

Check the servo drive at least once each year.

Table 5-2 Check items of the servo drive

Check Item	Check Period	Description	Remarks
Cleaning of the main body and circuit board	At least once each year	Ensure that there is no dirt, dust, or oil stain.	Clean with the cloth or air gun.
Screws		Ensure that the wiring terminals and connector screws are not loose.	Fasten the screws further.
Component abnormal of the main body and circuit board		There is no discoloring caused by heating, damage, or short-circuit.	Contact Inovance for technical support.

The electrical and electronic components will suffer mechanical wearing and aging after a long time of use. To ensure safety, you need to check these components periodically.

The user parameters of the servo drive after repair by Inovance are restored to the default setting upon delivery. Before use, remember to set the parameters according to requirements.

5.2 Troubleshooting

The alarms of the servo drive are classified into two levels:

Fault (level 1): The servo drive cannot work and must be stopped for troubleshooting. The DO signal is /ALM.

Warning (level 2): The servo drive reports the warning and can work temporarily. If the warning is not handled in time, it may change to a serious fault. The DO signal is /WARN.

When a warning occurs, the operator displays Er.9xx. The following table description the

warning

Table 5-3 Warning description

Warning Code	Name	Description
Er.909	Motor overload	The motor will be overloaded soon.
Er.910	Servo drive overload	The servo drive will be overloaded soon.
Er.941	Parameter modification requiring power-on again	The modification of certain parameters takes effect only after power-on again. In this case, power off the servo drive and then power it on again.
Er.991	Communication module self-check failure	The communication module self-check fails. In this case, power off the servo drive and then power it on again.
Er.992	Communication abnormal	Communication of the communication module is abnormal. In this case, power off the servo drive and then power it on again.

When a fault occurs on the servo drive, the operator displays "Er.xxx". The following table describes the analysis and handling of faults. If the faults persist after your handling or other fault codes are displayed, contact Inovance for technical support.

Table 5-4 Faults and solutions

Fault Code	Confirming Method	Solution
Er.200 (overcurrent 1) Er.201 (overcurrent 2)	Check following items: 1. Whether the wiring is correct 2. Whether short circuit exists between phase UVW and between UVW cables and the ground 3. Whether the motor parameters are set correctly 4. Whether the gear box is stuck 5. Whether the servo drive or servo motor is faulty	1. Correct the wiring. 2. Repair or replace cables. 3. Repair or replace the faulty servo drive. 4. Repair or replace the faulty servo motor. 5. Fill gear box with lubricating oil.
Er.210	Measure whether power cables UVW of the servo motor are short-circuited to ground.	1. Replace the motor. 2. Connect the motor UVW cables again.
Er.410 (undervoltage)	1. When the power voltage is 220 VAC, check whether the detected bus voltage is lower than 420 V, or whether the power voltage is lower than the input voltage limit. 2. Check whether the power voltage drops during running. 3. Check whether instantaneous power failure occurs. 4. Check whether the servo drive is faulty.	1. Adjust the power voltage to within the specifications. 2. Increase the power capacitance. 3. Repair or replace the faulty servo drive.
Er.610 (servo drive overload) Er.620 (motor overload)	Check the following items: 1. Whether the wiring is correct 2. Whether the gear box is stuck or the lubricating oil in the bear box is insufficient 3. Whether the servo drive or servo motor is faulty	1. Correct the wiring between the servo drive and the servo motor. 2. Eliminate the problem of stuck gear box, and fill the gear box with lubricating oil. 3. Replace the faulty servo drive or servo motor.

Fault Code	Confirming Method	Solution
Er.740 Er.741 Er.A34 Er.A35	Check whether the encoder cable is connected securely.	4. Check connection of the encoder cable to see whether incorrect connection, wire breaking, or poor contact exists. 5. Replace the encoder cable. 6. Replace the servo motor.
ER.915	Check the following item: 1. Whether the forward direction of the weaving machine is correct 2. Whether the direction of the spindle encoder is correct 3. Whether the spindle encoder follows the weaving machine during normal-speed running	1. Change the direction of the main motor. 2. Set the direction of the spindle encoder correctly. 3. Connect the encoder gear securely again.
ER.911	Check whether the displayed actual tension is larger than the sum of tension setting value plus tension amplitude.	In the manual state, adjust the tension so that the following requirements are met: (tension setting value + tension amplitude) < actual tension < (tension setting value – tension amplitude).
ER.913	Check whether the displayed actual tension is smaller than the sum of tension setting value minus tension amplitude.	In the manual state, adjust the tension so that the following requirements are met: (tension setting value + tension amplitude) < actual tension < (tension setting value – tension amplitude).
ER.912	Check whether wiring of the tension sensor is correct.	Replace the tension sensor.
ER.919	Check whether the spindle encoder runs abnormally when the servo drive does not receive the running signal.	Fasten the spindle encoder.
ER.917	During normal speed running, the forward button is pressed soon after the preparation button is pressed.	After pressing the preparation button, wait at least 0.5 seconds for stop compensation, and then press the forward button.
ER.931	1. The servo drive is powered on immediately after being powered off. 2. The servo drive is not enabled.	1. After cutting off the power supply, wait until the servo drive is powered off completely, and then power it on again. 2. Set H16-41 to 1 to enable the servo drive.