MITSUBISHI ELECTRIC

Tension Controller

LE7-40GU
APPLICATION MANUAL

SAFETY PRECAUTIONS

(Read these precautions before use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety in order to handle the product correctly.

This manual classifies the safety precautions into two categories: [⚠WARNING] and [⚠CAUTION].

⚠ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Depending on the circumstances, procedures indicated by [⚠CAUTION] may also cause severe injury.

It is important to follow all precautions for personal safety.

Store this manual in a safe place so that it can be read whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠WARNING

- Make sure to set up the following safety circuits outside the tension controller to ensure safe system operation even during external power supply problems or tension controller failure. Otherwise, malfunctions may cause serious accidents.
  - Note that when an error occurs in a relay or transistor of an output circuit, the output might stay on or off. For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
- Most importantly, set up the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower torque limits and upper and lower tension limits).
- In an output circuit, when a load current exceeding the current rating or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- For the operating status of each station after a communication failure of the network, refer to relevant manuals for the network. Incorrect output or malfunction may result in an accident.

[DESIGN PRECAUTIONS]

⚠CAUTION

- If a power failure or an abnormal voltage drop occurs, the tension controller stops, and output is turned off.

[INSTALLATION PRECAUTIONS]

⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Use the product within the generic environment specifications described in this manual (☞ Page 12 General specifications). Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions.
- Always wear an anti-static wristband and discharge static electricity from the body before handling the extension option. Failure to do so may cause the extension option to fail or malfunction.
- When drilling screw holes or wiring, make sure that cutting and wiring debris do not enter the ventilation slits of the tension controller. Failure to do so may cause fire, equipment failures or malfunctions.
- Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
- Install the product securely using mounting screws or fixtures.
- Connect the extension options securely to their designated connectors. Loose connections may cause malfunctions.
- Make sure to affix the extension option with tapping screws. Tightening torque should follow the specifications in the manual. If the screws are tightened outside of the specified torque range, poor connections may cause malfunctions.
- Work carefully when using a screwdriver such as installation of the product. Failure to do so may cause damage to the product or accidents.
- Connect the input/output cables and power cable securely to their designated connectors. Loose connections may cause malfunctions.
- Turn off the power to the tension controller before attaching or detaching the optional devices. Failure to do so may cause equipment failures or malfunctions.

[WIRING PRECAUTIONS]

⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Make sure to properly wire to the terminal block (Spring clamp type) in accordance with the following precautions. Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Twist the ends of stranded wires and make sure that there are no loose wires.
  - Do not solder-plate the electric wire ends.
  - Do not connect more than the specified number of wires or electric wires of unspecified size.
  - Affix the electric wires so that neither the terminal block nor the connected parts are directly stressed.

[WIRING PRECAUTIONS]

⚠CAUTION

- Perform class D grounding (grounding resistance: 100 Ω or less) of the grounding terminal on the tension controller with a wire 0.2 to 1.5 mm^2. Do not use common grounding with heavy electrical systems.
- Connect the power supply wiring to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the tension controller will burn out.
- Do not wire vacant terminals externally. Doing so may damage the product.
- Install module so that excessive force will not be applied to terminal blocks, power wire, or communication cables. Failure to do so may result in wire damage/breakage or tension controller failure.
- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to malfunction of the tension controller due to the effects of noise.
  - Do not bundle the power line and communication cables together with or lay them close to the main circuit, high-voltage line, load line or power line. As a guideline, lay the power line, control line and communication cables at least 100 mm away from the main circuit, high-voltage line, load line or power line.
  - Ground the shield of the shielded wire or shielded cable at one point on the tension controller. However, do not use common grounding with heavy electrical systems.
  - Ground the shield of the analog input/output cable at one point on the signal receiving side. However, do not use common grounding with heavy electrical systems.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠WARNING

- Do not touch any terminal while the tension controller's power is on. Doing so may cause electric shock or malfunctions.
- Before cleaning, cut off all phases of the power supply externally. Failure to do so in the power ON status may cause electric shock.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠CAUTION

- Do not disassemble or modify the product. Doing so may cause fire, equipment failures, or malfunctions.
  *For repair, contact your local Mitsubishi Electric representative.
- Turn off the power to the tension controller before connecting or disconnecting any extension cable. Failure to do so may cause equipment failures or malfunctions.
- Turn off the power to the tension controller before attaching or detaching the optional devices. Failure to do so may cause equipment failures, or malfunctions.

[DISPOSAL PRECAUTIONS]

⚠CAUTION

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

[TRANSPORTATION PRECAUTIONS]

⚠CAUTION

- The tension controller is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications described in this manual (☞ Page 12 General specifications) by using dedicated packaging boxes and shock-absorbing palettes. Failure to do so may cause failures in the tension controller. After transportation, verify operation of the tension controller and check for damage of the mounting part, etc.
- When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.

INTRODUCTION

Thank you very much for purchasing the tension controller.
Before using, read this document, and thoroughly understand the functions and performance of the tension controller to use it correctly.

Regarding use of this product

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

Note

- If in doubt at any stage during the installation of the product, always consult a professional electrical engineer who is qualified and trained in the local and national standards. If in doubt about the operation or use, please consult the nearest Mitsubishi Electric representative.
- Since the examples indicated by this manual, technical bulletin, catalog, etc. are used as a reference, please use it after confirming the function and safety of the equipment and system. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- This manual content, specification etc. may be changed, without a notice, for improvement.
- The information in this manual has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please contact the nearest Mitsubishi Electric representative. When doing so, please provide the manual number given at the end of this manual.

CONTENTS

RELEVANT MANUALS

Manual name <Manual number>	Description
LE7-40GU INSTRUCTION MANUAL <IB-0800569ENG>	How to handle and install the tension controller LE7-40GU
LE7-40GU APPLICATION MANUAL <SH-081822ENG> (this manual)	How to handle, install and set the tension controller LE7-40GU
LE7-40GU INSTRUCTION MANUAL (Communication) <SH-081834ENG>	How to wire and set the communication for the tension controller LE7-40GU
LE7-DCA INSTRUCTION MANUAL <IB-0800570>	How to handle and install the reel diameter calculation option LE7-DCA
LE7-DCA APPLICATION MANUAL <SH-081825ENG>	How to handle, install and set the reel diameter calculation option LE7-DCA
LE7-CCL INSTRUCTION MANUAL <IB-0800571>	How to handle and install the network option LE7-CCL
LE7-CCL APPLICATION MANUAL <SH-081828ENG>	How to handle, install and set the network option LE7-CCL
LD-8EEPROM INSTRUCTION MANUAL <JZ990D48001>	How to handle the memory cassette LD-8EEPROM

TERMS

Unless otherwise specified, this manual uses the following terms.

Terms	Description
Option	Generic term for extension options memory cassette
Extended options	Generic term for reel diameter calculation option, network option
Reel diameter calculation option	Generic term for the reel diameter calculation option LE7-DCA
Network option	Generic term for the network option LE7-CCL
LE7-40GU	Abbreviation for the tension controller LE7-40GU
LE7-DCA	Abbreviation for the reel diameter calculation option LE7-DCA
LE7-CCL	Abbreviation for the network option LE7-CCL
LD-8EEPROM	Abbreviation for the memory cassette LD-8EEPRO

1 OUTLINE

1.1 Functions and Features

Improved tension control functions

- Combined feedforward/feedback control is possible by using the reel diameter calculation option LE7-DCA
- Up to 8 points can be set for the folding line taper function, and fine taper control tailored to the material and reel shaft diameter can be performed.

Improved powder clutch/brake control functions

- You can switch between constant voltage and constant current control.
- Selecting a Mitsubishi Electric powder clutch/brake model enables you to set the powder clutch/brake functions.
- The number of nonlinear correction setting points for the powder clutch/brake has been increased to 10 points.

Diverse network compatibility

- It can be used as a slave station for basic communication or MODBUS communication (TCP) on a CC-Link IE field network. Additionally, because it has built-in client functionality for SLMP communication, it can communicate with various types of SLMP server devices.
- By using the network option LE7-CCL, various setting/monitoring and tension calibration such as zero/span adjustment can be performed from a master station such as a PLC via the CC-Link network.
- Because it comes with built-in RS-485 communication functionality, you can use it as an FX PLC over an N:N Network. It can also be used as a slave station for MODBUS communication (RTU or ASCII).

Compatibility with conventional products

- Since there are modes that are limited to the functions of the LE-40MT□ and LE-30CT□, replacement can be done smoothly.
- Panel mounting compatibility with conventional products can be obtained by using an attachment (LE7-ATT).

1.2 Procedures Before Operation

The procedures before operation is described below.

1. Confirmation of Package Contents

Open the package and check the included items.

For information on checking the included items, refer to the following.

📖LE7-40GU INSTRUCTION MANUAL

2. Installation

Mount the unit to the control panel or other surfaces. (☞ Page 18 INSTALLATION)

3. Wiring

Connect the power supply wires and I/O wires. (☞ Page 21 CONNECTIONS AND WIRING)

4. Setting

Configure the settings. (☞ Page 81 MONITORING AND SETTING METHODS)

5. Run

1.3 Specifications

General specifications

Item	Specifications				
Operating ambient temperature	0 to +40℃				
Storage ambient temperature	-20 to +60℃				
Operating ambient humidity	35 to 85%RH (with no dew condensation)				
Storage ambient humidity	35 to 85%RH (with no dew condensation)				
Vibration resistance*1		Frequency	Acceleration	Half amplitude	10 times each in X, Y, and Z (80 min. in total)
	Panel mounting	5 to 8.4 Hz	—	1.75 mm	
		8.4 to 150 Hz	4.9 m/s^2	—	
	Floor mounting	5 to 8.4 Hz	—	3.50 mm	
		8.4 to 150 Hz	9.8 m/s^2	—	
Impact resistance*1	147 m/s^2 Action time 11 ms, 3 times each in X, Y, Z directions with half-sine pulse				
Noise tolerance	Noise voltage 1000 Vp-p Noise width 1 μs. Using 30 to 100 Hz cycle noise simulator				
Withstand voltage	1500 V AC for one minute, measure across all terminals*2 and grounding terminal				
Insulation resistance	5 MΩ or more using 500 V DC insulation resistance tester:Measure across all terminals*2 and grounding terminal				
Grounding	Class D grounding (grounding resistance: 100 Ω or less, common grounding with heavy electrical system not allowed)				
Operating environment	Free of corrosive, flammable or conductive gases, and low levels of dust				

*1 Evaluation criteria depend on IEC 61131-2.
*2 Except SLD terminal.

Basic specifications

Item		Specifications
External dimensions		105×170×125 mm
Weight		Approx. 1.0 kg
Installation location		Panel installation, standalone installation
Installation method		Panel mounting, floor mounting
Wiring	Power input terminal block	Spring clamp AWG24 to 16 (0.2 to 1.5 mm^2) terminal block, not detachable
	Terminal block for powder clutch/brake output	Spring clamp AWG24 to 16 (0.2 to 1.5 mm^2) terminal block, not detachable
	Signal I/O terminal block	Spring clamp AWG24 to 16 (0.2 to 1.5 mm^2) terminal block, detachable
Power supply	Input	100 to 240 V AC
	Output	5 V DC for tension detector
		Contact input: 24 V DC
		5 V DC for potentiometer
Display	LCD	320 dots×128 dots TFT monochrome
	7-segment LED (for monitor)	4 digits (1 set)
	Unit display LED	4 types (1 set)
	Status display LED	6 points
Operation	Touch panel	Analog resistance film type
	Jog dial	With push ON switch
	Key switch	8 points
Contact signal	Input	General-purpose, 6 points, sink/source selectable
	Output	General-purpose, 2 points
Analog signal	Input	General-purpose, 3 points
	Output	General-purpose, 2 points

Item		Specifications
Tension detector input		For LX type tension detector or for strain gauge (range switching)
Control output	Output for 24 V DC system clutch/brake	0 to 24 V DC, 4.0 A[*1] for control, constant voltage/constant current control selectable
		For predrive/old reel stop. Total 0 to 24 V DC control is 4.0 A or less[*1]
	Voltage output for servo amplifier and inverter	±2.7 V DC, ±5 V DC, ±8 V DC, ±10 V DC, selectable
		For predrive/old reel stop. ±2.7 V DC, ±5 V DC, ±8 V DC, ±10 V DC, selectable
	Current output for electro-pneumatic regulator	0 to 20 mA, 4 to 20 mA DC selectable
Communication	Ethernet communication	CC-Link IE Field Network Basic, SLMP, MODBUS/TCP (slave), GT Designer3
	USB communication	Personal computer communication (GT Designer 3 and Data Transfer Tool)
	RS-485 communication	N:N Network, MODBUS/RTU, and ASCII (slave)
Optional components	extension option	The reel diameter calculation option LE7-DCA and the network option LE7-CCL
	External memory cassette	LD-8 EEPROM-type EEPROM cassette

*1 The PWM output upper limit becomes 3.6 A when used outside the derating range according to PWM output-on time.

1.4 Outline of Communication Functions

LE7-40GU is equipped with built-in Ethernet communication, USB communication, and RS-485 communication functionality as standard. Additionally, CC-Link communication can be supported by connecting the network option LE7-CCL.

Communication with a personal computer (GT Designer 3 and Data Transfer Tool)

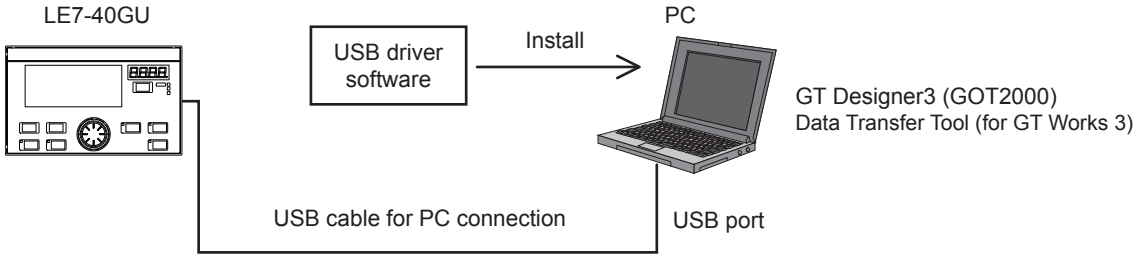
When changing the setting of Ethernet communication using LE7-40GU, communication with personal computer is required. For more information on communication with a personal computer (GT Designer 3 and Data Transfer Tool), refer to the following.

LE7-40GU INSTRUCTION MANUAL (Communication)

USB connection

LE7-40GU can be connected to a PC via USB.

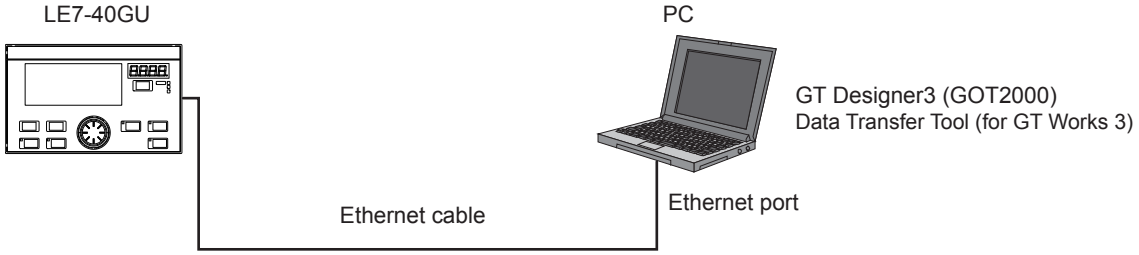
Screen data can be written to LE7-40GU from GT Designer 3 (GOT2000) and Data Transfer Tool (for GT Works 3).



Ethernet connection

LE7-40GU can be connected to a PC via Ethernet (100BASE-TX or 10BASE-T).

Screen data can be written to LE7-40GU from GT Designer 3 (GOT2000) and Data Transfer Tool (for GT Works 3).



Ethernet communication

For more information on Ethernet communication, refer to the following.

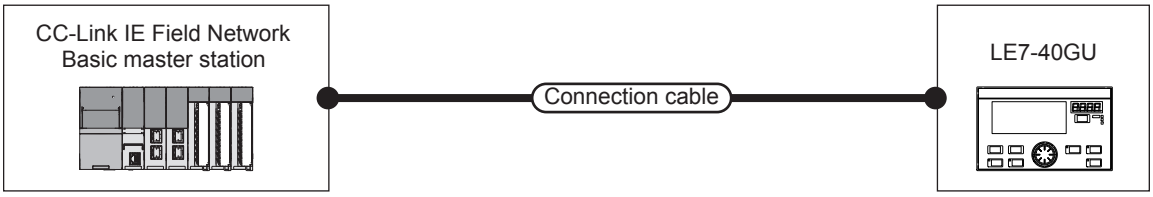
LE7-40GU INSTRUCTION MANUAL (Communication)

CC-Link IE field network basic communication

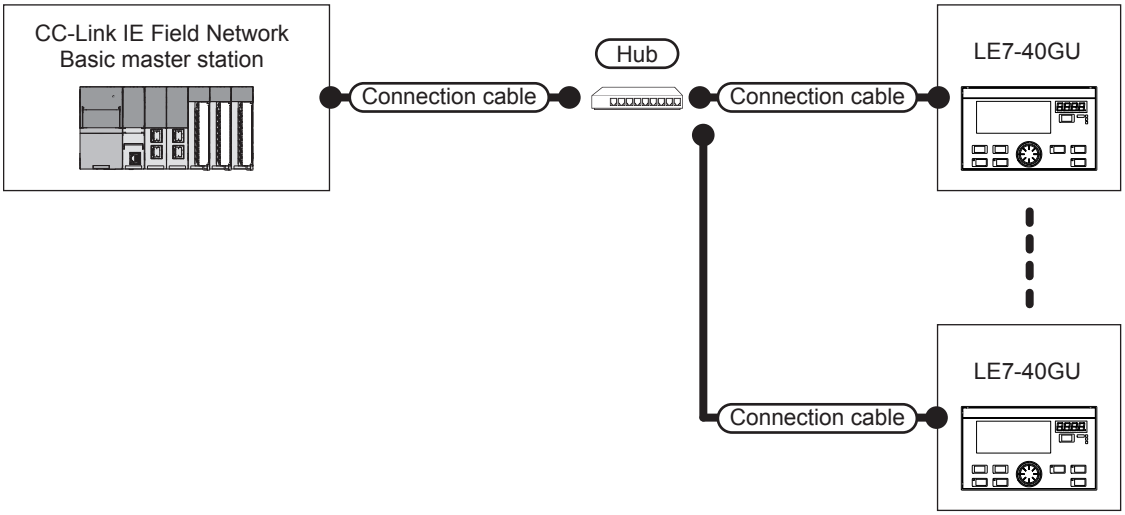
LE7-40GU supports slave functionality for CC-Link IE field network basic communication.

LE7-40GU can communicate with all kinds of CC-Link IE field network basic communication master stations.

■When connecting to one master station



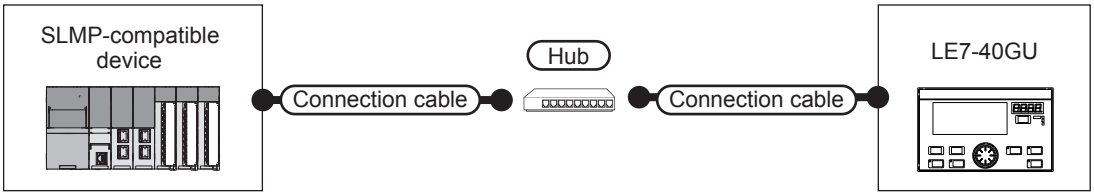
■When connecting one master station and multiple LE7-40GU (slave stations)



SLMP communication

LE7-40GU supports client functionality for SLMP communication.

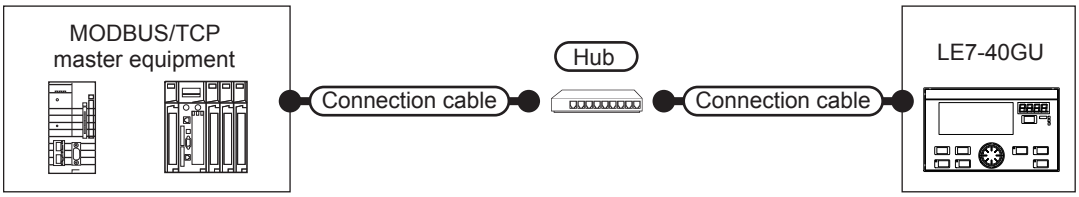
LE7-40GU can communicate with various SLMP-compatible devices. Also, up to seven LE7-40GU units can be connected to one SLMP-compatible device to carry out data monitoring and parameter writing.



MODBUS/TCP (slave)

LE7-40GU can be operated as a slave station for MODBUS/TCP communication.

LE7-40GU (as a slave station) can perform data monitoring and parameter writing from up to four master stations.

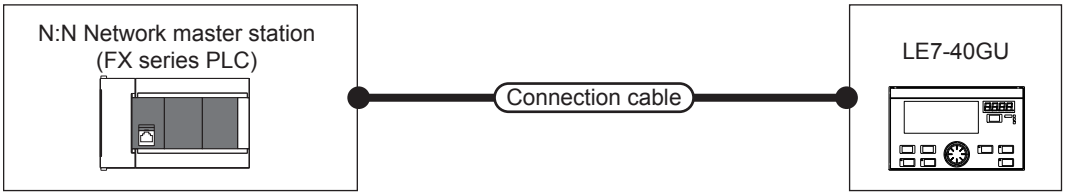


RS-485 communication

For more information on RS-485 communication, refer to the following.
LE7-40GU INSTRUCTION MANUAL (Communication)

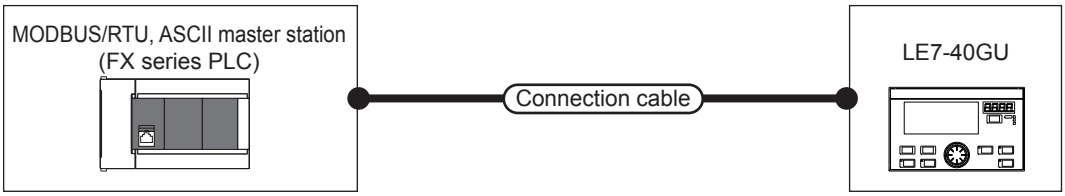
N:N Network

LE7-40GU can be operated as a local station for FX PLC N:N Network communication.
Data monitoring and parameter writing from a master station FX PLC for up to seven local stations (LE7-40GU units) can be carried out.



MODBUS/RTU, ASCII (slave)

LE7-40GU can be operated as a slave station for MODBUS/RTU and ASCII communication.
Data monitoring and parameter writing from a master station for up to 247 slave stations (LE7-40GU units) can be carried out.

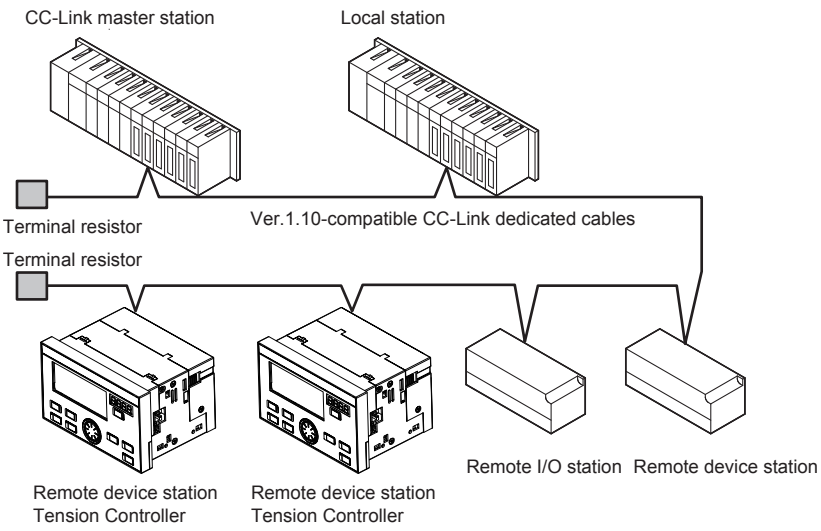


Precautions

RS-485 communication and CC-Link communication cannot be used simultaneously.

CC-Link communication

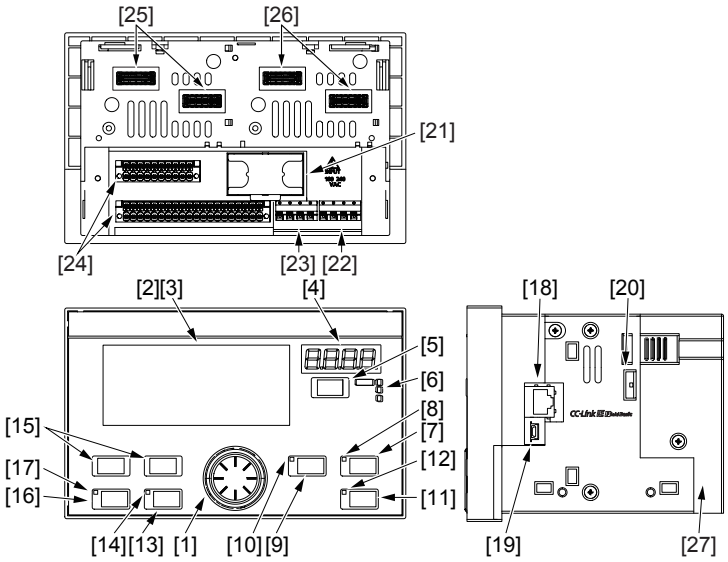
LE7-40GU can be operated as a remote device station for CC-Link by connecting the network option LE7-CCL. CC-Link Ver. 1.10 and Ver. 2.00 are supported, so extended cyclic transmission can be performed.
For more information on CC-Link communication, refer to the following.
LE7-CCL APPLICATION MANUAL



2 PART NAMES AND EXTERNAL DIMENSIONS

2.1 Part Names

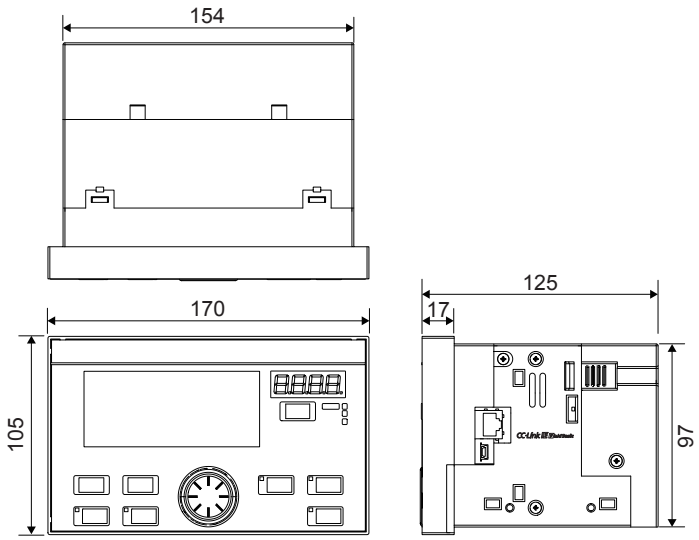
The part names for LE7-40GU are shown below.



No.	Name	Description
[1]	Value setting dial	Dial for setting various setting values By simultaneously pressing the Key Lock Key together, all operations in the panel are prohibited.
[2]	Touch panel	Touch panel for changing screens and setting various setting values
[3]	LCD display (monochrome)	Dot matrix LCD display
[4]	Monitor display (green)	Displays tension, reel diameter and output monitor values
[5]	Monitor display switching key	Switches the displayed items on the monitor display
[6]	Monitor display unit display LED (green)	Displays the units of the displayed items on the monitor display
[7]	Automatic control mode key	Selects automatic control mode
[8]	Automatic control mode status display LED (green)	Displays automatic control mode status
[9]	Manual control mode key	Selects manual control mode
[10]	Manual control mode status display LED (green)	Displays manual control mode status
[11]	Output ON/OFF key	Selects control output ON/OFF
[12]	Output ON/OFF status display LED (green)	Displays control output status
[13]	Key lock key	Prohibits changes to various setting values
[14]	Key lock status display LED (green)	Displays the change prohibition status for each setting
[15]	Menu switching key	Reads data saved in the menu
[16]	Power key	Selects power Standby/ON
[17]	Power status display LED (green)	Not lit: OFF (no AC power supply) Flash: Standby (AC power supplied+power standby key OFF) Lit: ON (AC power supplied+power standby key ON)
[18]	Ethernet interface	Connection with device such as PLC
[19]	USB interface	Connection with personal computer
[20]	Terminal resistor setting switch	Switching of RS-485 communication terminal resistor
[21]	Memory cassette connector (inside cover)	Connection with memory cassette
[22]	Power terminal block	Power input terminal block (non-removable)
[23]	Powder clutch/brake terminal block	Powder clutch/brake output terminal block (non-removable)
[24]	Signal terminal block	Signal input/output terminal block (removable)
[25]	Connector 1 for the extension option connection	Connection with the first extension option
[26]	Connector 2 for the extension option connection	Connection with the second extension option
[27]	Rear cover (open/close type)	Opens when wiring, or when connecting option

2.2 External Dimensions

The external dimensions for LE7-40GU are shown below.



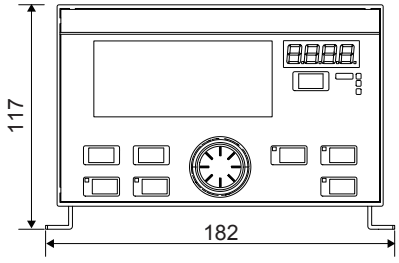
Unit: mm

3 INSTALLATION

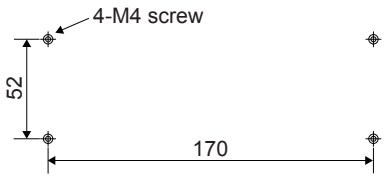
3.1 Installing LE7-40GU

LE7-40GU can be installed on the floor or on a panel. Refer to the following figure and mount the unit.

Floor mounting



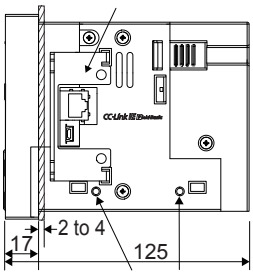
• Dimension of mounting screw holes when installing on a floor surface



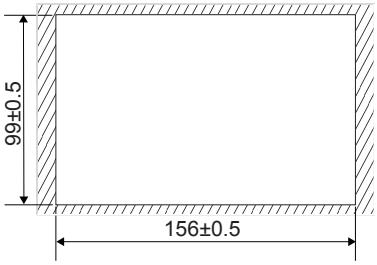
Unit: mm

Panel mounting

4-M4 × 10 mounting screws
Pressure welding from behind with mounting screws. Tightening torque: 0.5 to 0.8 N·m



• Dimension of panel cut when installing on a panel



Unit: mm

* Perform Class D grounding (grounding resistance: 100 Ω or less) on either screw parts.

3.2 Installation Place

Install the unit in the environment described in General Specifications.

☞ Page 12 Specifications

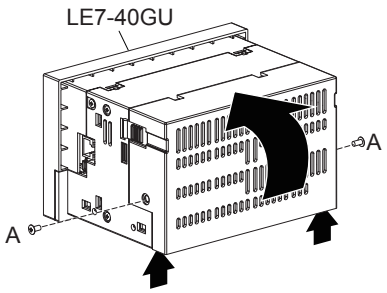
3.3 Installing Extension Option

This section describes how to install the reel diameter calculation option and the network option.

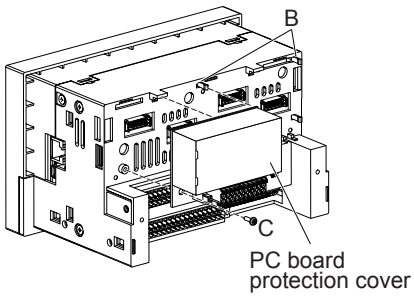
Installing the reel diameter calculation option LE7-DCA

This section describes the method of installing LE7-DCA on LE7-40GU unit.

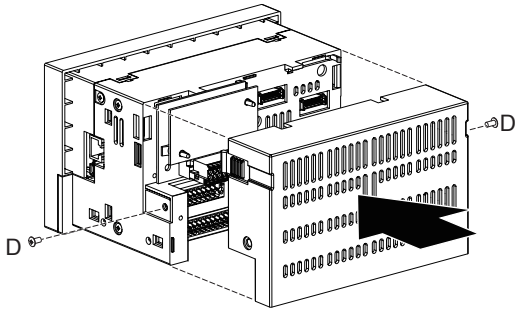
1. Turn LE7-40GU power OFF.
2. Remove the two screws (A in the right figure) that secure the rear cover of the LE7-40GU unit.
3. Lift the two claws at the lower part of the rear cover, and remove the cover as shown on the right.



4. Mount LE7-DCA on the left side.
   - Lightly push a fixing claw for the extension option in the upper part of LE7-40GU (B in the right figure), and attach LE7-DCA.
5. Fix with the unit fixing screw (C in the right figure). Tightening torque: 0.5 to 0.8 N·m
6. After the specified wiring to the terminal block, remove the PC board protection cover.



7. Mount LE7-40GU's rear cover as shown on the right.
8. Tighten the two screws fixing the rear cover of LE7-40GU (D in the right figure). Tightening torque: 0.5 to 0.8 N·m



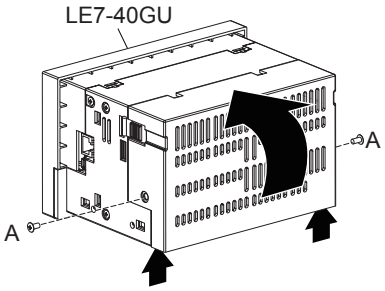
Precautions

The PC board protection cover is for preventing static electricity. Since the cover doesn't have heat resistance, make sure to remove the cover after wiring.

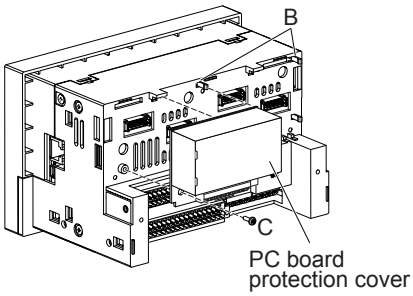
Installing the network option LE7-CCL

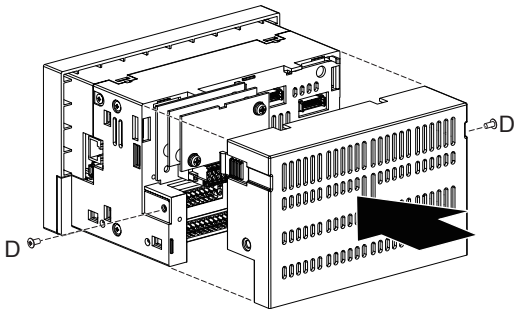
This section describes the method of installing LE7-CCL on LE7-40GU unit.

1. Turn LE7-40GU power OFF.
2. Remove the two screws fixing the rear cover of LE7-40GU (A in the right figure).
3. Lift the two claws at the lower part of the rear cover, and remove the cover as shown on the right.



4. Mount LE7-CCL on the left side. (Mount on the right when using simultaneously with LE7-DCA)
   - Lightly push a fixing claw for the extension option in the upper part of LE7-40GU (B in the right figure), and attach LE7-CCL.
5. Fix with the unit fixing screw (C in the right figure). Tightening torque: 0.5 to 0.8 N·m
6. After the specified wiring to the terminal block, remove the PC board protection cover.
7. Mount LE7-40GU's rear cover as shown on the right.
8. Tighten the two screws fixing the rear cover of LE7-40GU (D in the right figure). Tightening torque: 0.5 to 0.8 N·m





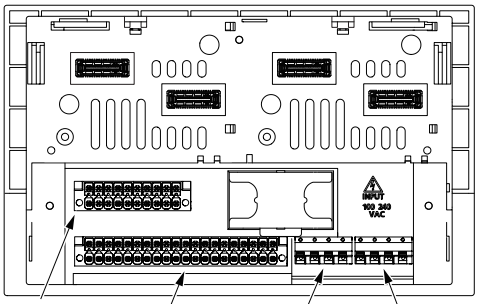
Precautions

The PC board protection cover is for preventing static electricity. Since the cover doesn't have heat resistance, make sure to remove the cover after wiring.

4 CONNECTIONS AND WIRING

4.1 Terminal Block Layout

The terminal block layout of LE7-40GU is shown below.



4.2 Terminal Layout

The terminal layout of LE7-40GU is shown below.

• Powder clutch/
brake output terminal block (CN2)

S2	S1	PN	PP

• Power terminal block (CN1)

⏚	NC	N	L

• Signal terminal block 1 (CN3)

0V	S/S	24V	DI6	DI5	DI4	DI3	DI2	DI1	NC	AO2	AO1	AI2	5V	SLD	SLD	WHL	GRL	BLK	RED
DOC	DO2	DO1	NC	SN	NRO	SN	SA	EAN	EAP	AOC	AIC	AI3	AI1	⏚	SLD	WHR	GRR	BLK	RED

• Signal terminal block 2 (CN4)

SG	RDA	SDA	NC	NC	NC	SNCR	Y3	Y2	Y1
RDB	SDB	NC	NC	NC	PDRV	MEM	LRST	DRST	BWD

***: Input system terminal ***: Output system terminal

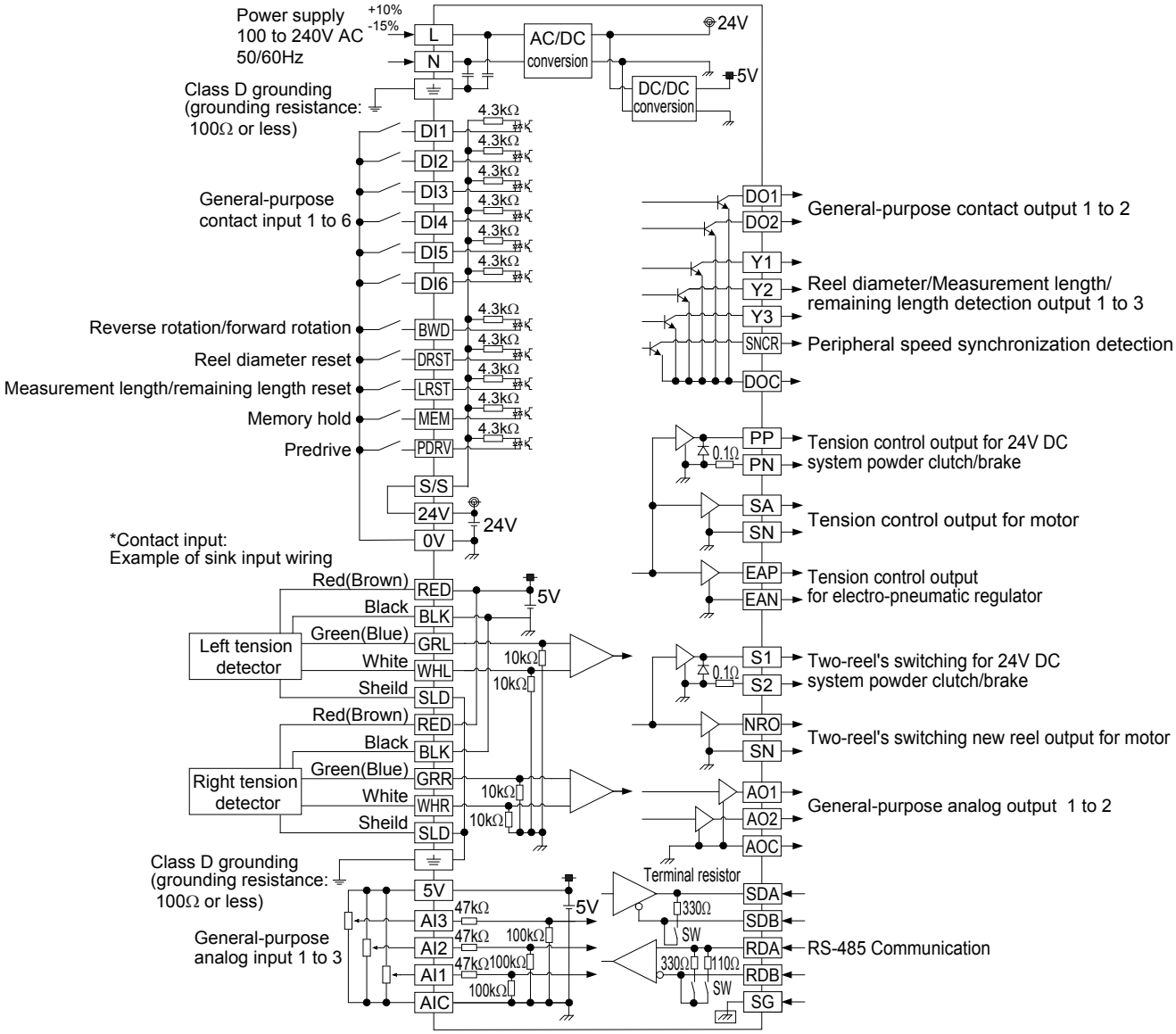
Item	Terminal names	Specifications		
Power input	L	100 to 240 V AC (-15% to +10%), 50/60 Hz 2 built-in 250 V, 8 A power fuses Power consumption 200 W, rush current 35 A 300 ms Tolerable instantaneous power failure time 10 ms		
	N			
	⏚			
Power output	RED	Tension detector power	• 5 V DC, 40 mA or less Up to two LX type tension detector can be connected.	
	BLK			
	5V	Potentiometer power	• 5 V DC, 20 mA or less Usable potentiometer: 0.5 to 2.0 kΩ	
	24V	Contact input power	• 24 V DC 55 mA or less	
	0V			
Contact input	DI1	General-purpose contact input 1 to 6 The functions follow the parameter settings.		• Input signal voltage 24 to 28.8 V DC • ON current approx. 5 mA • Sink/source input
	DI2			
	DI3			
	DI4			
	DI5			
	DI6			
	S/S	Sink/source switching		
	BWD	Reverse/forward	Usable only when reel diameter calculation option is connected.	
	DRST	Reel diameter reset		
	LRST	Measurement length reset		
	MEM	Memory hold		
	PDRV	Predrive		

Item	Terminal names	Specifications		
Contact output	DO1	General-purpose contact output 1 to 2 The functions follow the parameter settings.		• 30 V DC 0.1 A or less
	DO2			
	DOC	Contact output common		
	Y1	Reel diameter/measurement length/remaining length detection 1 to 3	Usable only when reel diameter calculation option is connected.	
	Y2			
	Y3			
	SNCR	Peripheral speed synchronization detection		
Analog input	AI1	General-purpose analog input 1 to 3 The functions follow the parameter settings.	• Input range selectable (1) 0 to 5 V DC Resolution: Approx. 193 μV (2) 0 to 10 V DC Resolution: Approx. 193 μV • Input resistance: 100 kΩ	
	AI2			
	AI3			
	AIC	Analog input common		
Analog output	AO1	Generalpurpose analog output 1 to 2 The functions follow the parameter settings.	• Output range selectable (1) 0 to 5 V DC Resolution: Approx. 358 μV (2) 0 to 10 V DC Resolution: Approx. 358 μV • Load resistance: 1 kΩ or more	
	AO2			
	AOC	Analog output common		
Tension detector Input	GRL	Tension detector left input	• Input range selectable (1) -150 to +150 mV DC (LX tension detector) Resolution: Approx. 7.90 μV (2) -15 to +15 mV DC (strain gauge) Resolution: Approx. 0.790 μV	
	WHL			
	GRR	Tension detector right input		
	WHR			
	SLD	For shield connection		
Control output	PP	Tension control output for 24 V DC system powder clutch/brake	• 0 to 24 V DC The rated current: 3.6 A or less, the maximum current: 4.0 A or less.*1 • PWM output	
	PN			
	S1	Two-reel's switching new reel output for 24 V DC system powder clutch/brake	• 0 to 24 V DC The rated current: The total current value with PP-PN output is 3.6 A or less. The maximum current: The total current value with PP-PN output is 4.0 A or less.*1 • PWM output	
	S2			
	SA	Tension control output for motor	• Output range selectable (1) -5 to +5 V DC Resolution: Approx. 358 μV (2) -8 to +8 V DC Resolution: Approx. 358 μV (3) -10 to +10 V DC Resolution: Approx. 358 μV (4) -2.7 to +2.7 V DC Resolution: Approx. 358 μV • Load resistance: 1 kΩ or more	
	SN			
	NRO	Two-reel's switching new reel output for motor		
	SN			
	EAP	Tension control output for electropneumatic regulator	• 0 to 20 mA DC resolution: Approx. 1.43 μA • Load resistance: 500 Ω or less	
	EAN			
Communication	SDA	RS-485 communication	• Terminating resistance selectable (1) 110 Ω (one-pair wiring) (2) 330 Ω (two-pair wiring)	
	SDB			
	RDA			
	RDB			
	SG			

*1 Output for 24 V DC system clutch/brake has the rated output current of 3.6 A, and the maximum output current of 4.0 A. When using the output with the rated output current of 3.6 A or more, if the amount of output power exceeds a fixed value, the output current is limited at 3.6 A.

4.3 Wiring Example

Refer to the following figure to complete the wiring.



Spring clamp terminal block

Connection should be performed as the following procedure.

Wire size

No. of wire per terminal	Wire size		
	Single wire/Strandwire	Ferrules with insulation sleeve	Ferrules withoutinsulation sleeve
One wire	AWG24 to 16	AWG23 to 16	AWG23 to 16

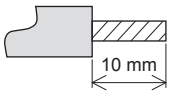
Treatment of wire ends

Strip the cable about 10 mm from the tip to connect a wire ferrule at the striped area. Failure to do so may result in electric shock or short circuit between adjacent terminals because of the conductive part. If the wire strip length is too short, it may result in the poor contact to the spring clamp terminal part.

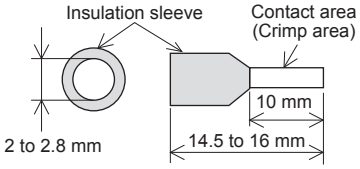
When using a wire ferrule with an insulating sleeve, choose a wire with proper cable sheath referring to the above outside dimensions, otherwise the wire cannot be inserted easily.

[Signal terminal block 1, 2]

• Strand wire/single wire

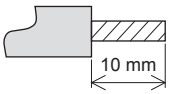


• Ferrule with insulation sleeve

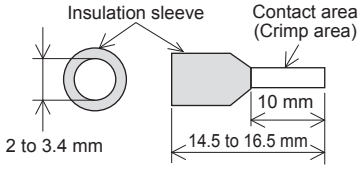


[Power terminal block, Clutch/brake output terminal block]

• Strand wire/single wire



• Ferrule with insulation sleeve



The following table shows wire ferrules and tools for wire ferrules compatible with the terminal block. Use of items other than these may result in not being able to remove the wire ferrule, so carefully check that the wire ferrule can be unplugged.

<Reference product>

Manufacturer	Model		Wire size	Crimp tool
	Signal terminal block 1 Signal terminal block 2	Power supply terminal block Clutch/brake terminal block		
PHOENIX CONTACT GmbH & Co. KG	AI 0.5-10 WH	AI 0.5-10 WH	0.5 mm^2	CRIMPFOX 6
	AI 0.75-10 GY	AI 0.75-10 GY	0.75 mm^2	
	A 1.0-10	AI 1-10 RD	1.0 mm^2	
	A 1.5-10	AI 1.5-10 BK	1.5 mm^2	

Connection and disconnection of the cable

Spring clamp terminal block is push-in type, therefore, wiring without a tool is possible by simply inserting the connecting terminal to the terminal block. However, the stranded wire does not comply with the push-in type, and a tool is required for connecting cables.

■Connection of the cable

Fully insert a cable or bar solderless terminal whose end has been properly processed into the wire insertion opening.

If the cable or bar solderless terminal cannot be inserted with this procedure, fully insert the cable or bar solderless terminal while pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5 mm. After fully inserting the cable, remove the screwdriver.

Do not tighten terminal screws exceeding the specified torque range. Otherwise it may cause equipment failure or malfunction.

When wiring with the thick electric wire, make sure to prevent the conductive parts from protruding to the front of the terminal block.

<Reference>

Manufacturer	Model
PHOENIX CONTACT GmbH & Co. KG	SZS 0.4×2.5 VDE

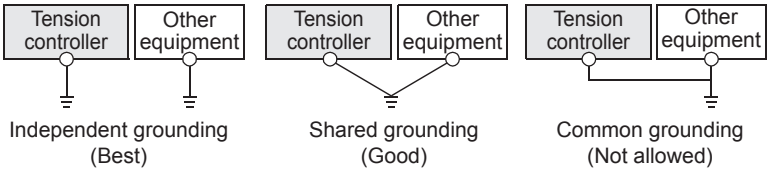
■Disconnection of the cable

While pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5 mm, disconnect the cable or bar solderless terminal.

Grounding

Grounding should be performed as stated below.

- Perform Class D grounding. (grounding resistance: 100 Ω or less)
- Independent grounding should be performed for best results.
- When independent grounding cannot be performed, perform “shared grounding” as shown in the following figure.

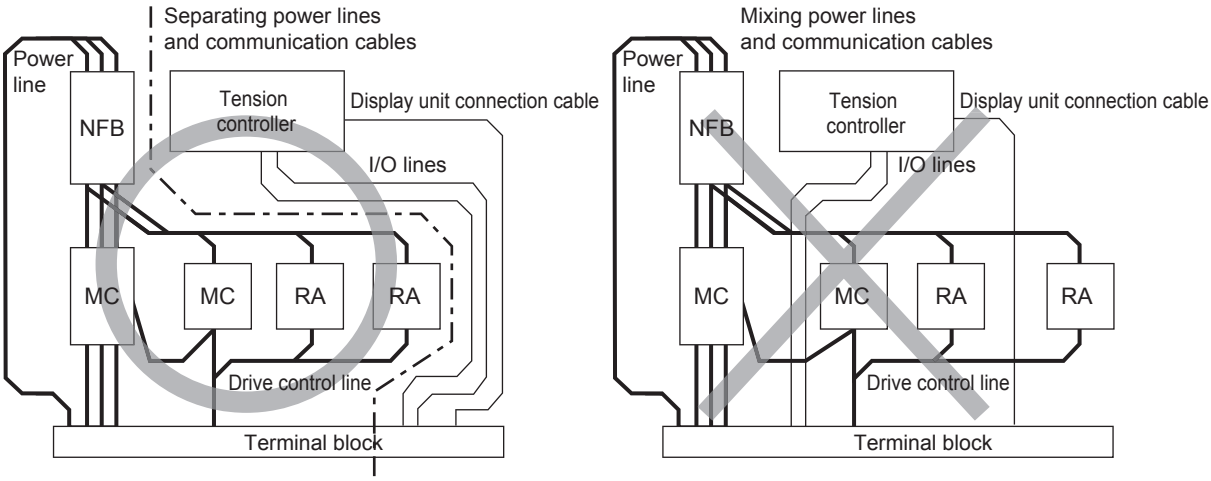


The grounding wire size should be AWG 24 to 16 (cross-section area: 0.2 to 1.5 mm^2).

The grounding point should be close to the tension controller, and all grounding wires should be as short as possible.

Wiring in panel

As shown in the figure below, the wiring should be done in such a way that the power wires, such as power supply wires and servo amplifier wires, are not mixed with the communication cables. If the wiring mixes power wires and communication cables together, malfunctions could occur as a result of electrical noise. Surge suppressors are also effective if you are using equipment that produces surge noise, such as no-fuse breakers (NFBs), magnetic contactors (MCs), relays (RAs), solenoid valves, and induction motors.

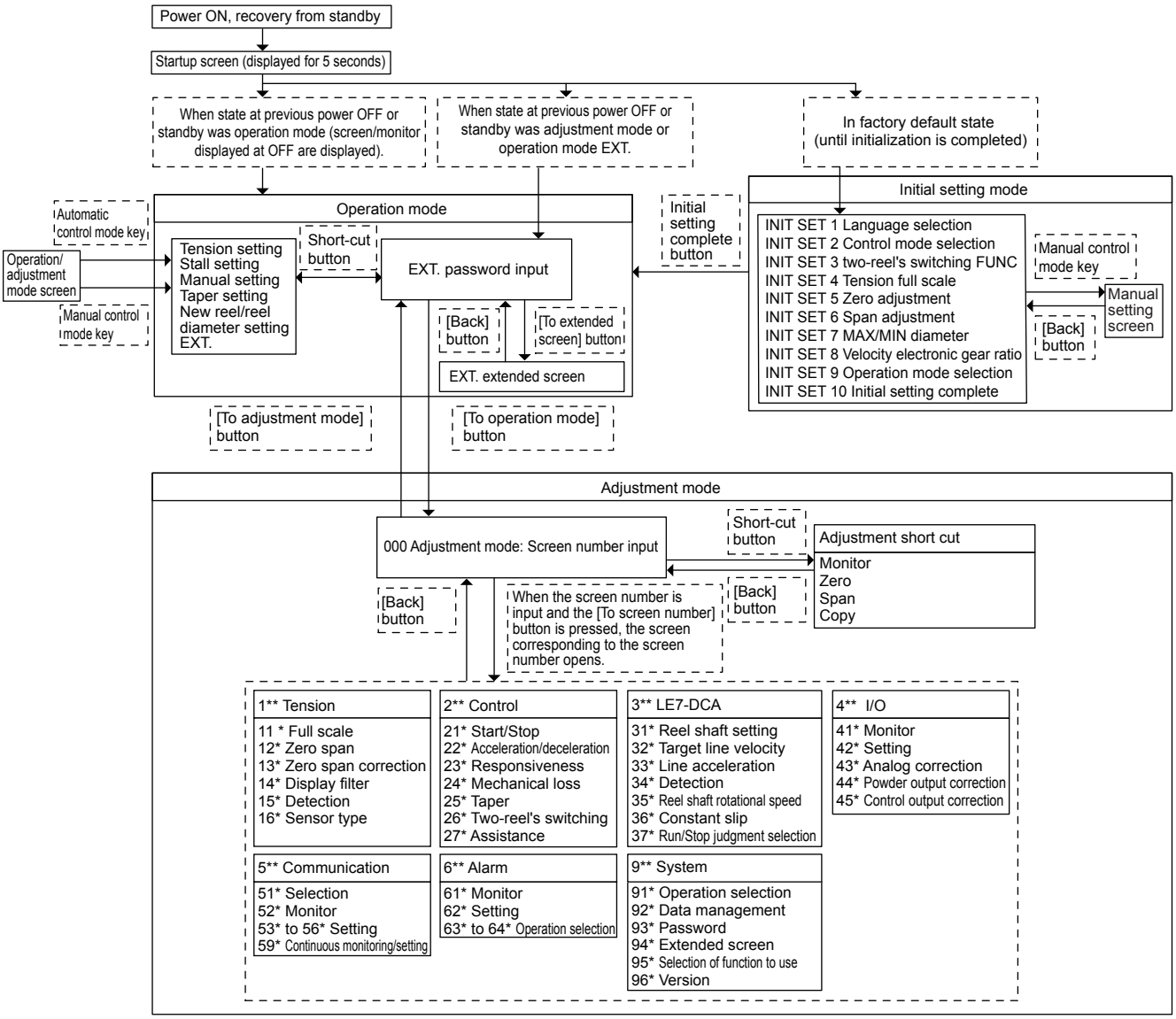


5 OPERATION SCREEN

This chapter describes screen transitions and settings on the touch panel.

5.1 General Configuration Diagram

The general configuration diagram is shown below.



Initial setting mode

After purchase, you must first set the required minimum values in order to perform tension control. If you don't complete the initial settings, you cannot switch to the operation mode screen or the adjustment mode screen. After you complete the initial settings, you cannot switch to the initial setting mode unless you initialize the product.

After completion of initial setting, the settings can be changed in adjustment mode.

Additionally, if you turn the product off or put it in standby while it is in initial settings mode, the "INIT SET 1 Language selection" screen will be shown when it restarts.

Operation mode

This is the mode used when you operate the equipment. You can configure the settings and operate the equipment while it is running in this mode even if the settings or monitor password doesn't match (parameter protection), without any setting restrictions. (This does not apply to extended screens.) If you turn the power off or put it in standby while it is in operation mode, it will display the same screen you were using when you turned it off or put it into standby when it restarts. (This does not apply to extended screens.)

Adjustment mode

This is the mode used when you start up or adjust the equipment. It includes items that are subject to restrictions when in operation mode. Almost no settings or monitor functions are available if the settings or monitor password does not match (parameter protection).

If you turn the product off or put it in standby while it is in adjustment mode, it will display the "EXT. Operation mode: Password input" screen when it restarts.

5.2 Turning on the Power and Recovering from Standby

Starting the equipment after you turn on the AC power and recovering from standby are performed as follows.

• With the equipment in the power standby state, turn off the AC power.

(1) When AC power is turned on, the LE7-40GU will start up in the power standby state.

(2) Press and hold the power key for at least one second. Once the power turns on, the startup screen will be displayed.

(3) After five seconds, the screen that corresponds to the state of the LE7-40GU (when newly shipped from the factory, this will be power off in operation mode or power off in adjustment mode) will be displayed.

• With the power turned on, turn off the AC power.

(1) When the AC power is turned on, the LE7-40 GU will start up, and because the power is on, the startup screen will be displayed.

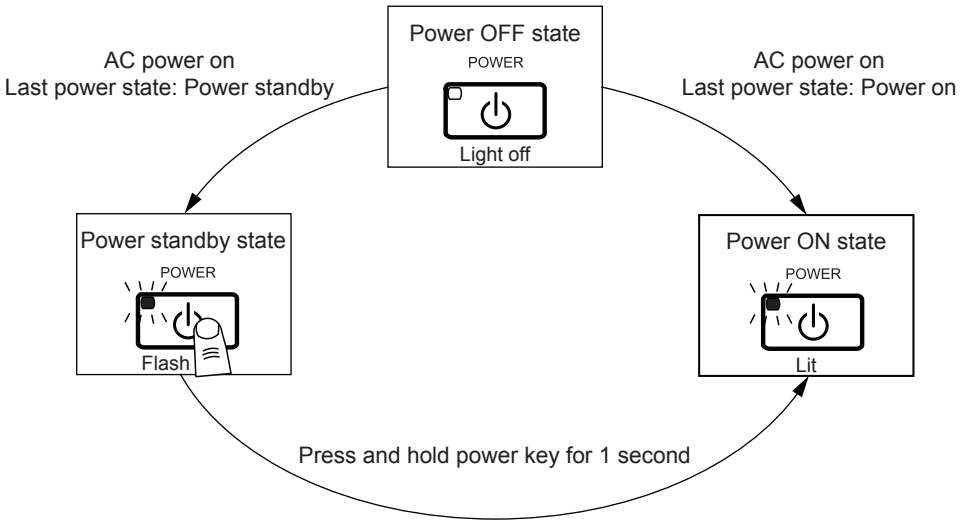
(2) After five seconds, the screen that corresponds to the state of the LE7-40GU (when newly shipped from the factory, this will be power off in operation mode or power off in adjustment mode) will be displayed.

• Power standby state

(1) Press and hold the power key for at least one second. Once the power turns on, the startup screen will be displayed.

(2) After five seconds, the screen that corresponds to the state of the LE7-40GU (when newly shipped from the factory, this will be power off in operation mode or power off in adjustment mode) will be displayed.

State transitions for power key operation and the power status display LED



Startup screen

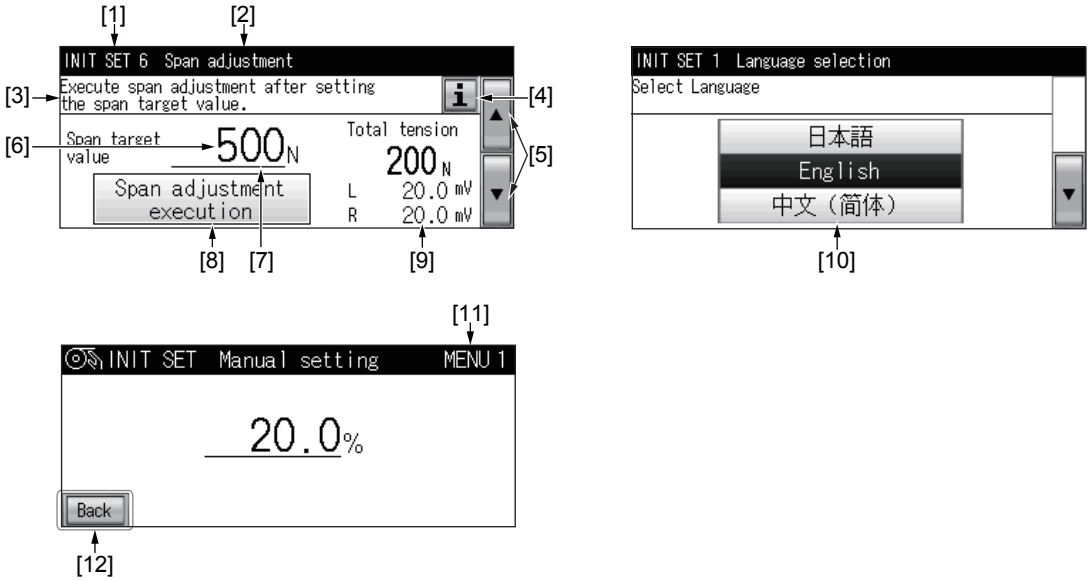
Name	Description
Screen version	This screen displays the screen data version. You can check the product's hardware version from the Main unit ROM/ screen version (screen number 961) in adjustment mode.

Screen display conditions after the startup screen Is displayed

Condition	Screen display conditions after the startup screen Is displayed
In factory default state (until initialization is completed)	INIT SET 1 Language selection
If power was turned off or standby was activated while in operation mode	The same setting or monitor screen that was displayed before the power was turned off or standby was activated will be displayed.
If power was turned off or standby was activated while in adjustment mode	EXT. Operation mode: Password input

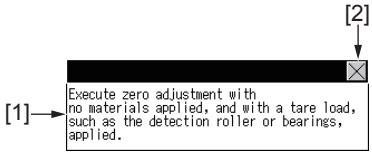
5.3 Screen Content Descriptions

Initial setting mode screen



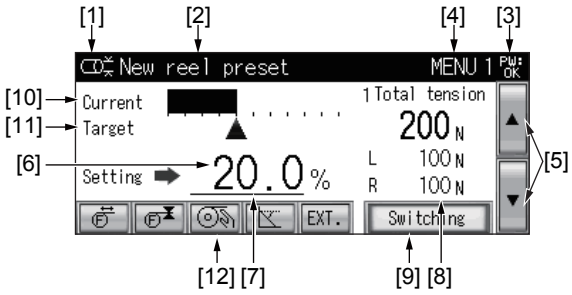
No.	Name	Description
[1]	Screen number	The number of the currently opened screen is displayed. In the initial setting mode, a value or a manual setting mark is displayed after the initial setting.
[2]	Screen name	The name of the currently opened screen is displayed.
[3]	Explanation	Explanations on the initial setting mode settings are displayed.
[4]	Information button	The information regarding setting methods or precautions are displayed.
[5]	Screen move button	This button is used to change the LCD display screens. When the screens can be moved with the screen move button, [▲], [▼], and [To ××] are displayed. The button is inverted black and white when the screens cannot be moved.
[6]	Setting value	The currently set value is displayed.
[7]	Under cursor	Setting restrictions and status of the setting value are displayed. When settings are possible, a solid line is displayed under the setting value. The under cursor flashes for setting that can be input with the dial.
[8]	Operation execution button	Press this button to execute an operation. When the operation being executed, this button flashes, and the value setting dial and value setting numeric keypad cannot be operated.
[9]	Monitor display	Monitor values, such as the current tension, etc., are displayed
[10]	Selection setting button	Press this button to change the setting value for the selected setting.
[11]	Menu No.	The menu number is displayed. This appears only on screens saved in the menu function. Menu switching key is valid only in the screen displaying the menu number.
[12]	Back button	In the initial setting mode screen, the display is returned to the screen before being moved to the manual setting screen.

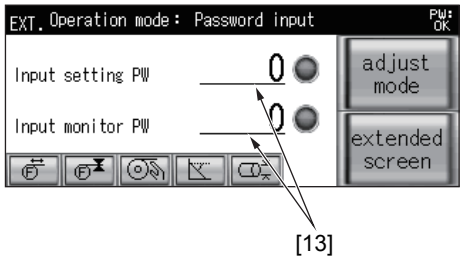
Information screen

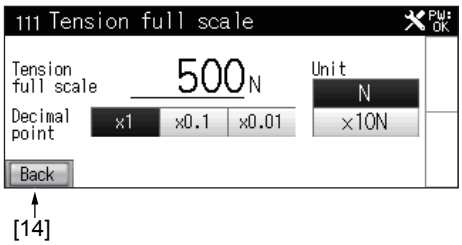


No.	Name	Description
[1]	Explanation	Displays supplemental or cautionary information.
[2]	×Button	Closes supplemental and cautionary pop-ups.

Operation mode screen

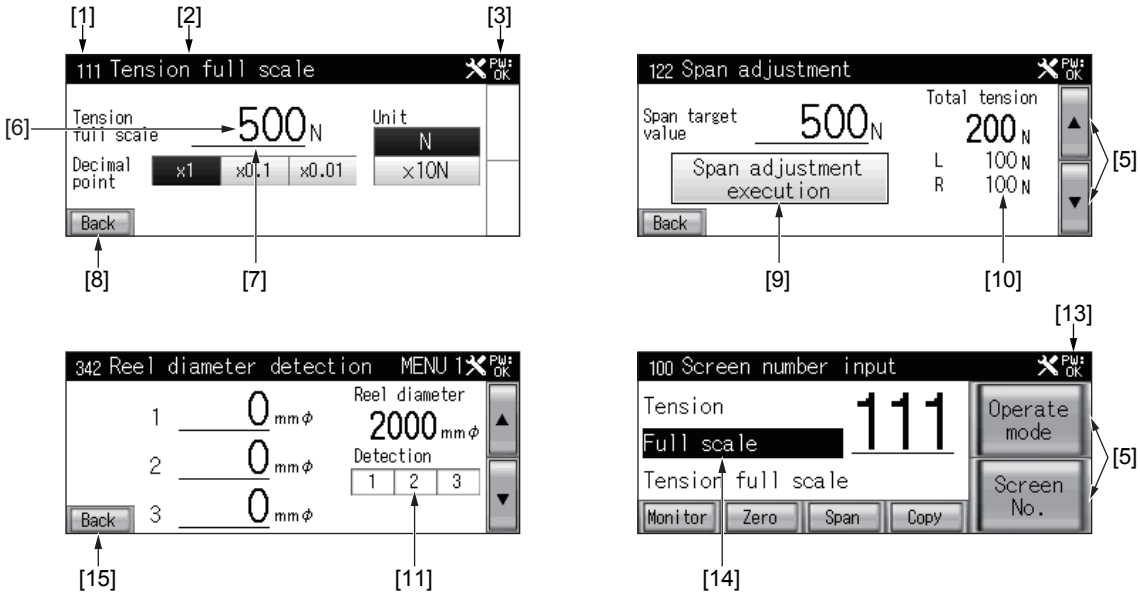






No.	Name	Description
[1]	Screen number	The number of the currently opened screen is displayed. In the operation mode, a mark will appear at the screen number
[2]	Screen name	The name of the currently opened screen is displayed.
[3]	Password protection status	The parameter protection execution status by the password is displayed. PW:NG: Status of parameter protection is being executed when the password is not matched. PW:OK: Password matched status If either the setting password or monitor password is incorrect, the status of parameter protection is being executed.
[4]	Menu No.	The menu number is displayed. This appears only on screens saved in the menu function. Menu switching key is valid only in the screen displaying the menu number.
[5]	Screen move button	This button is used to change the LCD display screens. When the screens can be moved with the screen move button, [▲], [▼], and [To ××] are displayed. The button is inverted black and white when the screens cannot be moved.
[6]	Setting value	The currently set value is displayed. The parameter-protected setting values do not appear during the parameter protection execution.
[7]	Under cursor	Setting restrictions and status of the setting value are displayed. When settings are possible, a solid line is displayed under the setting value. This does not appear during parameter protection, or when the settings are restricted during operation. The under cursor flashes for setting that can be input with the dial.
[8]	Monitor display	Monitor values, such as the current tension, etc., are displayed.
[9]	Monitor display switching button	This button is used to change the details displayed on the monitor. The display on the 7-segment monitor display automatically change according to the display details.
[10]	Tension monitor graph	The current tension is displayed. When the tension is 100%, the tension full-scale setting value is displayed.
[11]	Target tension indicator	The target tension during automatic control is displayed. When the target tension is 100%, the tension full-scale setting value is displayed.
[12]	Short-cut button	This button is used to move to a specific function screen. The button is inverted black and white when the screens cannot be moved.
[13]	Password match indicator	The status of the password is displayed. When the password is matched, the black color is displayed, and when the password is not matched, the white color is displayed.
[14]	Back button	This returns you from the extended screen to the password input screen in operation mode.

Adjustment mode screen

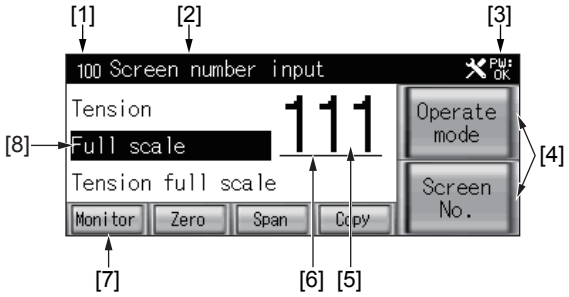


No.	Name	Description
[1]	Screen number	The number of the currently opened screen is displayed. A three-digit number is displayed while you are in adjustment mode. This number corresponds to the category of the adjustment content. The hundreds digit is the top-level category. The tens digit is the mid-level category. The ones digit is the bottom-level category.
[2]	Screen name	The name of the currently opened screen is displayed.
[3]	Password Protection Status	The parameter protection execution status by the password is displayed. PW:NG: Status of parameter protection is being executed when the password is not matched. PW:OK: Password matched status If either the setting password or monitor password is incorrect, the status of parameter protection is being executed.
[4]	Menu No.	The menu number is displayed. This appears only on screens saved in the menu function. Menu switching key is valid only in the screen displaying the menu number.
[5]	Screen move button	This button is used to change the LCD display screens. When the screens can be moved with the screen move button, [▲], [▼], and [To ××] are displayed. The button is inverted black and white when the screens cannot be moved.
[6]	Setting value	The currently set value is displayed. The parameter-protected setting values do not appear during the parameter protection execution.
[7]	Under cursor	Setting restrictions and status of the setting value are displayed. When settings are possible, a solid line is displayed under the setting value. This does not appear during parameter protection, or when the settings are restricted during operation. The under cursor flashes for setting that can be input with the dial.
[8]	Selection setting button	Press this button to change the setting value for the selected setting. The image will change if the setting is restricted.
[9]	Operation execution button	Press this button to execute an operation. While execution is in progress, the button will flash, and you will be unable to use the value setting dial and numpad.
[10]	Monitor display	Monitor values, such as the current tension, etc., are displayed.
[11]	Contact monitor	Displays the status of contacts, including I/O and detection signals. It appears white when OFF, and black when ON.
[12]	Short-cut button	This button is used to move to a specific function screen. The button is inverted black and white when the screens cannot be moved.
[13]	Adjustment mode icon	This indicator is for helping you distinguish whether you are on the adjustment screen or the extended operation screen. It appears only on the adjustment screen, and not on the extended operation screen.
[14]	Screen category	The top-level, mid-level, and bottom-level categories (screen names) are displayed in order from the top. If you select a category, you can change the category you are using with the dial input.
[15]	Back button	In the adjustment mode screen, the back button returns you to the adjustment mode's screen number input screen.

Screen number input

If you press the top-level category, mid-level category, or bottom-level category (screen name), you can operate the dial to change the applicable category number, and the both the screen number input number and dial-selected category will be saved in the event of a power outage.

Additionally, you cannot set the screen number to a screen number that doesn't exist or that cannot be displayed due to restrictions.

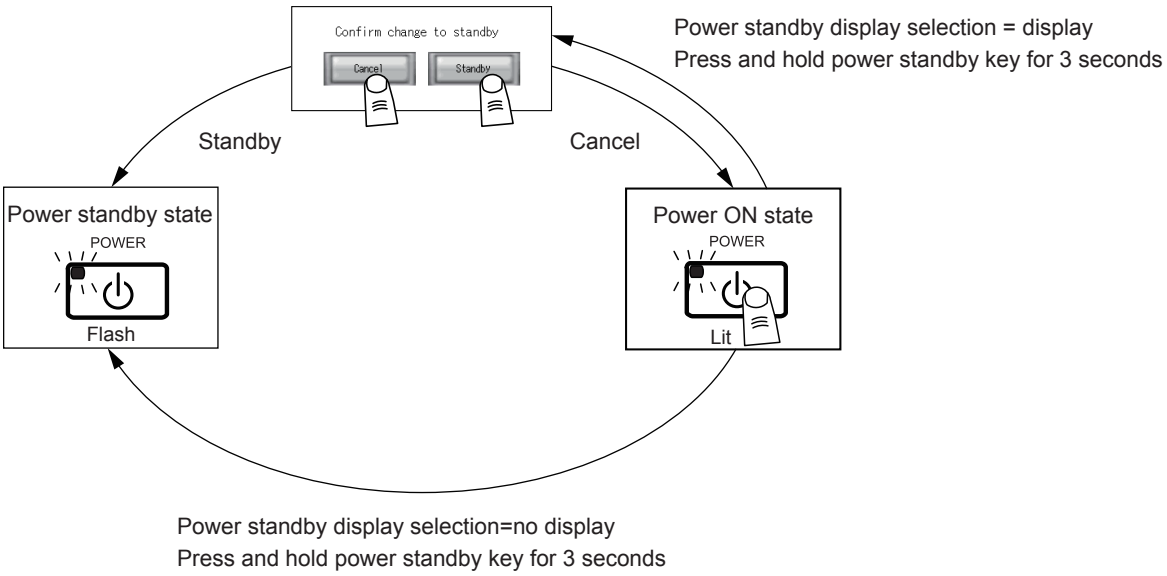


No.	Name	Description
[1]	Screen number	The number of the currently opened screen is displayed. A three-digit number is displayed while you are in adjustment mode. This number corresponds to the category of the adjustment content. The hundreds digit is the top-level category. The tens digit is the mid-level category. The ones digit is the bottom-level category.
[2]	Screen name	The name of the currently opened screen is displayed.
[3]	Password protection status	The parameter protection execution status by the password is displayed. PW:NG: Status of parameter protection is being executed when the password is not matched. PW:OK: Password matched status If either the setting password or monitor password is incorrect, the status of parameter protection is being executed.
[4]	Screen move button	This button is used to change the LCD display screens. When the screens can be moved with the screen move button, [▲], [▼], and [To ××] are displayed. The button is inverted black and white when the screens cannot be moved.
[5]	Setting value	The currently set value is displayed. The parameter-protected setting values do not appear during the parameter protection execution.
[6]	Under cursor	Setting restrictions and status of the setting value are displayed. If a setting can be modified, an underline is displayed underneath the setting value, but if the setting is restricted due to parameter protection or operation in progress, no underline will be displayed. The under cursor flashes for setting that can be input with the dial.
[7]	Short-cut button	This button is used to move to a specific function screen. The button is inverted black and white when the screens cannot be moved.
[8]	Screen category	The top-level, mid-level, and bottom-level categories (screen names) are displayed in order from the top. If you select a category, you can change the category you are using with the dial input.

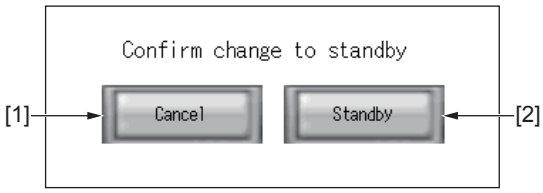
5.4 Activating Standby

If the power standby key is pressed and held for 3 seconds while the power standby display selection is being displayed (initial value), the power standby screen will be displayed. If the power standby display selection is not being displayed, then it will go into standby without displaying the screen below.

Power standby state transitions



Power standby screen example



No.	Name	Description
[1]	Cancel	If you press the Cancel button, power status will remain unchanged, and the move to the standby screen will be canceled.
[2]	Standby	If you press the Standby button, the product will go into standby.

5.5 Switching between Automatic Control and Manual Control

You can switch the tension control mode's automatic control mode and manual control mode by pressing the automatic control mode key and the manual mode control key. Additionally, the tension control mode's state transitions differ according to the run/stop signal, the inching on/off signal, the start timer setting, and the stop timer setting. You can also switch between displaying the automatic control mode status display LED and the manual control mode status display LED according to the tension control mode status.

Pressing the automatic control mode key switches the LCD display screen to the tension setting screen, and pressing the manual control mode key switches the LCD display screen to the manual setting screen. However, during initial setting, you cannot switch the LCD display screen using the automatic control mode key.

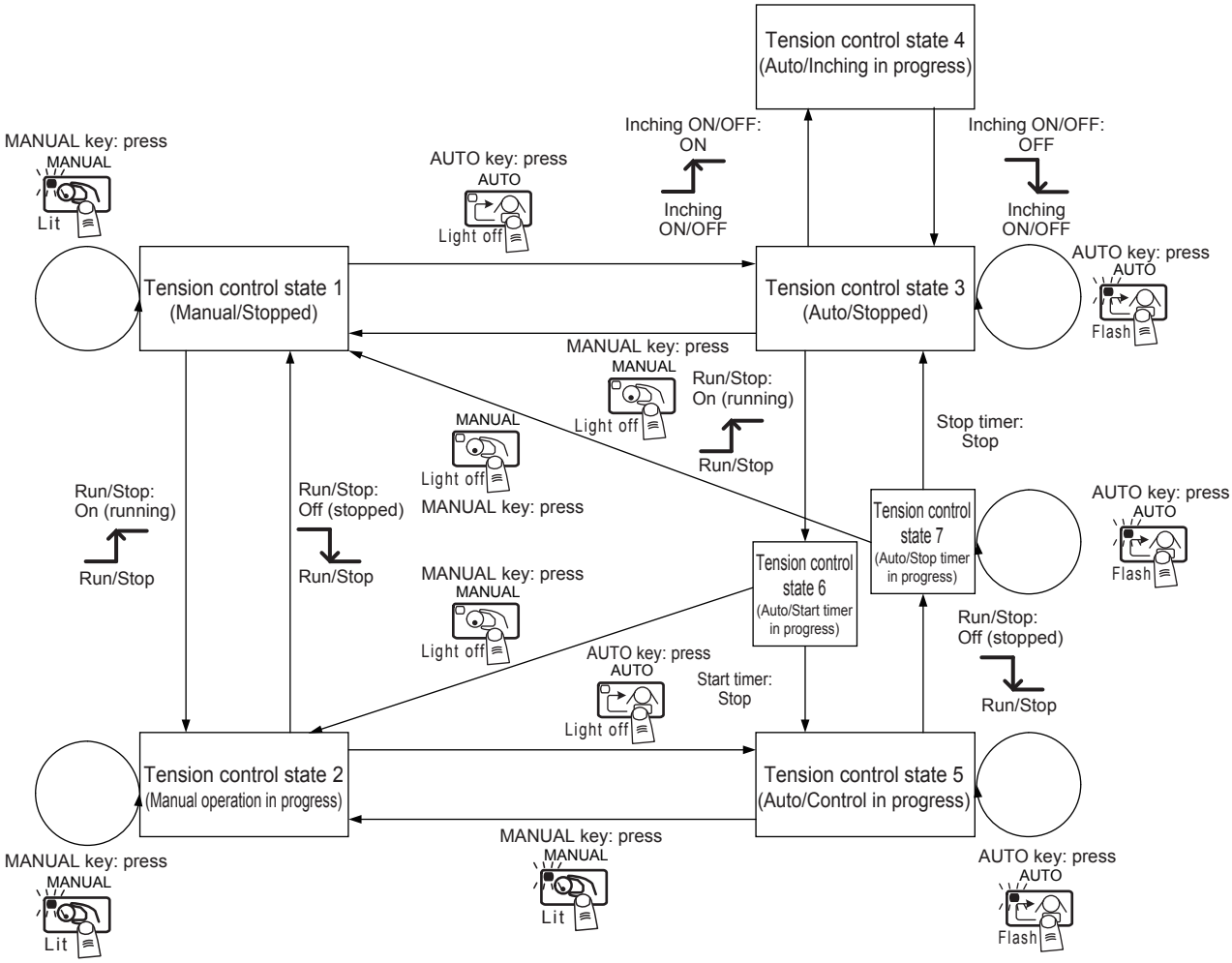
Automatic control mode

Auto control starts right after the run/stop signal is turned ON. The system automatic varies control outputs so that the current and target tensions match the set value of the tension setting.

Manual control mode

For the set value of manual setting, the [PP]-[PN] terminal output generates a control output voltage of 0 to about 24 V DC, and the SA-SN terminal output generates the control output voltage according to the control output mode selection.

Automatic control mode and manual control mode state transitions



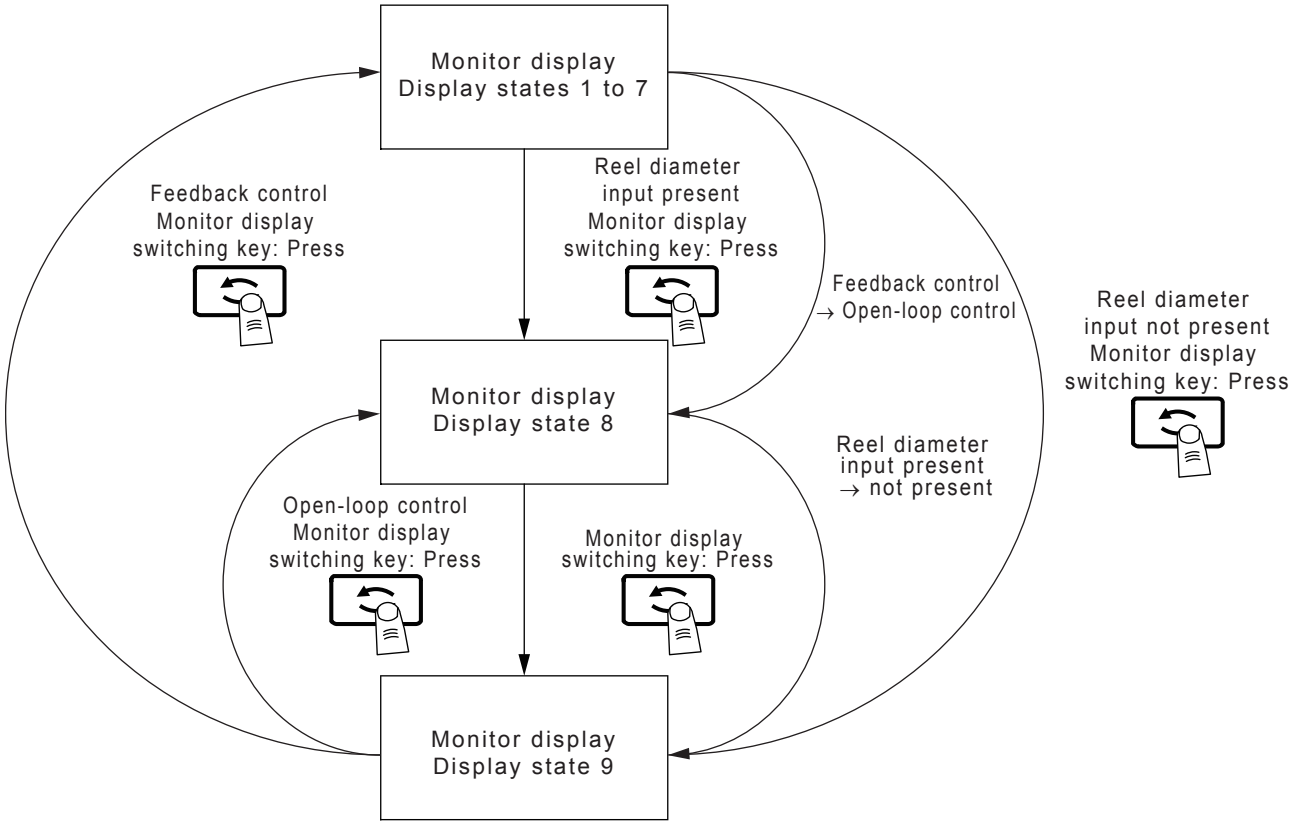
Automatic control mode and manual control mode states

Tension control state 3				Power status display LED	
No.	**Auto/Manual**	**Running/Stopped**	**Control state**	**AUTO**	**MANUAL**
1	Manual	Stopped	—	AUTO Light off	MANUAL Lit
2		Running	—	AUTO Light off	MANUAL Lit
3	Automatic	Stopped	—	AUTO Flash	MANUAL Light off
4			Inching in progress	AUTO Light off	MANUAL Light off
5		Running	Control in progress	AUTO Lit	MANUAL Light off
6			Start timer operation being executed	AUTO Light off	MANUAL Light off
7			Stop timer operation being executed	AUTO Light off	MANUAL Light off

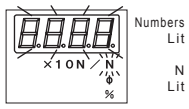
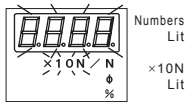
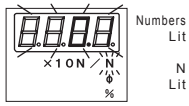
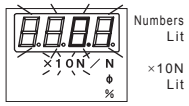
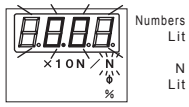
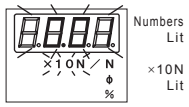
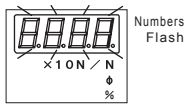
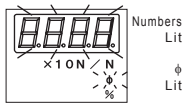
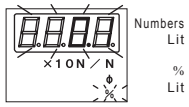
5.6 Monitor Display Switching

The monitor display displays tension values and output values. It also displays reel diameter during the use of the reel diameter calculation option and when there is reel diameter signal input coming from an external source. You can switch the information displayed by the monitor display by operating the monitor display switching key. Additionally, switching the LCD screen's monitor display causes the information displayed by the monitor display to change.
For tension display, the decimal point position displayed by the monitor display and the monitor display's unit display LED will change according to the tension display's decimal point setting and the tension display unit setting. Additionally, the tension display will blink if the total tension monitor value exceeds the tension full scale value.
If reel diameter input is no longer present during reel diameter display, the monitor display will switch to output display.
The LE7-40GU saves the display status of the monitor display when AC power is turned off. When the power is on again, the display status of the monitor display when AC power was turned off will be displayed.

Monitor display state transitions



Monitor display states

Display states of the monitor display					Monitor display
No.	Description of screen content	Tension display decimal point setting	Tension display unit setting	Total tension monitor value	
1	Tension display	×1	N	Monitor value≤tension full scale	
2			×10 N	Monitor value≤tension full scale	
3		×0.1	N	Monitor value≤tension full scale	
4			×10 N	Monitor value≤tension full scale	
5		×0.01	N	Monitor value≤tension full scale	
6			×10 N	Monitor value≤tension full scale	
7		—	—	Monitor value>tension full scale	
8	Reel diameter display	—	—	—	
9	Output display	—	—	—	

5.7 Control Output State Switching

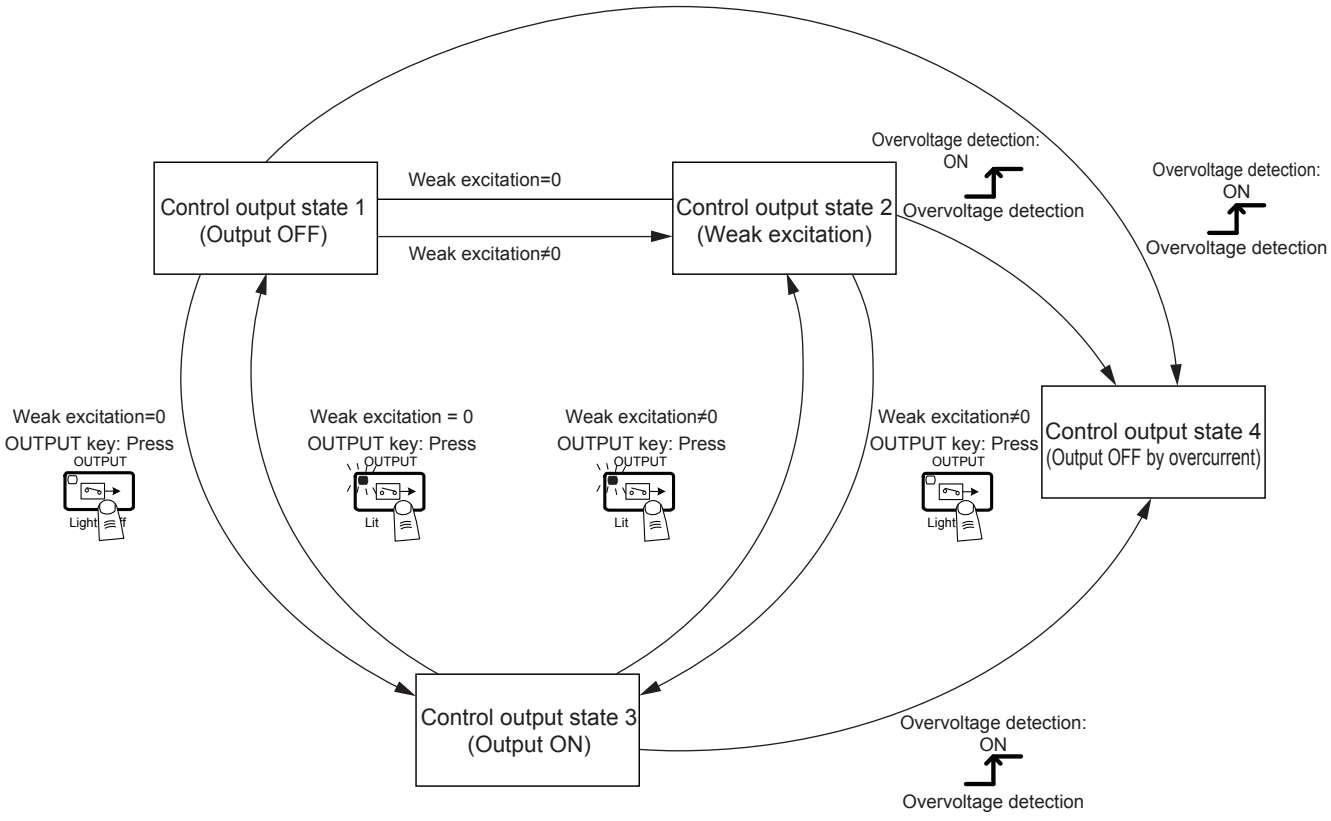
You can switch the control output state between on and off by pressing the control output on/off key. For the monitor display's output display, when control output is in the off state, the monitor display will blink "off", and the output on/off state display LED will be lit. Under these conditions, if the weak excitation setting is anything other than zero, the monitor display will display the weak excitation setting's control output percentage and blink. For the monitor display's output display, when control output is in the on state, the monitor display's control output percentage will be displayed, and the output on/off state display LED will be lit.

Additionally, if overvoltage detection between the [PP]–[PN] and [S1]–[S2] terminals for the powder clutch/brake is triggered, the monitor display will flash "O.C." and the output on/off state display LED will blink. If overvoltage detection has been triggered, you must first eliminate the short circuit, and then either turn the power on, off, and on again, or else turn power on, activate standby, and turn power on again in order to return to normal operation.

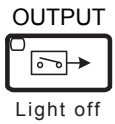
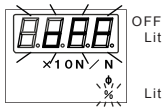
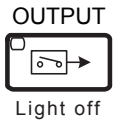
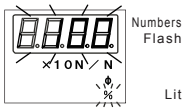
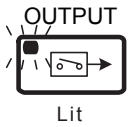
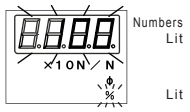
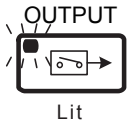
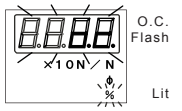
Even if you operate the control output on/off key, the display status will continue unchanged if the monitor display was in the tension display state or reel diameter display state. However, if overvoltage detection has been triggered, the display will switch to the overvoltage detection on state even if the monitor display was in the tension display state or reel diameter display state.

5

Control output state transitions



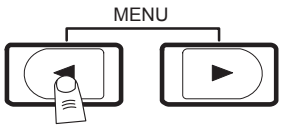
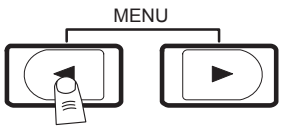
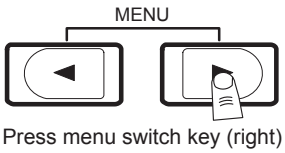
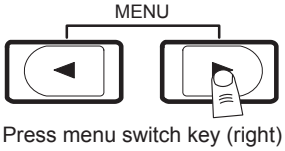
Control output states

Display states of the monitor display				Output on/off status display LED	Monitor display
No.	Overvoltage detection	Output on/off	Weak excitation		
1	OFF	Control output OFF	0		
2			Any value other than zero		
3		Control output ON	—		
4	ON	—	—		

5.8 Menu Number Switching

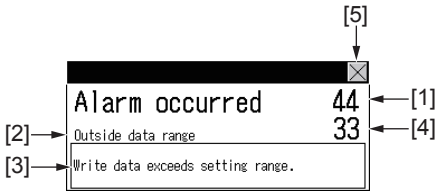
You can switch the menu number by pressing the menu switching key.

Switching the menu number will have no effect if operation protection or all-operation key lock protection is active. The menu number is displayed on the LCD display screen.

Using the menu switching key		Menu number after key operation
Menu No.	Menu switching key operation	
1	 Press menu switch key (left)	8
2 to 8	 Press menu switch key (left)	Decreases the menu number by one.
1 to 7	 Press menu switch key (right)	Increases the menu number by one.
8	 Press menu switch key (right)	1

5.9 Alarm Display

This is displayed when an alarm occurs. The alarm display disappears once the Alarm display time has elapsed or if the "×" button at the top right of the screen is pressed.



No.	Name	Description
[1]	Alarm number	Displays the alarm number.
[2]	Alarm name	Displays the alarm name.
[3]	Alarm description	Displays a description of the alarm.
[4]	Network alarm number	If a network alarm occurs, this shows the device number responsible for causing the alarm.
[5]	×Button	Turns off the alarm display.

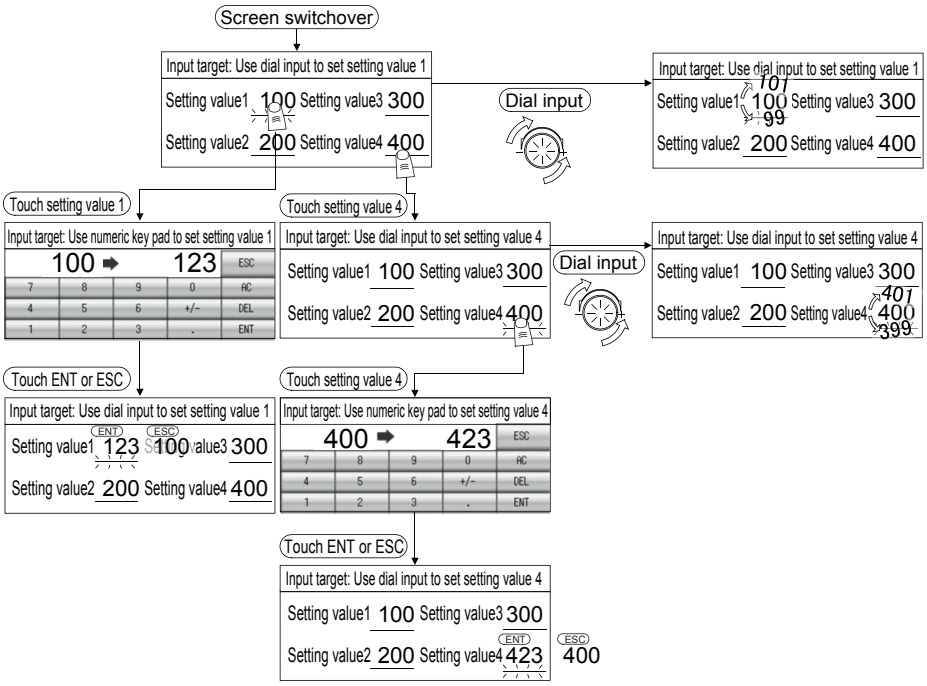
5.10 How to Input Numerical Values for Settings

Numeric value input method

There are two methods for inputting numerical values: dial input using the value setting dial, and numpad input using the on-screen keypad. When the screen switches, the setting item located on the upper left of the screen changes to the value setting dial input state. The other setting values are all set to the unselected state. However, if the setting is limited with a key lock or protection, all setting values on the screen are under setting restricted state.

Status	Under cursor	Dial operation	Setting item touch
Value setting dial input	Flash	Possible	Value setting key window displays, value setting numeric key pad input status enabled
Value setting numeric key pad input	—	Not possible	—
Not selected	Display	Not possible	Touch setting item changes to value setting dial input status. Other value setting dial input state setting items change to non-selected state.
Setting restriction	No display	Not possible	No operation

Example of status transition



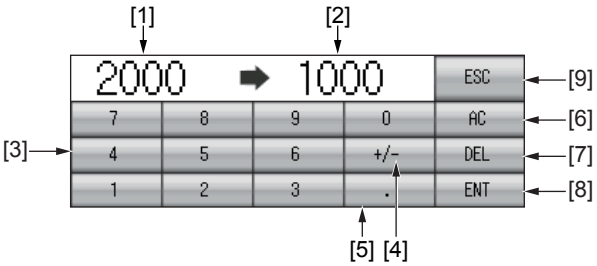
Dial input

Rotate the dial clockwise to increment the setting value, and rotate it counterclockwise to decrement the setting value. The amount by which the setting value changes has three levels determined by dial rotation speed.

Dial operation		Dial rotation speed	Change in setting value
Dial rotation direction	**Dial operation**		
Clockwise		Slow	Small decrease
		Medium	Medium decrease
		Fast	Large decrease
Counterclockwise		Slow	Small decrease
		Medium	Medium decrease
		Fast	Large decrease

Key window display

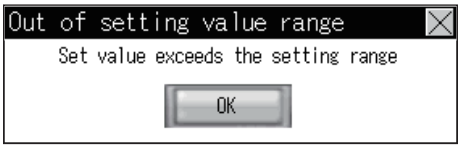
When the setting value is pressed again while dial operation is enabled, the key window will appear.
The key window closes if you press the “ESC” button (cancel) or the “ENT” button (apply the value to the setting value).



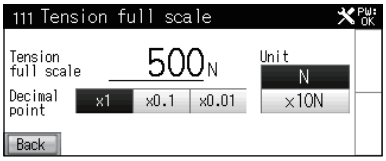
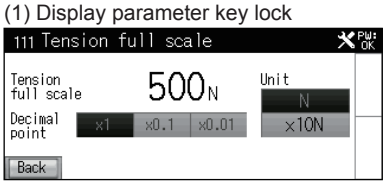
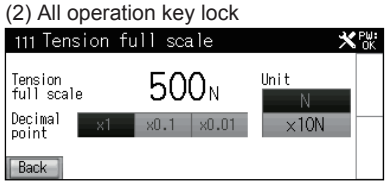
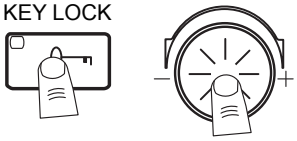
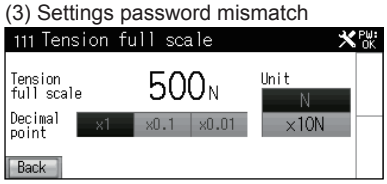
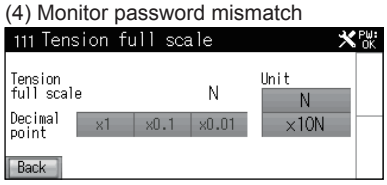
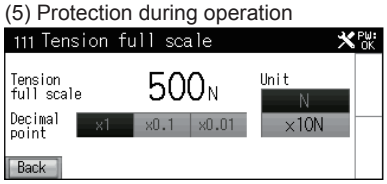
No.	Name	Description
[1]	Original setting value	The original setting value is displayed.
[2]	Setting value	The value being input is displayed.
[3]	Value button	Use these buttons to input the value.
[4]	+/- button	Press this button to switch the value to a positive or negative value. The minus sign will not be displayed for setting valued that cannot be negative.
[5]	Decimal point button	Press this button to add a decimal point to the value. A decimal point will not be displayed for setting values that do not use the decimal point.
[6]	AC button	Press this button to clear all values.
[7]	DEL button	Press this button to clear the far right value.
[8]	ENT button	Press this button to reflect the value onto the setting value. If the value is lower than the setting’s minimum value or higher than its maximum value, pressing the “ENT” button will cancel changing the setting value, and the setting value out-of-range screen will be displayed.
[9]	ESC button	Press this button to cancel changes to the setting value.

Out of setting value range

This screen is displayed if you press the “ENT” button while the value in the key window display is lower than the setting’s minimum value or higher than its maximum value.



5.11 Examples of Key Lock, Password, and Operation Protection States

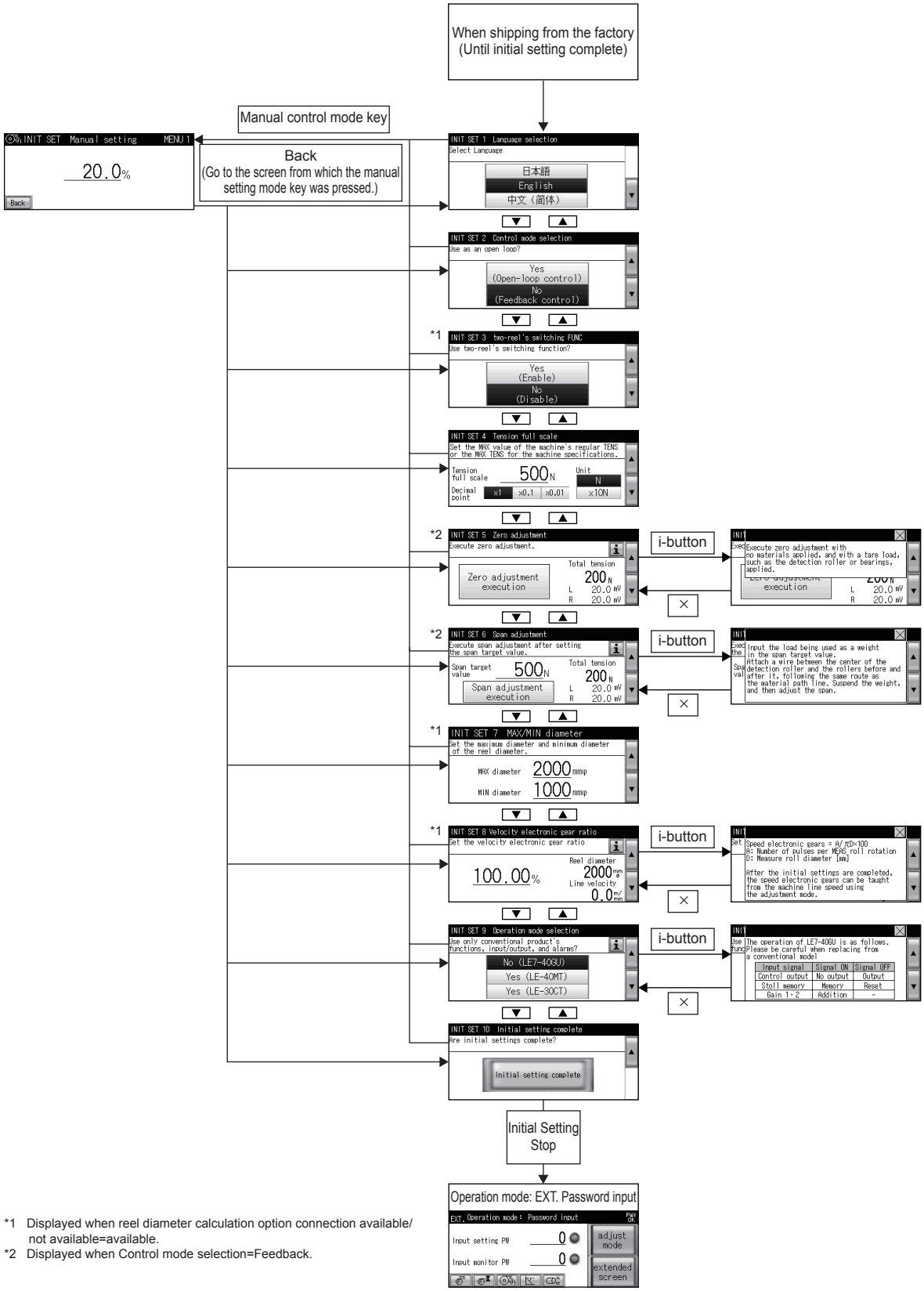
Touch panel key lock display states	Operation and monitor states	Setting method	Cancellation method
Normal status 	Setting: Enabled Monitor: Enabled Operation: Enabled	—	—
(1) Display parameter key lock 	Setting: Disabled Monitor: Enabled*1 Operation: Enabled	KEY LOCK  Key lock Press and hold for 3 seconds	KEY LOCK  Key lock Press and hold for 1 second
(2) All operation key lock 	Setting: Disabled Monitor: Enabled*1 Operation: Disabled	KEY LOCK  Key lock/Dial push key Press and hold for 3 seconds	KEY LOCK  Key lock Press and hold for 1 second
(3) Settings password mismatch 	Setting: Disabled Monitor: Enabled Operation: Enabled	The input does not match the setting password. The input matches the monitor password.	Make the input match the setting password.
(4) Monitor password mismatch 	Setting: Disabled Monitor: Disabled Operation: Enabled	The input does not match the monitor password. (This has no effect on the setting password.)	Make the input match the monitor password.
(5) Protection during operation 	Setting: Disabled only for protection parameters during operation Monitor: Enabled*1 Operation: Enabled	Run/stop status is the operating state.	Change run/stop status to the stopped state.

*1 Disabled if the input does not match the monitor password.

No protection will be active during initial setting configuration.

5.12 Initial Setting

Screen flowchart

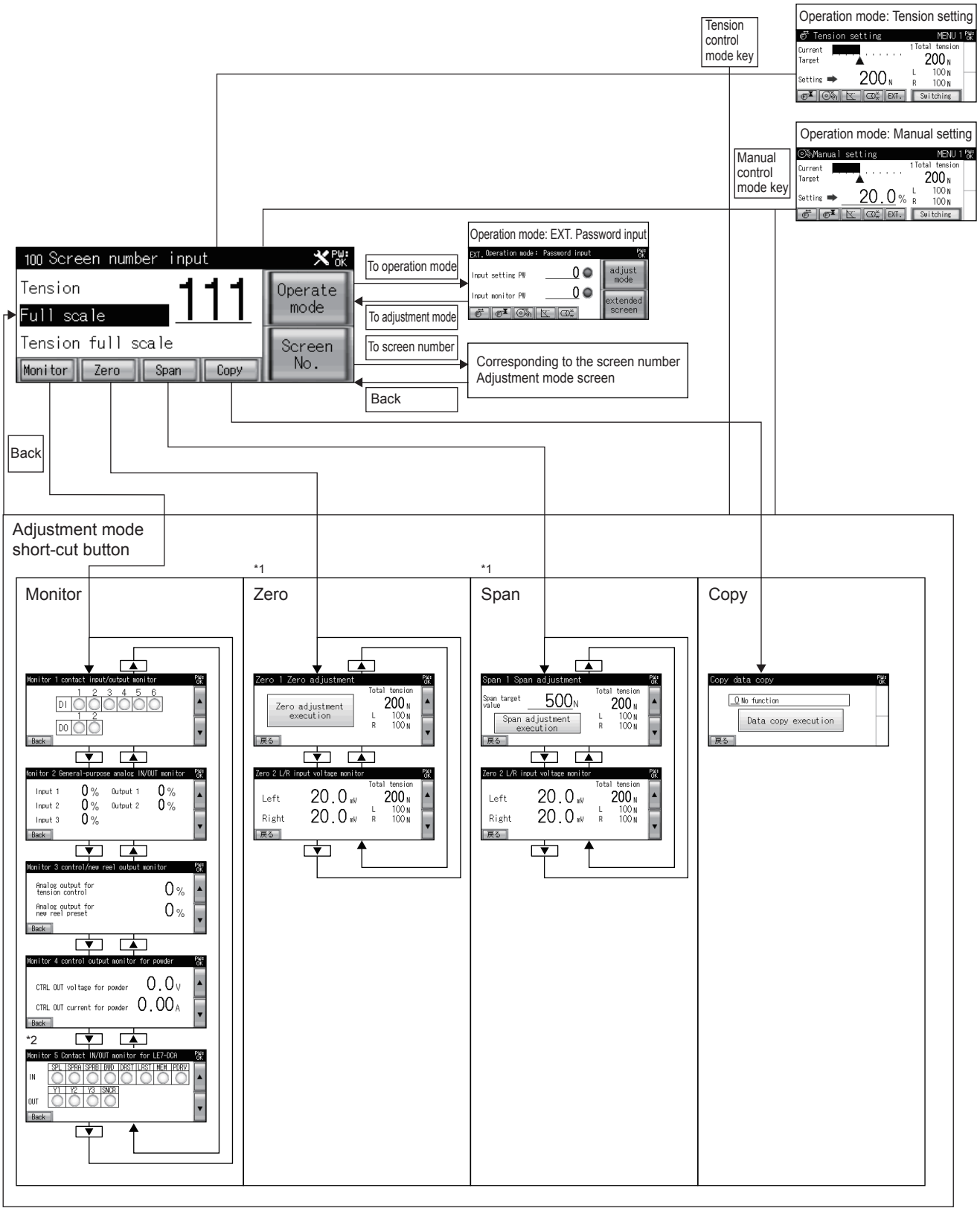


*1 Displayed when reel diameter calculation option connection available/ not available=available.
*2 Displayed when Control mode selection=Feedback.

Adjustment mode

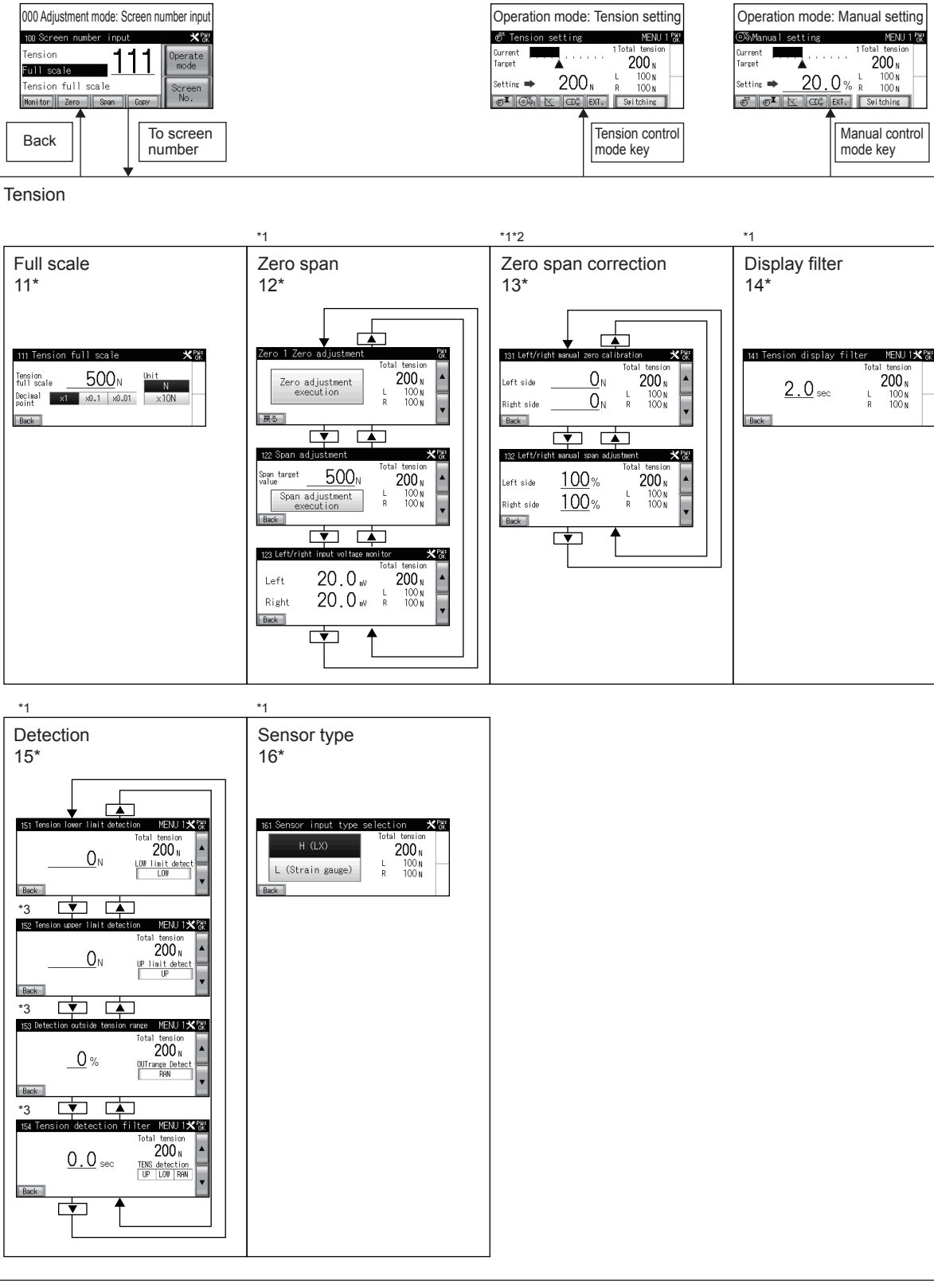
A flowchart of the adjustment mode screens is shown below.

Screen number input and adjustment shortcuts



*1 Displayed when Control mode selection=Feedback.
*2 Displayed when reel diameter calculation option connection available/not available=available.

1** Tension



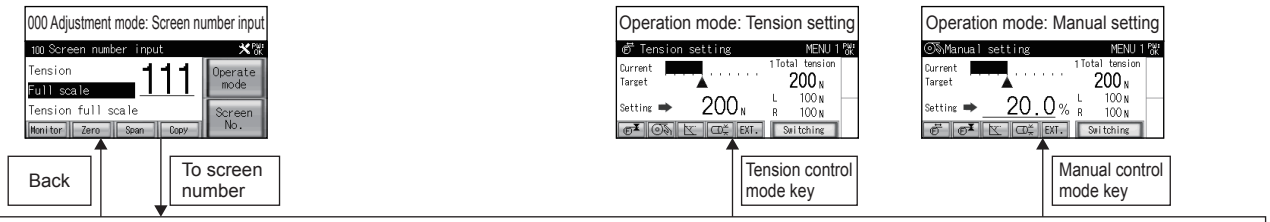
The screen will be displayed only when all of the following * conditions are satisfied.

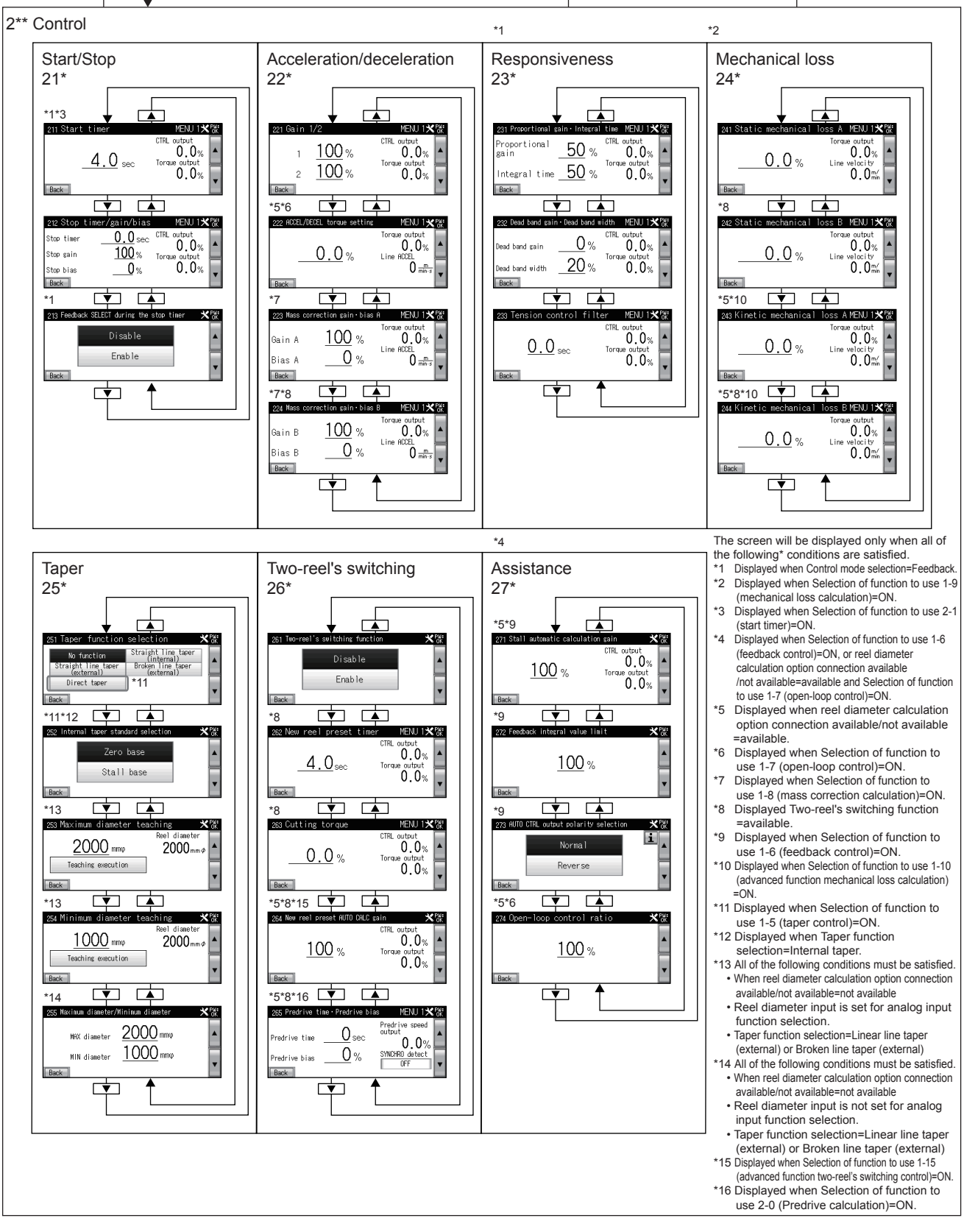
*1 Displayed when Control mode selection=Feedback.

*2 Displayed when Selection of function to use 1-0 (correction of tension calibration)=ON.

*3 Displayed when Selection of function to use 1-1 (tension upper limit and outside range detection)=ON.

2** Control





The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when Control mode selection=Feedback.

*2 Displayed when Selection of function to use 1-9 (mechanical loss calculation)=ON.

*3 Displayed when Selection of function to use 2-1 (start timer)=ON.

*4 Displayed when Selection of function to use 1-6 (feedback control)=ON, or reel diameter calculation option connection available /not available=available and Selection of function to use 1-7 (open-loop control)=ON.

*5 Displayed when reel diameter calculation option connection available/not available =available.

*6 Displayed when Selection of function to use 1-7 (open-loop control)=ON.

*7 Displayed when Selection of function to use 1-8 (mass correction calculation)=ON.

*8 Displayed when Two-reel's switching function =available.

*9 Displayed when Selection of function to use 1-6 (feedback control)=ON.

*10 Displayed when Selection of function to use 1-10 (advanced function mechanical loss calculation) =ON.

*11 Displayed when Selection of function to use 1-5 (taper control)=ON.

*12 Displayed when Taper function selection=Internal taper.

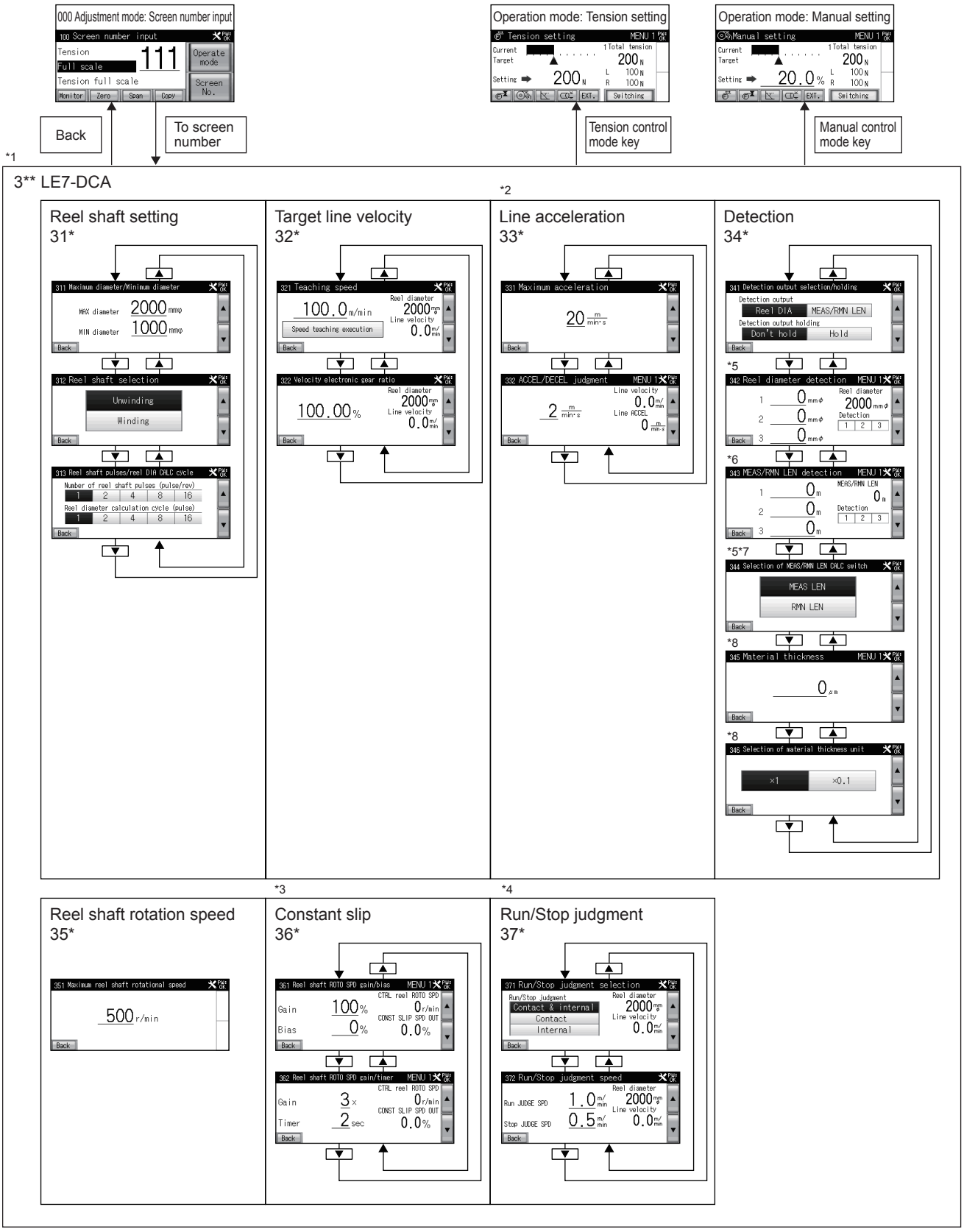
*13 All of the following conditions must be satisfied.
- When reel diameter calculation option connection available/not available=not available
- Reel diameter input is set for analog input function selection.
- Taper function selection=Linear line taper (external) or Broken line taper (external)

*14 All of the following conditions must be satisfied.
- When reel diameter calculation option connection available/not available=not available
- Reel diameter input is not set for analog input function selection.
- Taper function selection=Linear line taper (external) or Broken line taper (external)

*15 Displayed when Selection of function to use 1-15 (advanced function two-reel's switching control)=ON.

*16 Displayed when Selection of function to use 2-0 (Predrive calculation)=ON.

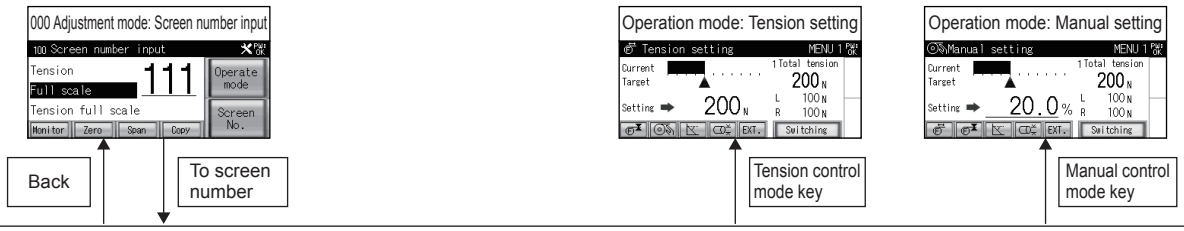
3** LE7-DCA

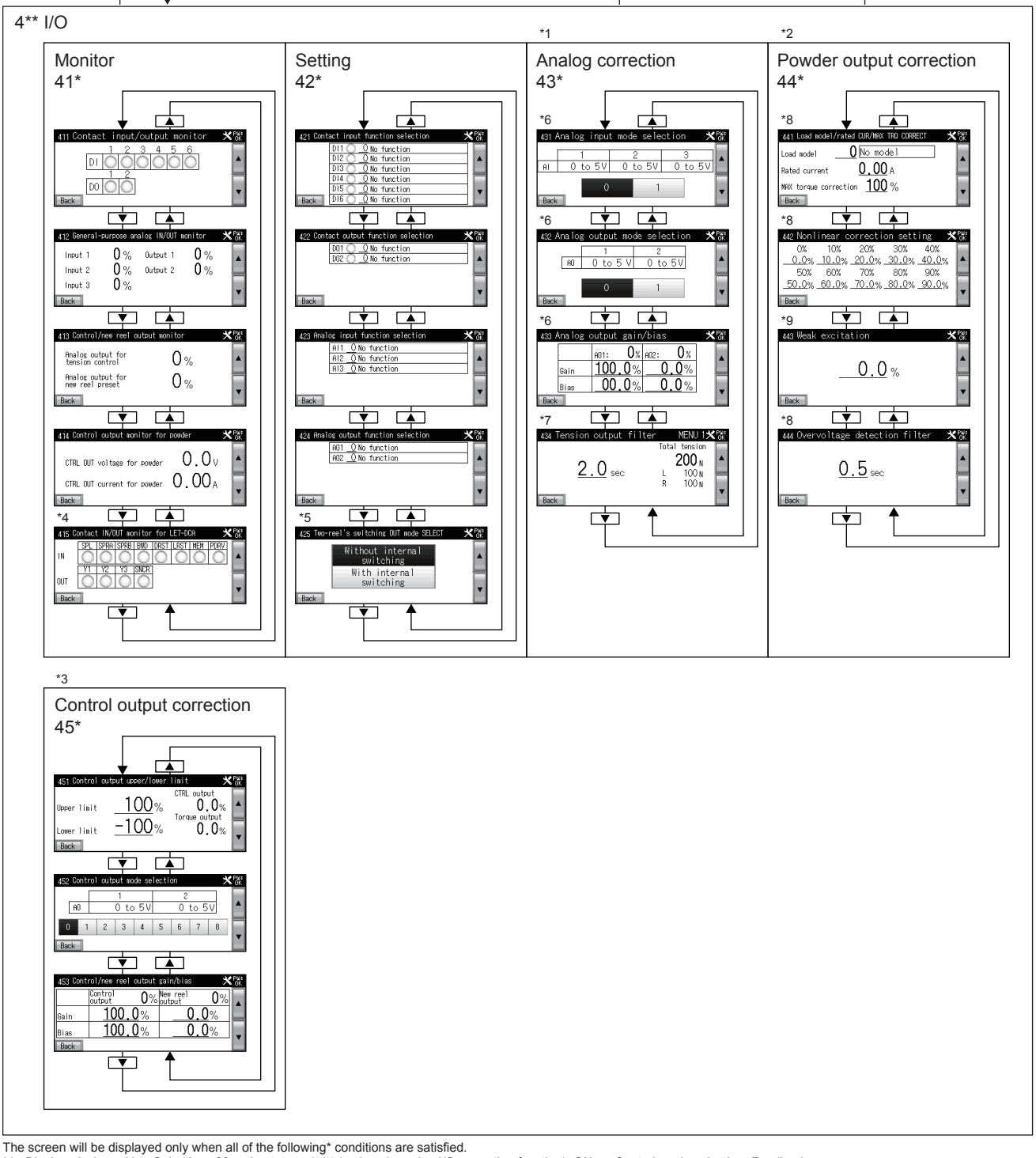


The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when reel diameter calculation option connection available/not available=available.
*2 Displayed when Selection of function to use 1-2 (acceleration calculation)=ON.
*3 Displayed when Selection of function to use 1-4 (constant slip control calculation)=ON.
*4 Displayed when Selection of function to use 1-3 (run/stop judgment)=ON.
*5 Displayed when Detection output=Reel diameter.
*6 Displayed when Detection output=Measurement length/remaining length.
*7 Displayed when Reel shaft setting=Unwinding.
*8 Displayed when Selection of MEAS/RMN LEN CALC switch=RMN LEN.

4** I/O

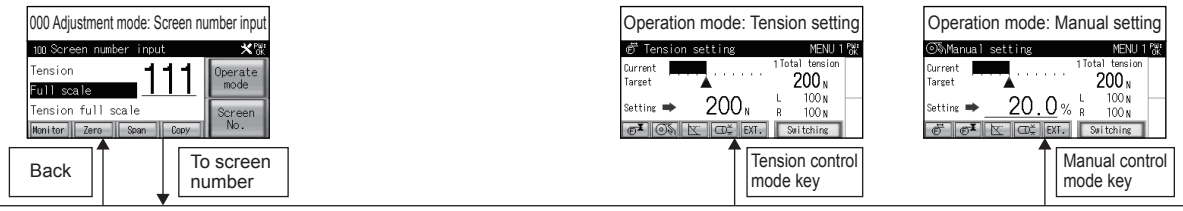




The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when either Selection of function to use 1-14 (main unit analog I/O correction function)=ON, or Control mode selection=Feedback.
*2 Displayed when Selection of function to use 1-11 (weak excitation)=ON, or Selection of function to use 1-12 (powder torque output correction)=ON.
*3 Displayed when Selection of function to use 1-13 (control output correction)=ON.
*4 Displayed when reel diameter calculation option connection available/not available=available.
*5 Displayed when Two-reel's switching function=available, and Selection of function to use 1-15 (Advanced function 2-reel's switching CTRL)=ON.
*6 Displayed when Selection of function to use 1-14 (main unit analog I/O correction function)=ON.
*7 Displayed when Control mode selection=Feedback.
*8 Displayed when Selection of function to use 1-12 (powder torque output correction)=ON.
*9 Displayed when Selection of function to use 1-11 (weak excitation)=ON.

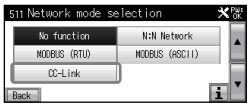
5** Communication



5** Communication

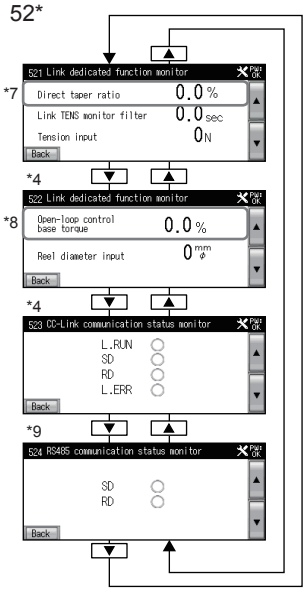
*1 *2 *3

Selection
51*



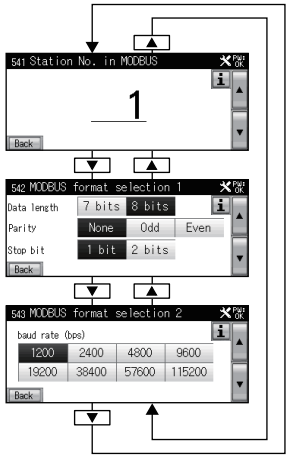
*4

Monitor
52*



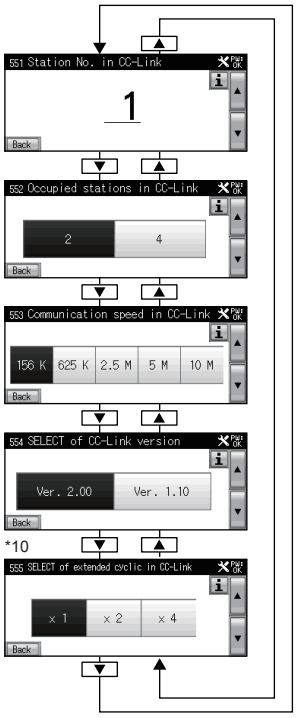
*7 *8

Setting
53* from

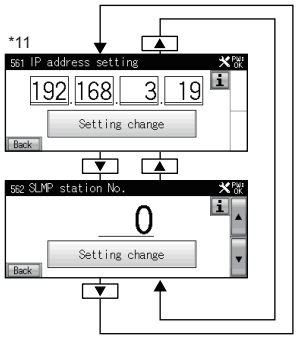


*4 *5 *6

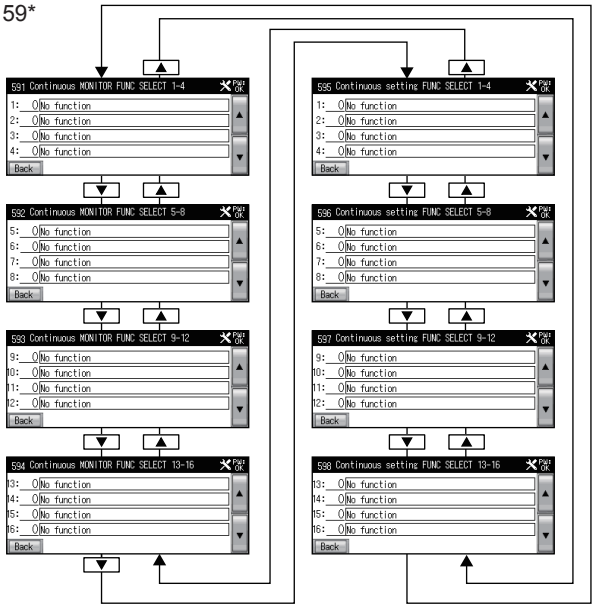
Setting
to 56*



*11



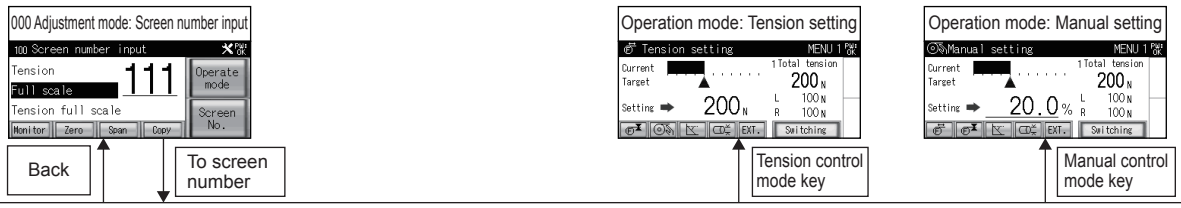
Continuous monitoring/setting
59*



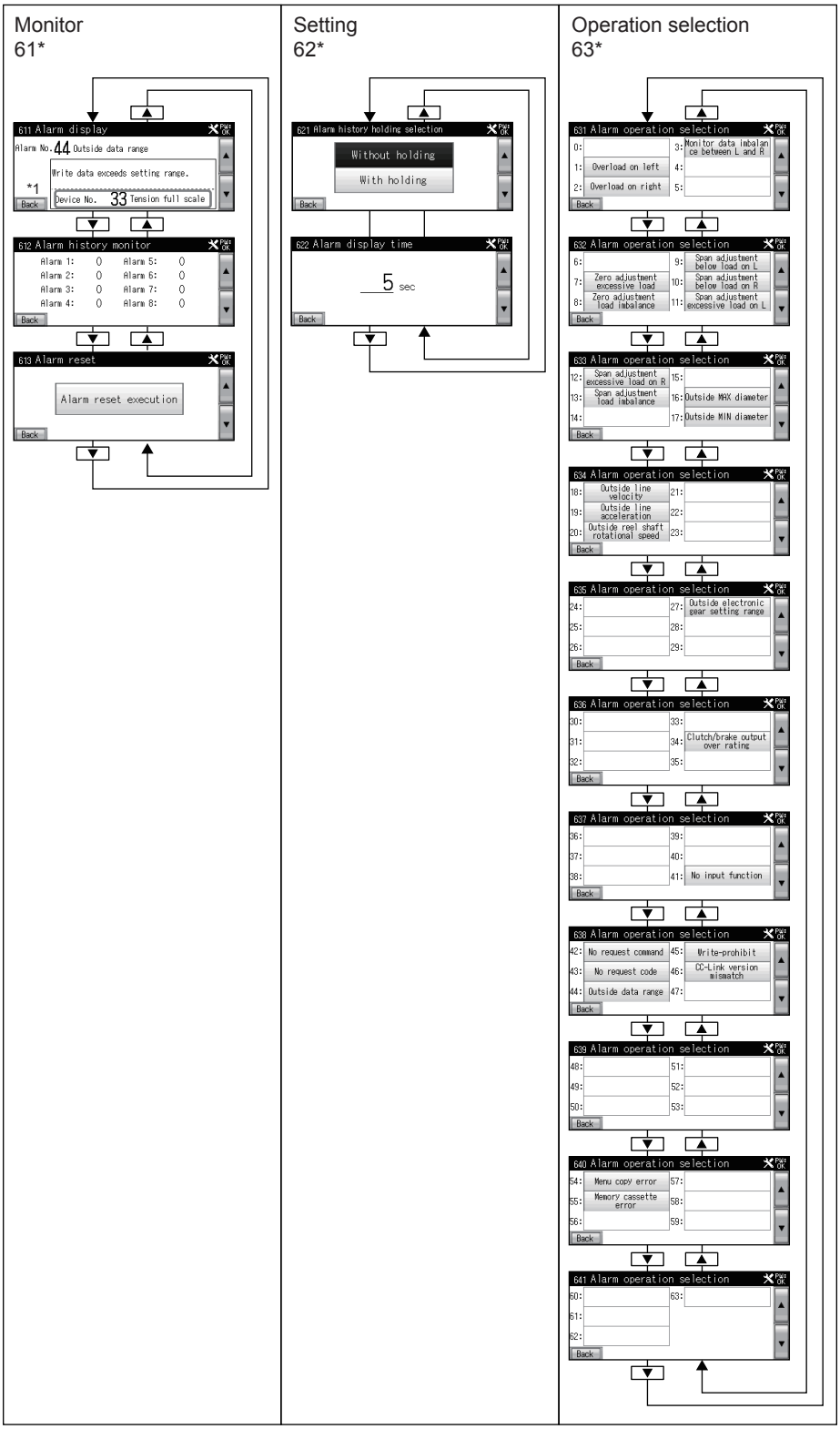
The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when Network mode selection=anything other than No function.
*2 Displayed when Network mode selection=N:N Network.
*3 Displayed when Network mode selection=either MODBUS (RTU) or MODBUS (ASCII).
*4 Displayed when Network option connection available/not available=available.
*5 Displayed when Ethernet communication selection=CC-Link IEF Basic, SLMP, or MODBUS/TCP.
*6 Displayed when Network mode selection=N:N Network or CC-Link, or Ethernet communication selection=CC-Link IEF Basic, SLMP, or MODBUS/TCP.
*7 Displayed when Taper control=Direct taper rate.
*8 Displayed when Selection of function to use 1-7 (open-loop control)=ON.
*9 Displayed when Network mode selection=MODBUS (RTU), N:N Network, or MODBUS (ASCII).
*10 Displayed when Selection of CC-Link version=Ver. 2.00.
*11 Displayed when Ethernet communication selection=SLMP.

6** Alarm

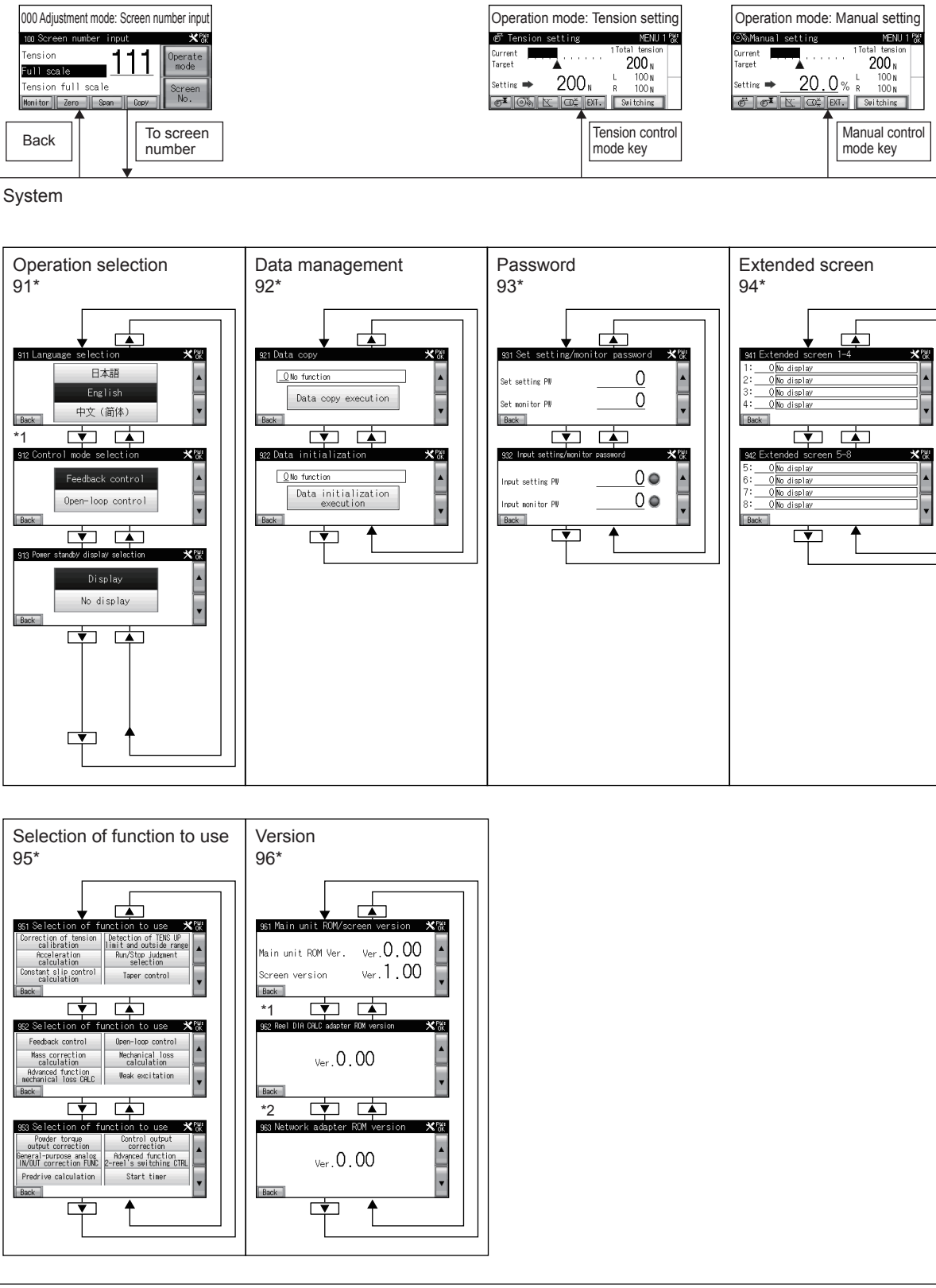


6** Alarms



*1 If a network alarm is occurring, the device number causing the alarm is displayed.

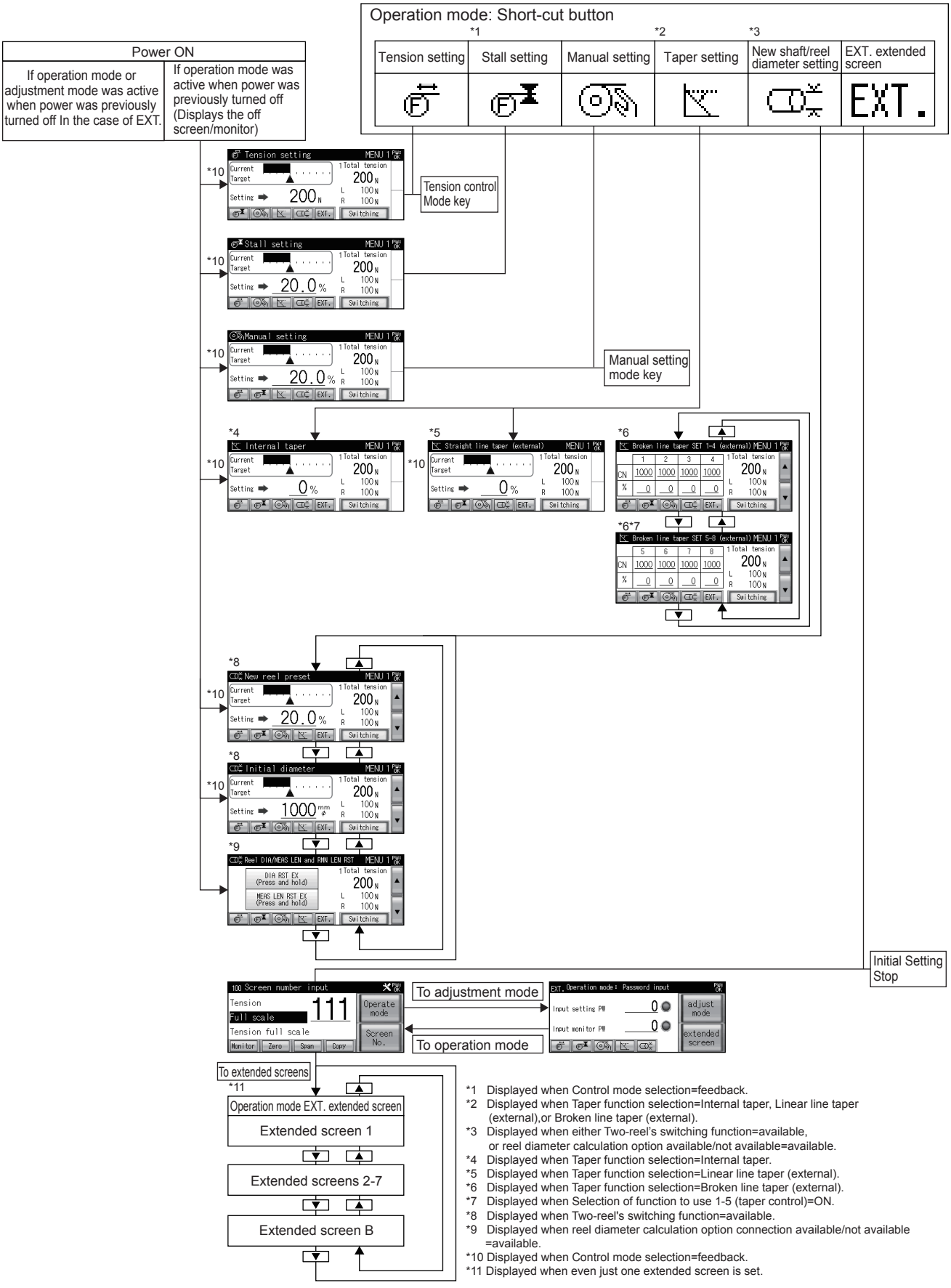
9** System



*1 Displayed when reel diameter calculation option connection available/not available=available.
*2 Displayed when Network option connection available/not available=ON.

5.13 Operation Mode

Screen flowchart



*1 Displayed when Control mode selection=feedback.
*2 Displayed when Taper function selection=Internal taper, Linear line taper (external),or Broken line taper (external).
*3 Displayed when either Two-reel's switching function=available, or reel diameter calculation option available/not available=available.
*4 Displayed when Taper function selection=Internal taper.
*5 Displayed when Taper function selection=Linear line taper (external).
*6 Displayed when Taper function selection=Broken line taper (external).
*7 Displayed when Selection of function to use 1-5 (taper control)=ON.
*8 Displayed when Two-reel's switching function=available.
*9 Displayed when reel diameter calculation option connection available/not available =available.
*10 Displayed when Control mode selection=feedback.
*11 Displayed when even just one extended screen is set.

Extended screen

By configuring the extended screen settings, you can display up to eight adjustment item setting screens that can normally only be displayed in adjustment mode during normal operation mode. Additionally, you can move to the extended screens if extended screen settings 1 to 8 are not set to zero, but if extended screen settings 1 to 8 are set to zero, you cannot move to the extended screens. If extended screen setting 1 does not exist, then the screens will be displayed in ascending order for the extended screen settings that do exist. The extended screen with the smallest number will be the next screen shown after the one with the largest number.

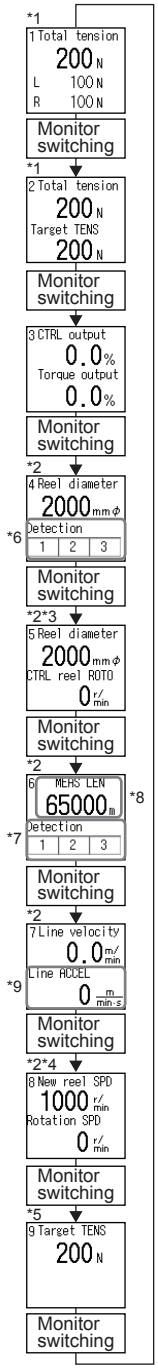
Point

Differences from the adjustment mode screens

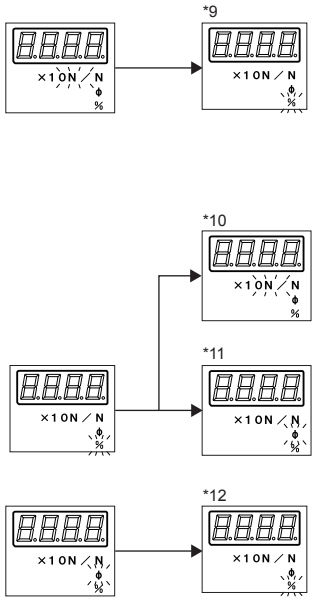
- The return button moves you to the password input screen in operation mode.
- The adjustment mode screen icon is not displayed.
- The screen move button moves you to the next extended screen.

Monitor

Monitor display on touch panel

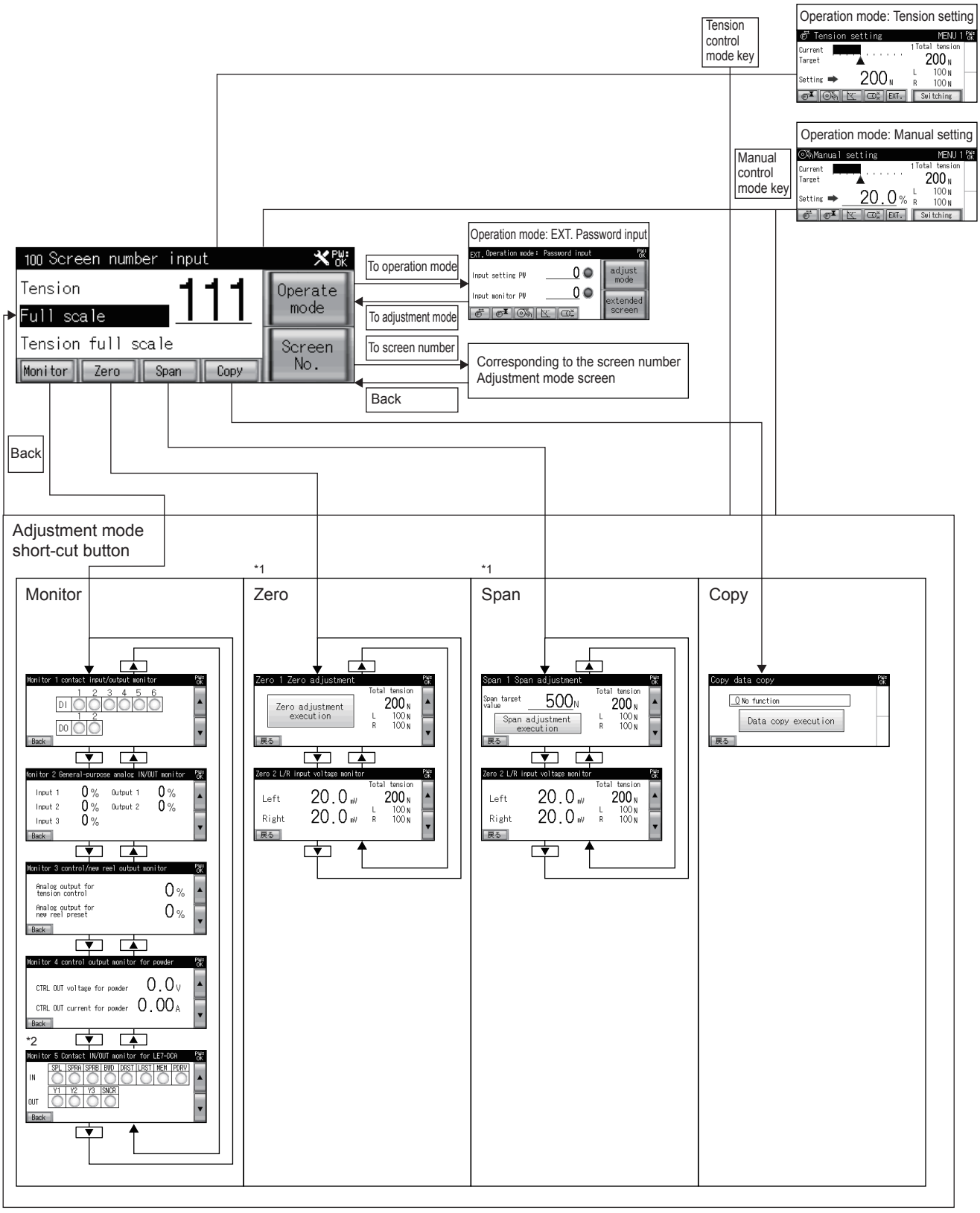


Monitor display, monitor display unit display



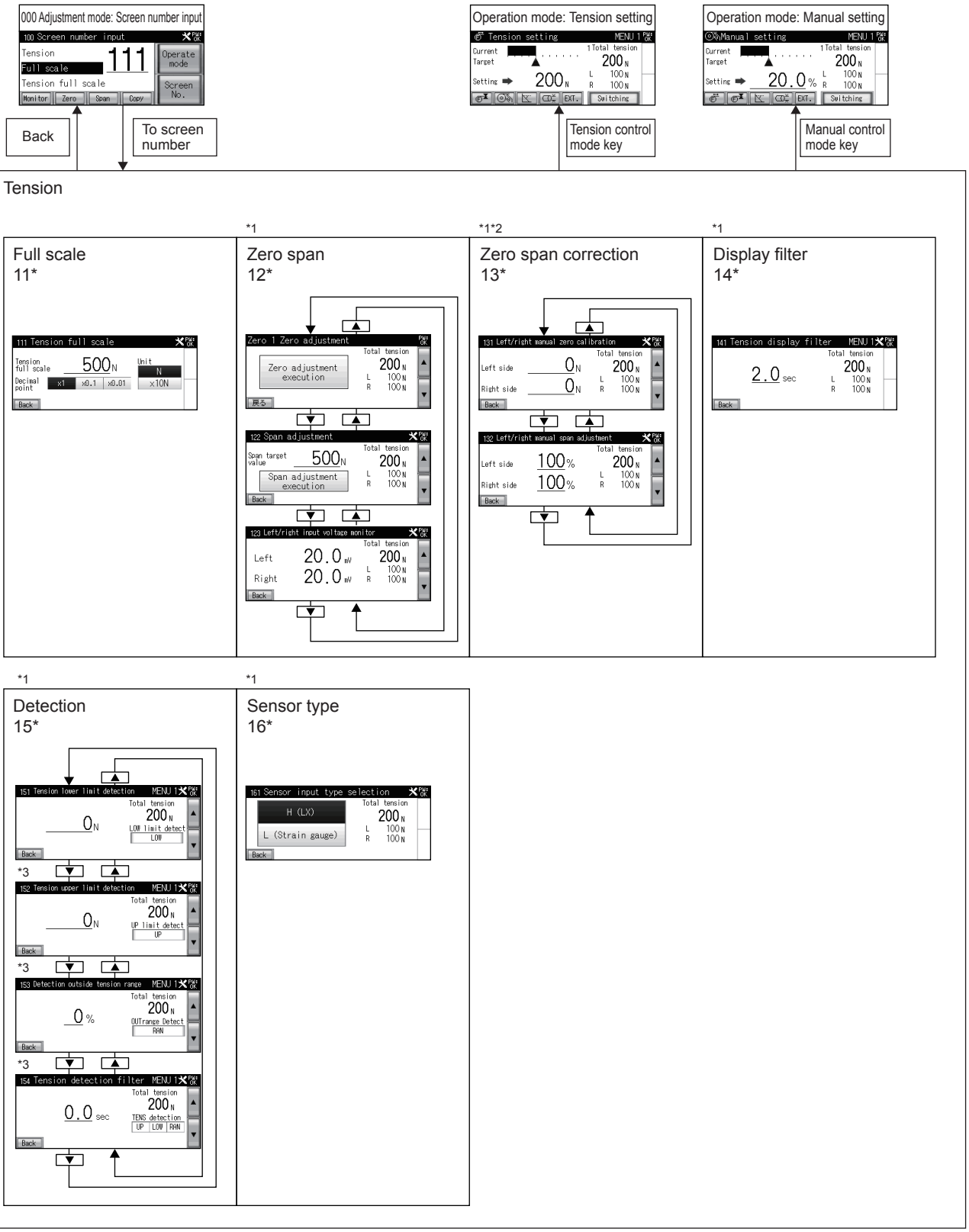
*1 Displayed when Control mode selection=Feedback.
*2 Displayed when reel diameter calculation option connection available/not available=available.
*3 Displayed when Selection of function to use 1-4 (constant slip control calculation)=ON.
*4 Displayed when Two-reel's switching function=available.
*5 Displayed when Control mode selection=Open-loop.
*6 Displayed when Detection output=Reel diameter.
*7 Displayed when Detection output=Measurement length/remaining length.
*8 Measurement length is displayed when Selection of MEAS/RMN LEN CALC switch=MEAS LEN, and remaining length is displayed when Selection of MEAS/RMN LEN CALC switch=RMN LEN.
*9 Displayed when Selection of function to use 1-2 (acceleration calculation)=ON.
*10 When you switch the touch panel monitor to the screen shown at left, if the monitor display is total tension [×10N/N], it will switch to control output [%].
*11 When you switch the touch panel monitor to the screen shown at left, if the monitor display is control output [%], it will switch to total tension [×10N/N] if Control mode selection=Feedback.
*12 When you switch the touch panel monitor to the screen shown at left, if the monitor display is control output [%], it will switch to reel diameter [ϕ] if Control mode selection=Open-loop.
*13 When you switch the touch panel monitor to the screen shown at left, if the monitor display is reel diameter [ϕ], it will switch to control output [%].

Screen number input and adjustment shortcuts



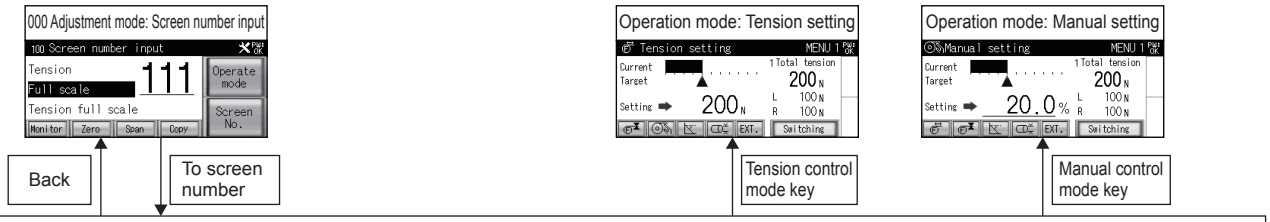
*1 Displayed when Control mode selection=Feedback.
*2 Displayed when reel diameter calculation option connection available/not available=available.

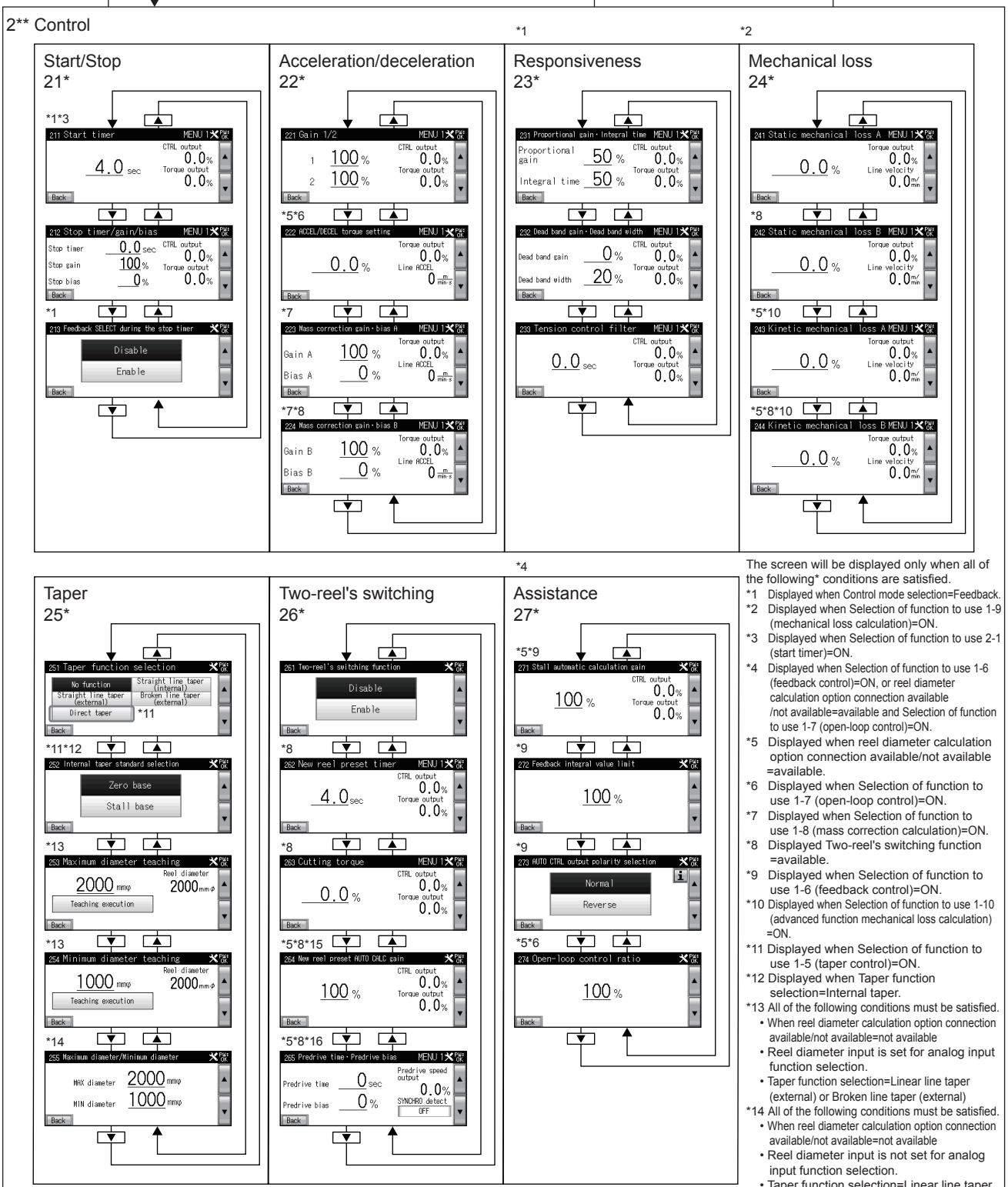
1** Tension



The screen will be displayed only when all of the following * conditions are satisfied.
*1 Displayed when Control mode selection=Feedback.
*2 Displayed when Selection of function to use 1-0 (correction of tension calibration)=ON.
*3 Displayed when Selection of function to use 1-1 (tension upper limit and outside range detection)=ON.

2** Control





The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when Control mode selection=Feedback.

*2 Displayed when Selection of function to use 1-9 (mechanical loss calculation)=ON.

*3 Displayed when Selection of function to use 2-1 (start timer)=ON.

*4 Displayed when Selection of function to use 1-6 (feedback control)=ON, or reel diameter calculation option connection available /not available=available and Selection of function to use 1-7 (open-loop control)=ON.

*5 Displayed when reel diameter calculation option connection available/not available =available.

*6 Displayed when Selection of function to use 1-7 (open-loop control)=ON.

*7 Displayed when Selection of function to use 1-8 (mass correction calculation)=ON.

*8 Displayed Two-reel's switching function =available.

*9 Displayed when Selection of function to use 1-6 (feedback control)=ON.

*10 Displayed when Selection of function to use 1-10 (advanced function mechanical loss calculation) =ON.

*11 Displayed when Selection of function to use 1-5 (taper control)=ON.

*12 Displayed when Taper function selection=Internal taper.

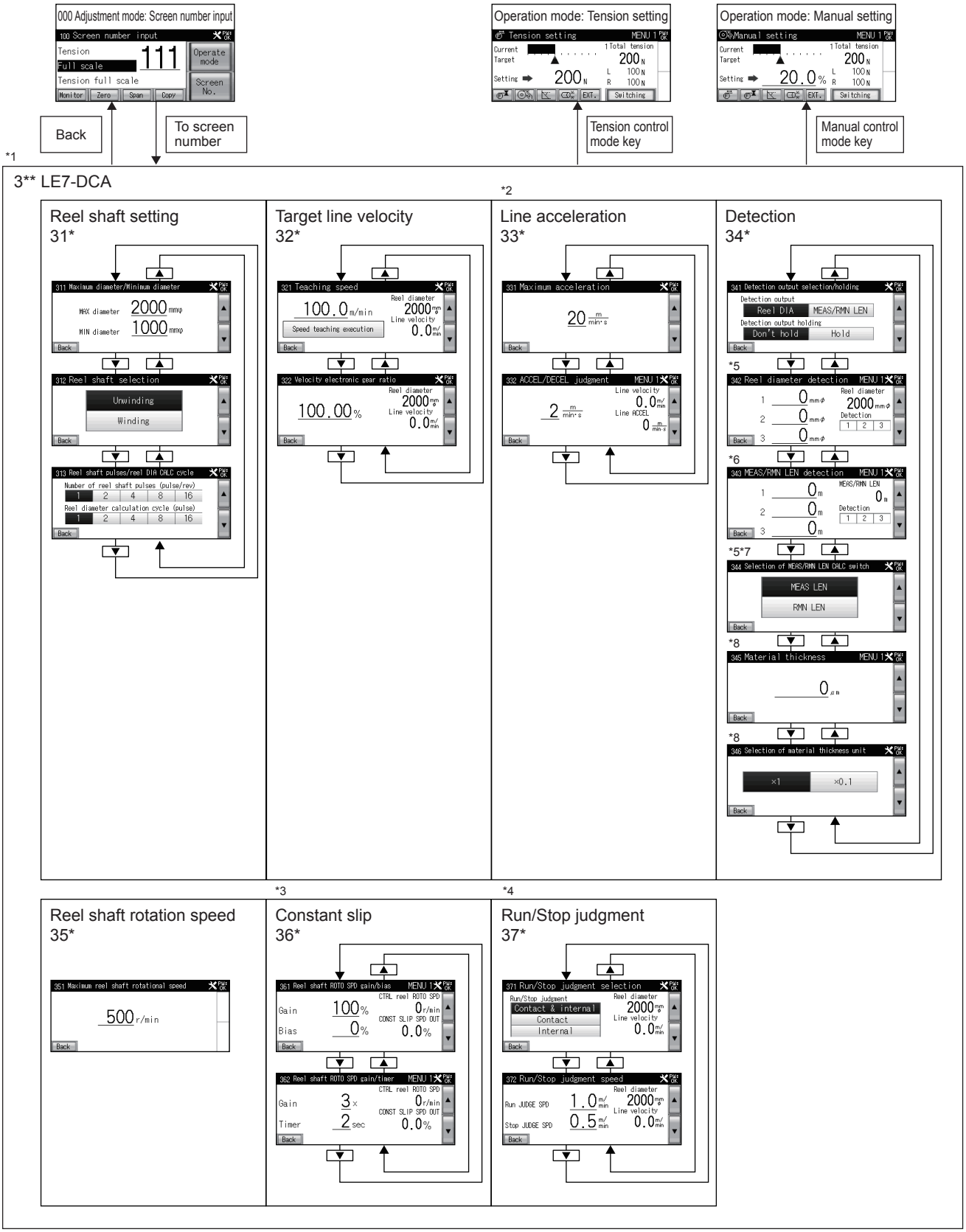
*13 All of the following conditions must be satisfied.
- When reel diameter calculation option connection available/not available=not available
- Reel diameter input is set for analog input function selection.
- Taper function selection=Linear line taper (external) or Broken line taper (external)

*14 All of the following conditions must be satisfied.
- When reel diameter calculation option connection available/not available=not available
- Reel diameter input is not set for analog input function selection.
- Taper function selection=Linear line taper (external) or Broken line taper (external)

*15 Displayed when Selection of function to use 1-15 (advanced function two-reel's switching control)=ON.

*16 Displayed when Selection of function to use 2-0 (Predrive calculation)=ON.

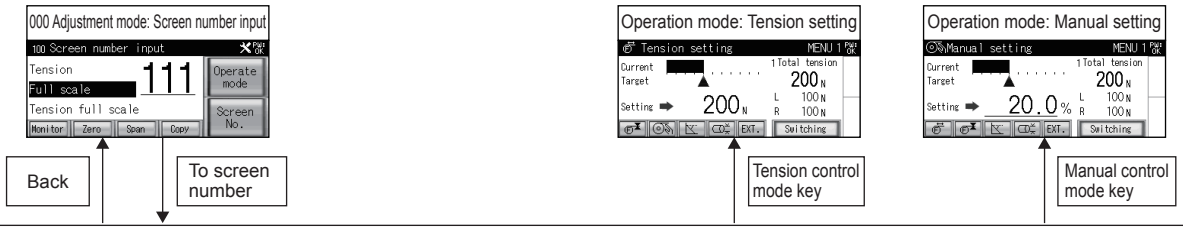
3** LE7-DCA



The screen will be displayed only when all of the following* conditions are satisfied.

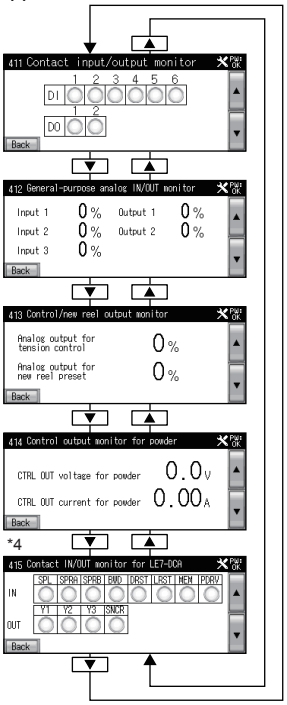
*1 Displayed when reel diameter calculation option connection available/not available=available.
*2 Displayed when Selection of function to use 1-2 (acceleration calculation)=ON.
*3 Displayed when Selection of function to use 1-4 (constant slip control calculation)=ON.
*4 Displayed when Selection of function to use 1-3 (run/stop judgment)=ON.
*5 Displayed when Detection output=Reel diameter.
*6 Displayed when Detection output=Measurement length/remaining length.
*7 Displayed when Reel shaft setting=Unwinding.
*8 Displayed when Selection of MEAS/RMN LEN CALC switch=RMN LEN.

4** I/O

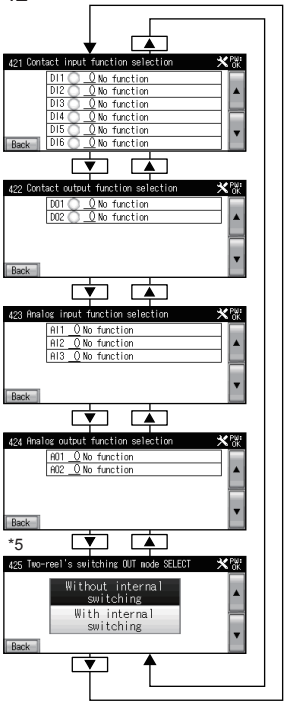


4** I/O

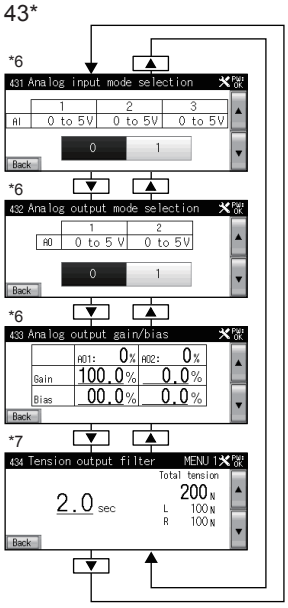
Monitor
41*



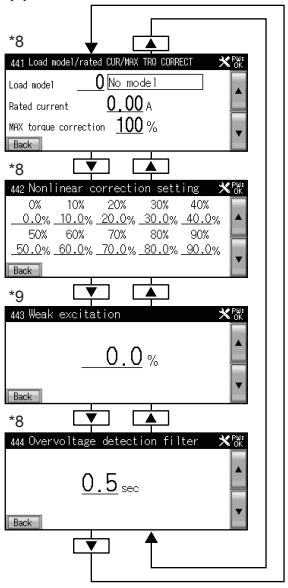
Setting
42*



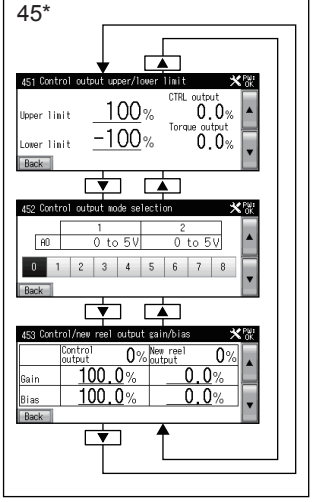
*1
Analog correction
43*



*2
Powder output correction
44*



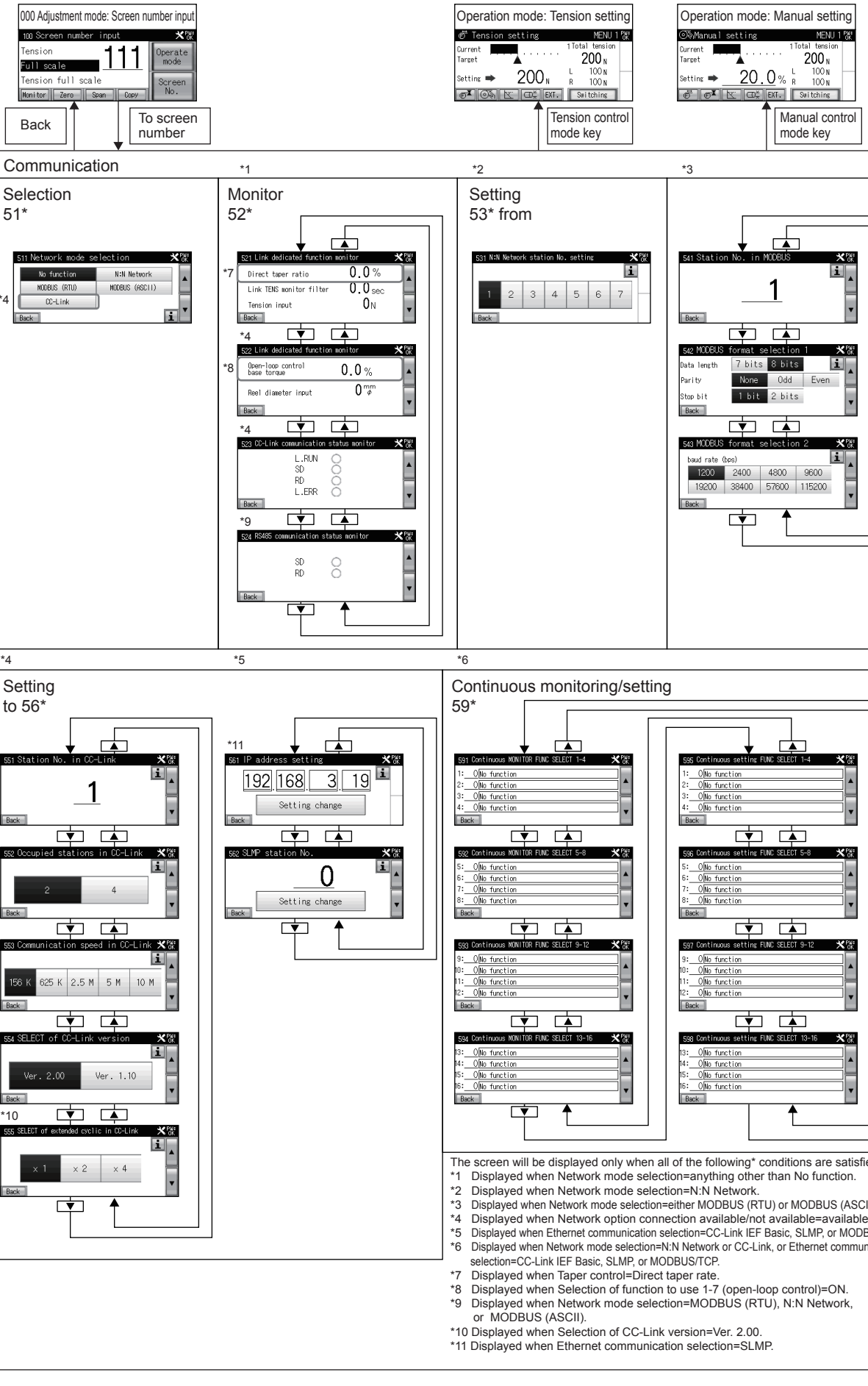
*3
Control output correction
45*



The screen will be displayed only when all of the following* conditions are satisfied.

*1 Displayed when either Selection of function to use 1-14 (main unit analog I/O correction function)=ON, or Control mode selection=Feedback.
*2 Displayed when Selection of function to use 1-11 (weak excitation)=ON, or Selection of function to use 1-12 (powder torque output correction)=ON.
*3 Displayed when Selection of function to use 1-13 (control output correction)=ON.
*4 Displayed when reel diameter calculation option connection available/not available=available.
*5 Displayed when Two-reel's switching function=available, and Selection of function to use 1-15 (Advanced function 2-reel's switching CTRL)=ON.
*6 Displayed when Selection of function to use 1-14 (main unit analog I/O correction function)=ON.
*7 Displayed when Control mode selection=Feedback.
*8 Displayed when Selection of function to use 1-12 (powder torque output correction)=ON.
*9 Displayed when Selection of function to use 1-11 (weak excitation)=ON.

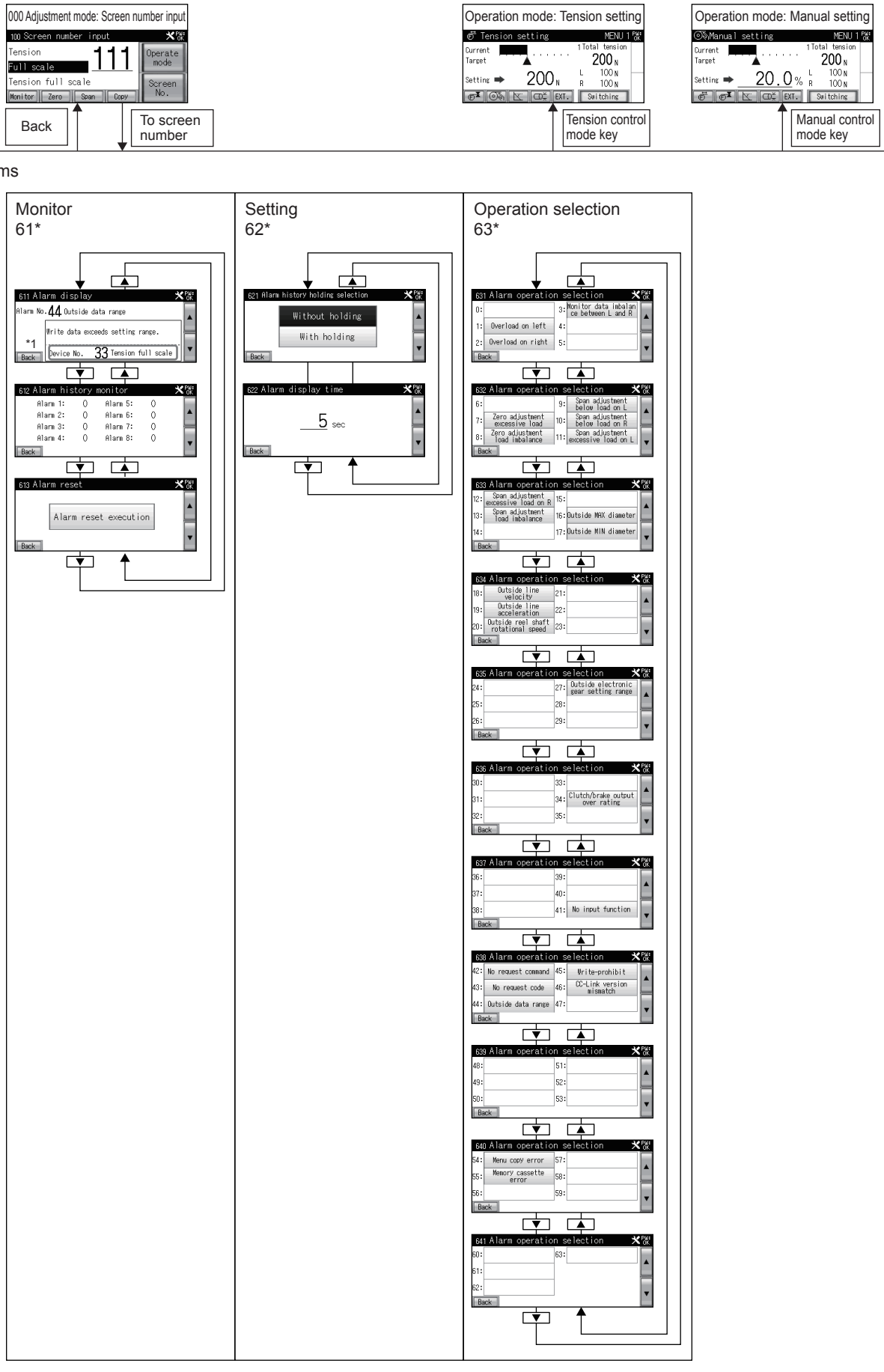
5** Communication



The screen will be displayed only when all of the following* conditions are satisfied.

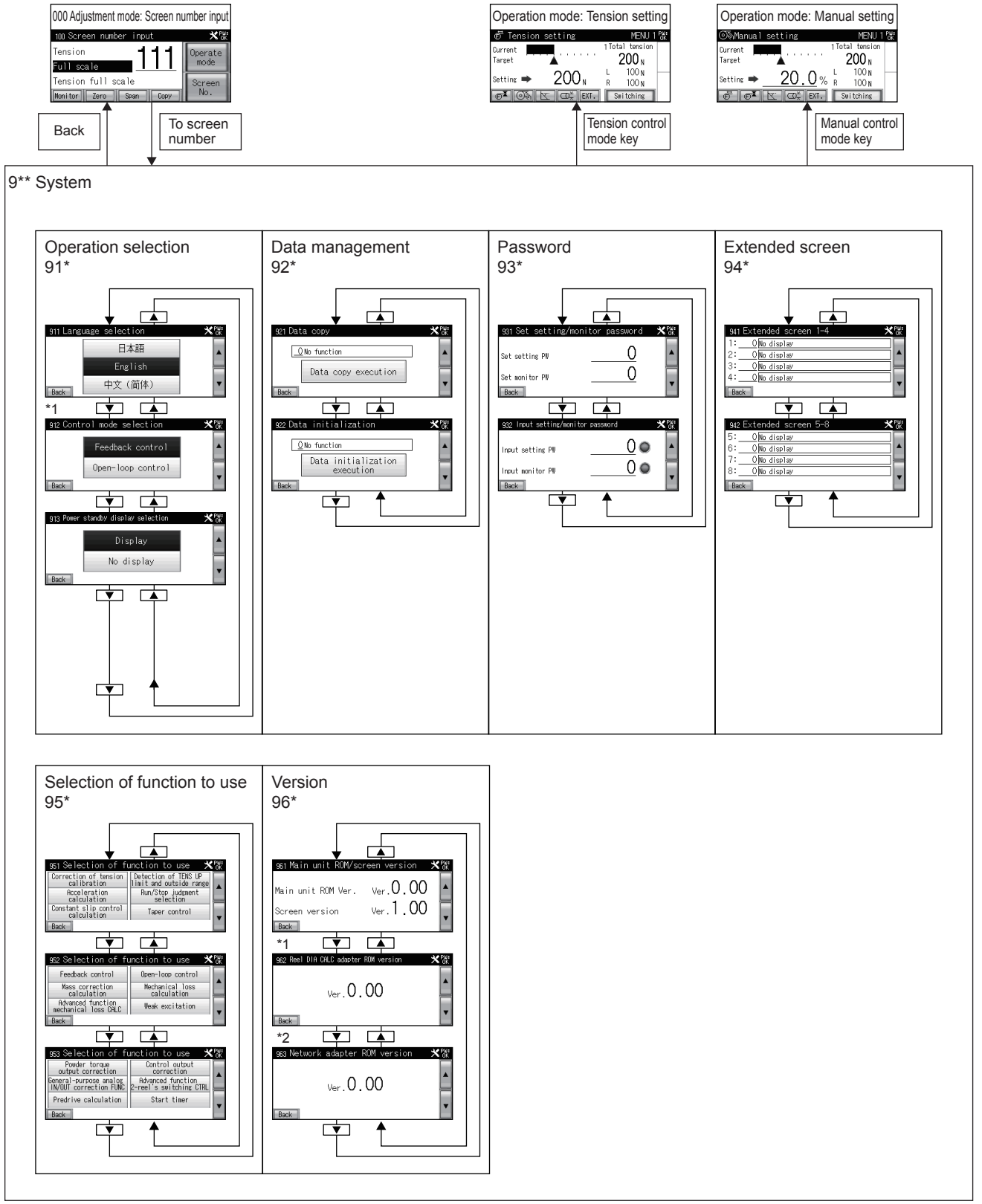
*1 Displayed when Network mode selection=anything other than No function.
*2 Displayed when Network mode selection=N:N Network.
*3 Displayed when Network mode selection=either MODBUS (RTU) or MODBUS (ASCII).
*4 Displayed when Network option connection available/not available=available.
*5 Displayed when Ethernet communication selection=CC-Link IEF Basic, SLMP, or MODBUS/TCP.
*6 Displayed when Network mode selection=N:N Network or CC-Link, or Ethernet communication selection=CC-Link IEF Basic, SLMP, or MODBUS/TCP.
*7 Displayed when Taper control=Direct taper rate.
*8 Displayed when Selection of function to use 1-7 (open-loop control)=ON.
*9 Displayed when Network mode selection=MODBUS (RTU), N:N Network, or MODBUS (ASCII).
*10 Displayed when Selection of CC-Link version=Ver. 2.00.
*11 Displayed when Ethernet communication selection=SLMP.

6** Alarm



*1 If a network alarm is occurring, the device number causing the alarm is displayed.

9** System



*1 Displayed when reel diameter calculation option connection available/not available=available.
*2 Displayed when Network option connection available/not available=ON.

5.14 List of Screen Numbers and Display Restrictions

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
111	Tension full scale	Adjustment	×	○	○	—	—	—	—
121	Zero adjustment	Adjustment	×	○	○	—	Control mode selection= Feedback control	—	—
122	Span adjustment	Adjustment	×	○	○	—		—	—
123	Left/right input voltage monitor	Adjustment	×	×	×	—		—	—
131	Left/right manual zero calibration	Adjustment	×	○	○	—	Control mode selection= Feedback control Selection of function to use 1-0=ON	—	—
132	Left/right manual span adjustment	Adjustment	×	○	○	—		—	—
141	Tension display filter	Adjustment	○	×	○	—	Control mode selection= Feedback control	—	—
151	Tension lower limit detection	Adjustment	○	×	○	—		—	—
152	Tension upper limit detection	Adjustment	○	×	○	—		Selection of function to use 1-1=ON	—
153	Detection outside tension range	Adjustment	○	×	○	—			—
154	Tension detection filter	Adjustment	○	×	○	—			
161	Sensor input type selection	Adjustment	×	○	○	—		—	—
211	Start timer	Adjustment	○	×	○	—	—	Selection of function to use 2-1 (Start timer)=ON	—
212	Stop timer/gain/ bias	Adjustment	○	×	○	—	—	—	—
213	Feedback SELECT during the stop timer	Adjustment	×	○	○	—	—	Control mode selection =Feedback control	—
221	Gain 1/2	Adjustment	○	×	○	—	—	—	—
222	ACCEL/ DECEL torque setting	Adjustment	○	×	○	—	—	Selection of function to use 1-7=ON Reel diameter calculation option connection available/not available D445=ON	—
223	Mass correction gain•bias A	Adjustment	○	×	○	—	—	Selection of function to use 1-8=ON	—
224	Mass correction gain•bias B	Adjustment	○	×	○	—	—	Selection of function to use 1-8=ON Two-reel's switching function=Enable	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
231	Proportional gain/integral time	Adjustment	○	×	○	—	Control mode selection =Feedback control	—	—
232	Dead band gain•Dead band width	Adjustment	○	×	○	—	Control mode selection =Feedback control	—	—
233	Tension control filter	Adjustment	○	×	○	—	Control mode selection =Feedback control	Selection of function to use 1-6=ON	—
241	Static mechanical loss A	Adjustment	○	×	○	—	Selection of function to use 1-9=ON	—	—
242	Static mechanical loss B	Adjustment	○	×	○	—	Selection of function to use 1-9=ON	Two-reel's switching function=Enable	—
243	Kinetic mechanical loss A	Adjustment	○	×	○	—	Selection of function to use 1-9=ON	Selection of function to use 1-10 (Advanced function mechanical loss CALC=ON) Reel diameter calculation option connection available/not available D445=ON	—
244	Kinetic mechanical loss B	Adjustment	○	×	○	—	Selection of function to use 1-9=ON	Selection of function to use 1-10 (Advanced function mechanical loss CALC=ON) Reel diameter calculation option connection available/not available D445=ON Two-reel's switching function=Enable	—
251	Taper function selection	Adjustment	×	○	○	—	—	—	Selection of function to use 1-5=ON (Direct taper displayed, off when “-”)
252	Internal taper standard selection	Adjustment	×	○	○	—	—	Taper function selection =Internal line taper Selection of function to use 1-5=ON	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
253	Maximum diameter teaching	Adjustment	×	○	○	—	—	Reel diameter calculation option connection available/not available=not available Analog input function selection=reel diameter Taper function selection= Straight line taper (external) or Broken line taper (external)	—
254	Minimum diameter teaching	Adjustment	×	○	○	—	—		—
255	Maximum diameter/ Minimum diameter	Adjustment	×	○	○	—	—		—
261	Two-reel's switching function	Adjustment	×	○	○	—	—	—	—
262	New reel preset timer	Adjustment	○	×	○	—	—	Two-reel's switching function=Enable	—
263	Cutting torque	Adjustment	○	×	○	—	—		—
264	New reel preset AUTO CALC gain	Adjustment	×	×	○	—	—	Two-reel switching function =available Reel diameter calculation option connection available/not available D445=ON Selection of function to use 1-15 (Advanced function 2-reel's switching CTRL)=ON	—
265	Predrive time•Predrive bias	Adjustment	○	×	○	—	—	Two-reel's switching function=Enable Reel diameter calculation option connection available/not available D445=ON Selection of function to use 2-0 (Predrive calculation)=ON	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
271	Stall automatic calculation gain	Adjustment	×	×	○	—	Selection of function to use 1-6 (Feedback control)=ON, or Selection of function to use 1-7 (Open-loop control)=ON Reel diameter calculation option connection available/not available D445=ON	Selection of function to use 1-6 (Feedback control)=ON Reel diameter calculation option connection available/not available D445=ON	—
272	Feedback integral value limit	Adjustment	×	○	○	—		Selection of function to use 1-6 (Feedback control)=ON	—
273	AUTO CTRL output polarity selection	Adjustment	×	○	○	—			—
274	Open-loop control ratio	Adjustment	×	○	○	—		Selection of function to use 1-7 (Open-loop control)=ON Reel diameter calculation option connection available/not available D445=ON	—
311	Maximum diameter/ Minimum diameter	Adjustment	×	○	○	Reel diameter calculation option connection available/ not available D445=ON	—	—	—
312	Reel shaft selection	Adjustment	×	○	○		—	—	—
313	Reel shaft pulses/reel DIA CALC cycle	Adjustment	×	○	○		—	—	—
321	Teaching speed	Adjustment	×	×	○		—	—	—
322	Velocity electronic gear ratio	Adjustment	×	×	○		—	—	—
331	Maximum acceleration	Adjustment	×	○	○		Selection of function to use 1-2 (Acceleration calculation)=ON	—	—
332	ACCEL/ DECEL judgment	Adjustment	○	×	○			—	—
341	Detection output selection/ holding	Adjustment	×	○	○		—	—	—
342	Reel diameter detection	Adjustment	○	×	○		—	Detection output=Reel DIA	—
343	MEAS/RMN LEN detection	Adjustment	○	×	○		—	Detected output=MEAS/ RMN LEN	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
344	Selection of MEAS/RMN LEN CALC switch	Adjustment	×	○	○	Reel diameter calculation option connection available/ not available D445=ON	—	Reel shaft setting= Unwinding	—
345	Selection of material thickness unit	Adjustment	○	×	○		—	Detected output=MEAS/ RMN LEN	—
346	Specifying the unit of material thickness	Adjustment	×	○	○		—	Selection of MEAS/RMN LEN CALC switch=RMN LEN	—
351	Maximum reel shaft rotational speed	Adjustment	×	○	○		—	—	—
361	Reel shaft ROTO SPD gain/bias	Adjustment	○	×	○		Selection of function to use 1-4 (Constant slip control calculation)=ON	—	—
362	Reel shaft ROTO SPD gain/timer	Adjustment	○	×	○			—	—
371	Run/Stop judgment selection	Adjustment	×	○	○		Selection of function to use 1-3 (Run/Stop judgment selection)=ON	—	—
372	Run/Stop judgment speed	Adjustment	×	×	○			—	—
411	Contact input/ output monitor	Adjustment	×	×	×	—	—	—	—
412	General-purpose analog IN/OUT monitor	Adjustment	×	×	×	—	—	—	—
413	Control/new reel output monitor	Adjustment	×	×	×	—	—	—	—
414	Control output monitor for powder	Adjustment	×	×	×	—	—	—	—
415	Contact IN/ OUT monitor for LE7-DCA	Adjustment	×	×	×	—	—	Reel diameter calculation option connection available/not available D445=ON	—
421	Contact input function selection	Adjustment	×	○	○	—	—	—	—
422	Contact output function selection	Adjustment	×	○	○	—	—	—	—
423	Analog output function selection	Adjustment	×	○	○	—	—	—	—
424	Analog output function selection	Adjustment	×	○	○	—	—	—	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
425	Two-reel's switching OUT mode SELECT	Adjustment	×	○	○	—	—	Two-reel's switching function=Enable Selection of function to use 1-15 (Advanced function 2-reel's switching CTRL)=ON	—
431	Analog input mode selection	Adjustment	×	○	○	—	Selection of function to use 1-14 (General-purpose analog IN/OUT correction FUNC)=ON or Control mode selection= Feedback control	Selection of function to use 1-14 (General-purpose analog IN/OUT correction FUNC)=ON	—
432	Analog output mode selection	Adjustment	×	○	○	—			—
433	Analog output gain/bias	Adjustment	×	○	○	—			—
434	Tension output filter	Adjustment	○	○	○	—		Control mode selection= Feedback control	—
441	Load model/ rated CUR/ MAX TRQ CORRECT	Adjustment	×	○	○	—	Selection of function to use 1-11 (Weak excitation)=ON, or Selection of function to use 1-12 (Powder torque output correction)=ON	Selection of function to use 1-12 (Powder torque output correction)=ON	—
442	Nonlinear correction setting	Adjustment	×	○	○	—			—
443	Weak excitation	Adjustment	×	○	○	—		Selection of function to use (Weak excitation) 1-11=ON	—
444	Overvoltage detection filter	Adjustment	×	○	○	—		Selection of function to use 1-12 (Powder torque output correction)=ON	—
451	Control output upper/lower limit	Adjustment	×	×	○	—	Selection of function to use 1-13 (Control output correction)=ON	—	—
452	Control output mode selection	Adjustment	×	○	○	—		—	—
453	Control/new reel output gain/bias	Adjustment	×	○	○	—		—	—
511	Network mode selection	Adjustment	×	○	○	—	—	—	Network option connection ON/OFF=ON (The button is blank when CC-link display is off.)
512	Ethernet communication selection	Adjustment	×	○	○	—	—	—	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
521	Link dedicated function monitor	Adjustment	×	×	×	—	Network mode selection =N:N Network or MODBUS (RTU) or MODBUS (ASCII) or CC-Link or Ethernet communication selection=CC-Link IEF Basic or SLMP or Modbus/TCP	—	Taper control=Direct taper rate (direct taper rate displayed, nothing else displayed)
522	Link dedicated function monitor	Adjustment	×	×	×	—		—	Selection of function to use 1-7 (Open-loop control)=ON (open-loop base torque displayed, not displayed when off)
523	CC-Link communication status monitor	Adjustment	×	○	○	—		Network mode selection =CC-Link	—
524	RS485 communication status monitor	Adjustment	×	○	○	—		Network mode selection =N:N Network or MODBUS (RTU) or MODBUS (ASCII)	—
525	Ethernet communication status monitor	Adjustment	×	○	○	—		Ethernet communication selection=CC-Link IEF Basic or SLMP or Modbus/TCP	—
531	N:N Network station No. setting	Adjustment	×	○	○	—	Network mode selection =N:N Network	—	—
541	Station No. in MODBUS	Adjustment	×	○	○	—	Network mode selection =MODBUS (RTU) or MODBUS (ASCII).	—	—
542	MODBUS format selection 1	Adjustment	×	○	○	—		—	—
543	MODBUS format selection 2	Adjustment	×	○	○	—		—	—
551	Station No. in CC-Link	Adjustment	×	○	○	—	Network mode selection =CC-Link	—	—
552	Occupied stations in CC-Link	Adjustment	×	○	○	—		—	—
553	Communication speed in CC-Link	Adjustment	×	○	○	—		—	—
554	SELECT of CC-Link version	Adjustment	×	○	○	—		—	—
555	SELECT of extended cyclic in CC-Link	Adjustment	×	○	○	—		Selection of CC-Link version=Ver. 2.00	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
561	IP address setting	Adjustment	×	○	○	—	Ethernet communication selection=CC-Link IEF Basic or SLMP or Modbus/TCP	—	—
562	SLMP station No.	Adjustment	×	○	○	—		Ethernet communication selection=SLMP	—
591	Continuous MONITOR FUNC SELECT 1-4		×	○	○	—	Network mode selection =N:N Network or CC-Link or Ethernet communication selection=CC-Link IEF Basic or SLMP or Modbus/TCP	—	—
592	Continuous MONITOR FUNC SELECT 5-8		×	○	○	—		—	—
593	Continuous MONITOR FUNC SELECT 9-12		×	○	○	—		—	—
594	Continuous MONITOR FUNC SELECT 13-16		×	○	○	—		—	—
595	Continuous setting FUNC SELECT 1-4		×	○	○	—		—	—
596	Continuous setting FUNC SELECT 5-8		×	○	○	—		—	—
597	Continuous setting FUNC SELECT 9-12		×	○	○	—		—	—
598	Continuous setting FUNC SELECT 13-16		×	○	○	—		—	—
611	Alarm Display	Adjustment	×	×	×	—	—	—	Network alarm device number≠0 (Network alarm device number displayed, not displayed if 0)
612	Alarm history monitor	Adjustment	×	×	×	—	—	—	—
613	Alarm reset	Adjustment	×	×	×	—	—	—	—
621	Alarm history holding selection	Adjustment	×	○	○	—	—	—	—
622	Alarm display time	Adjustment	×	○	○	—	—	—	—
911	Language selection	Adjustment	×	○	○	—	—	—	—
912	Control mode selection	Adjustment	×	○	○	—	—	Reel diameter calculation option connection available/not available D445=ON	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
913	Power standby display selection	Adjustment	×	○	○	—	—	—	—
921	Data copy	Adjustment	×	○	○	—	—	—	—
922	Data initialization	Adjustment	×	○	○	—	—	—	—
923	Memory cassette backup selection	Adjustment	×	○	○	—	—	—	—
941	Extended screen 1-4	Adjustment	×	×	×	—	—	—	—
942	Extended screen 5-8	Adjustment	×	×	×	—	—	—	—
961	Main unit ROM/ screen version	Adjustment	×	×	×	—	—	—	—
962	Reel DIA CALC adapter ROM version	Adjustment	×	×	×	—	—	Reel diameter calculation option connection available/not available=ON	—
963	Network adapter ROM version	Adjustment	×	×	×	—	—	Network option connection available/not available=ON	—
—	Setting value out-of-range	Full-screen window	—			—	—	—	—
—	Shipping calibration	Shipping calibration	—			—	—	—	—
—	Key window	Full-screen window				—	—	—	—
—	Alarm Display monitor	Full-screen window	—	—	—	—	—	—	Network alarm device number≠0 (network alarm device number not displayed)
—	Confirm change to standby	Full-screen window	—	—	—	—	—	—	—
—	Method/caution pop-up	Full-screen window	—	—	—	—	—	—	—
000	Screen Number Input	Adjustment	×	×	×	—	—	—	—
631 to 641	Alarm operation selection	Adjustment	×	○	○	—	—	—	—
951 to 953	Selection of function to use	Adjustment	×	○	○	—	—	—	—
EXT.	Operation mode: password Input	Run	×	×	×	—	—	—	—
W1	Tension monitor	Run Window	—	—	—	—	—	Control mode selection=Feedback	—
W2	Target tension monitor	Run Window	—	—	—	—	—		—
W3	Output monitor	Run Window	—	—	—	—	—	—	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
W4	Reel diameter monitor	Run Window	—	—	—	—	—	Reel diameter calculation option connection available/not available D445=ON	Detection output=Reel diameter (Reel diameter detection 1 to 3 on/off displayed, length measurement/remaining time not displayed)
W5	Reel shaft rotational speed monitor	Run Window	—	—	—	—	—	Reel diameter calculation option connection available/not available D445=ON Selection of function to use 1-4 (constant slip control calculation)=ON	—
W6	Measurement length/ remaining length monitor	Run Window	—	—	—	—	—	Reel diameter calculation option connection available/not available D445=ON	Selection of MEAS/RMN LEN CALC switch=RMN LEN (length measurement becomes residual length) Detection output= MEAS/RMN LEN (length measurement/remaining length detection 1-3 on/off displayed, reel diameter not displayed)
W7	Line velocity/ acceleration monitor	Run Window	—	—	—	—	—	Reel diameter calculation option connection available/not available D445=ON	Selection of function to use 1-2 (Acceleration calculation)= ON (line acceleration monitor displayed, not displayed when off)

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
W8	New reel rotational speed monitor	Run Window	—	—	—	—	—	Reel diameter calculation option connection available/not available D445=ON Two-reel's switching function =available Selection of function to use 2-0 (Predrive calculation)=ON	—
W9	Target tension monitor	Run Window	—	—	—	—	—	Control mode selection=Open-loop.	—
Copy	Data copy	Adjustment short cut	×	○	○	—	—	—	—
Initial setting+ manual setting icon on left side	Manual setting	Initial Setting	○	×	×	—	—	—	—
Initial setting 1	Language selection	Initial Setting	×	○	○	—	—	—	—
Initial setting 10	Initial setting complete	Initial Setting	×	×	×	—	—	—	—
Initial setting 2	Control mode Selection	Initial Setting	×	○	○	—	—	Reel diameter calculation option connection available/not available D445=ON	—
Initial setting 3	two-reel's switching FUNC	Initial Setting	×	○	○	—	—	—	—
Initial setting 4	Tension full scale	Initial Setting	×	○	○	—	—	—	—
Initial setting 5	Zero adjustment	Initial Setting	×	○	○	—	—	Control mode selection= Feedback	—
Initial setting 6	Span adjustment	Initial Setting	×	○	○	—	—		—
Initial setting 7	MAX/MIN diameter	Initial Setting	×	○	○	—	—	Reel diameter calculation option connection available/not available D445=ON	—
Initial setting 8	Velocity electronic gear ratio	Initial Setting	×	×	○	—	—		—
Initial setting 9	Operation mode Selection	Initial Setting	×	○	○	—	—	—	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
Stall setting icon	Stall setting	Run	○	×	×	—	—	Control mode selection= Feedback control	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
Span 1	Span adjustment	Adjustment short cut	×	○	○	—	Control mode selection= Feedback control	—	—
Span 2	Left/right input voltage monitor	Adjustment short cut	×	×	×	—		—	—
Zero 1	Zero adjustment	Adjustment short cut	×	○	○	—		—	—
Zero 2	Left/right input voltage monitor	Adjustment short cut	×	×	×	—		—	—
Taper setting icon	Internal taper	Run	○	×	×	—	Taper function selection setting=Internal taper or Straight line taper (external) or Broken line taper (external)	Taper function selection setting=internal taper	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
Taper setting icon	Straight line taper (external)	Run	○	×	×	—		Taper function selection setting=Straight line taper (external)	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
Taper setting icon	Broken line taper SET 1-4 (external)	Run	○	×	×	—		Taper function selection setting=Broken line taper (external)	—
Taper setting icon	Broken line taper (external) setting 5-8	Run	○	×	×	—		Taper function selection setting=Broken line taper (external) Selection of function to use 1-5 (taper control)=ON	—
Monitor 1	Contact input/ output monitor	Adjustment short cut	×	×	×	—	—	—	—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
Monitor 2	General-purpose analog IN/OUT monitor	Adjustment short cut	×	×	×	—	—	—	—
Monitor 3	Control/new reel output monitor	Adjustment short cut	×	×	×	—	—	—	—
Monitor 4	control output monitor for powder	Adjustment short cut	×	×	×	—	—	—	—
Monitor 5	Contact IN/ OUT monitor for LE7-DCA	Adjustment short cut	×	×	×	—	—	Reel diameter calculation option connection available/not available D445=ON	—
Manual setting icon	Manual setting	Run	○	×	×	—	—	—	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
New shaft/ reel diameter icon	New reel preset	Run	○	×	×	—	Two-reel's switching function =available, or Reel diameter calculation option connection available/not available D445=ON	Two-reel's switching function =available	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
New shaft/ reel diameter icon	Initial diameter	Run	○	×	×	—		Reel diameter calculation option connection available/not available D445=ON	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)
New shaft/ reel diameter icon	Reel diameter Measurement length/ remaining length reset	Run	○	×	×	—			—

Screen No.	Screen name	Mode	Menu available	Restrictions during operation	Setting protection	Display restriction			
						Top-level category	Mid-level category (shortcut button)	Screen	Setting value
Tension setting icon	Tension setting	Run	○	×	×	—	—	—	Control mode selection= Feedback control (current value/target value graph displayed, open-loop not displayed)

5.15 List of Screen Restriction Items and Cancellation Methods

Restriction item	Setting	Restriction cancellation method
LE7-DCA	When connected	Connect the reel diameter calculation option LE7-DCA to the LE7-40GU unit and turn on the power again.
	When not connected	Disconnect the reel diameter calculation option LE7-DCA from the LE7-40GU unit and turn on the power again.
LE7-CCL	When connected	Connect the network option LE7-CCL to the LE7-40GU unit and turn on the power again.
Control mode selection	Feedback control	Either of the following conditions must be satisfied. • The reel diameter calculation option LE7-DCA is not connected. • The reel diameter calculation option LE7-DCA is connected and “Feedback control” is selected in "912: Control mode selection”.
	Open-loop control	Either of the following conditions must be satisfied. The reel diameter calculation option LE7-DCA is connected and “Open-loop control” is selected with the relevant button on any of the screens below. • Initial setting mode: “INIT SET 2 Control mode selection” • Adjustment mode: “912: Control mode selection”
Two-reel's switching function	Available	Select the “Available” button from either screen below: • Initial setting mode: “INIT SET 3 two-reel's switching FUNC” • Adjustment mode: “261: 2 axis switching function selection”
Selection of function to use	Correction of tension calibration	Turn on the target restriction item with “Selection of function to use” on adjustment mode screens 951 to 953. However, the following conditions must be satisfied in order to set the conditions below. • Can be set only when the reel diameter calculation option LE7-DCA is connected: “Acceleration calculation”, “Run/Stop judgment selection”, “Constant slip control calculation”, “Open-loop control”, “Mass correction calculation”, and “Predrive calculation” • Can be set only when LE7-DCA is connected and the selection of function to use (mechanical loss calculation) is on: “Advanced function mechanical loss calculation”
	Detection of TENS UP limit and outside range	
	Acceleration calculation	
	Run/Stop judgment selection	
	Constant slip control calculation	
	Taper control	
	Feedback control	
	Open-loop control	
	Mass correction calculation	
	Mechanical loss calculation	
	Advanced function mechanical loss CALC	
	Weak excitation	
	Powder torque output correction	
	Control output correction	
	General-purpose analog IN/OUT correction FUNC	
	Advanced function 2-reel's switching CTRL	
	Predrive calculation	
	Start timer	
Analog input function selection	Reel Diameter Input	Connect the reel diameter calculation option LE7-DCA and assign function “7: Reel diameter input” to any of AI1 to AI3 on adjustment mode screen “423: Analog input function selection”.
	Anything other than reel diameter input	Ensure that function “7: Reel diameter input” is not assigned to AI1 to AI3 on adjustment mode screen “423: Analog input function selection”.
Network function selection	No function	Turn on the button of the function to be used in the adjustment mode screen “511: Network mode selection”.
	N:N Network	
	MODBUS (RTU)	
	MODBUS (ASCII)	
	CC-Link	
Ethernet function selection	No function	Turn on the button of the function to be used in the adjustment mode screen “512: Ethernet communication selection”.
	CC-Link IEF Basic	
	SLMP	
	MODBUS/TCP	

Restriction item	Setting	Restriction cancellation method
Taper standard selection	No function	Turn on the button of the function to be used in the adjustment mode screen “251: Taper function selection”.
	Internal line taper	
	Straight line taper (external)	
	Broken line taper (external)	
	Direct taper	
Reel shaft selection	Unwinding	Connect the reel diameter calculation option LE7-DCA and select the “Unwinding” button in the adjustment mode screen “312: Reel shaft selection”.
Detection output selection	Reel diameter	Connect the reel diameter calculation option LE7-DCA and select the “Unwinding” button in the adjustment mode screen “341: Detection output selection/holding”.
	Measurement length/remaining length	Connect the reel diameter calculation option LE7-DCA and select the “Measurement length/Remaining length” button in the adjustment mode screen “341: Detection output selection/holding”.
Selection of measurement length/remaining length calculation switch	Remaining length	When you connect the reel diameter calculation option LE7-DCA and set Reel shaft selection to “Unwinding”, set adjustment mode screen “344: Selection of MEAS/RMN LEN CALC switch” to “Remaining length”.

6 MONITORING AND SETTING METHODS

The following methods are available for monitoring and setting the LE7-40GU parameters.

- Panel operation
- Analog I/O
- Ethernet communication
- RS-485 communication
- CC-Link communication (optional)

6.1 Order of Priority for Setting Methods

The order of priority for setting methods is as shown in the table below. If the function has been set to analog input selection, all settings other than the analog input will be unavailable for the corresponding parameter. Panel operation and network setting configuration have lower priority, and chronologically, later settings take effect with priority over earlier settings. Additionally, in the case of tension input and reel diameter input, setting done from the network will take effect if the setting value is not 0. If the setting value is 0, then the results of the LE7-40GU's tension calculations and the LE7-DCA's reel diameter calculations will take effect.

Order of priority for setting methods (except tension input and reel diameter input)

Order of priority	Setting method
1	Analog input
2	Panel operation, network (Ethernet, RS-485 communication, and CC-Link communication)

Order of priority for tension input

Order of priority	Setting method
1	Analog input
2	Network (Ethernet, RS-485 communication, and CC-Link communication)
3	Value calculated by LE7-40GU

Order of priority for reel diameter input

Order of priority	Setting method
1	Value calculated by LE7-DCA
2	Analog input
3	Network (Ethernet, RS-485 communication, and CC-Link communication)

Additionally, restrictions on access to the various parameters, which vary according to the monitoring and setting method, are as shown below.

Parameters marked with a "○" can be accessed using the method in question.

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
0	—	—	—	—	—	—
1	Total tension	○	○	○	○	○
2	Left tension	○	×	○	○	○
3	Right tension	○	×	○	○	○
4	Left input voltage	○	×	○	○	○
5	Right input voltage	○	×	○	○	○
6	—	—	—	—	—	—
7	—	—	—	—	—	—
8	—	—	—	—	—	—
9	—	—	—	—	—	—

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
10	—	—	—	—	—	—
11	—	—	—	—	—	—
12	—	—	—	—	—	—
13	—	—	—	—	—	—
14	—	—	—	—	—	—
15	—	—	—	—	—	—
16	Tension upper limit detection	○	×	○	○	○
17	Tension lower limit detection	○	×	○	○	○
18	Detection outside target tension range	○	×	○	○	○
19	Tension display filter	○	×	○	○	○
20	Tension output filter	○	×	○	○	○
21	—	○	×	○	○	○
22	—	—	—	—	—	—
23	—	—	—	—	—	—
24	—	—	—	—	—	—
25	—	—	—	—	—	—
26	—	—	—	—	—	—
27	—	—	—	—	—	—
28	—	—	—	—	—	—
29	—	—	—	—	—	—
30	—	—	—	—	—	—
31	Tension input filter	×	×	×	×	×
32	Sensor input type selection	○	×	○	○	○
33	Tension full scale	○	×	○	○	○
34	Tension display decimal point selection	○	×	○	○	○
35	Tension display unit selection	○	×	○	○	○
36	Span target tension	○	×	○	○	○
37	Left manual zero calibration	○	×	○	○	○
38	Right manual zero calibration	○	×	○	○	○
39	Left manual span calibration	○	×	○	○	○
40	Right manual span calibration	○	×	○	○	○
41	—	—	—	—	—	—
42	Tension full scale×10 data	×	×	×	×	×
43	Span adjustment data range switching	×	×	×	×	×
44	Left zero adjustment data	×	×	×	×	×
45	Right zero adjustment data	×	×	×	×	×
46	Left span adjustment data	×	×	×	×	×
47	Right span adjustment data	×	×	×	×	×
48	Reel diameter	○	○	○	○	○
49	Target line velocity	○	×	○	○	○
50	Line acceleration	○	×	○	○	○
51	Measurement length/remaining length	○	×	○	○	○
52	Reel rotational speed	○	×	○	○	○
53	New reel rotational speed	○	×	○	○	○
54	Constant slip ROTO speed command output	○	×	○	○	○
55	Predrive rotation speed command output	○	×	○	○	○

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
56	Predrive target rotation speed	○	×	○	○	○
57	Reel diameter CALC adapter ROM version	○	×	○	○	○
58	—	—	—	—	—	—
59	—	—	—	—	—	—
60	—	—	—	—	—	—
61	—	—	—	—	—	—
62	—	—	—	—	—	—
63	—	—	—	—	—	—
64	Initial diameter	○	×	○	○	○
65	Material thickness	○	×	○	○	○
66	Reel diameter detection 1	○	×	○	○	○
67	Reel diameter detection 2	○	×	○	○	○
68	Reel diameter detection 3	○	×	○	○	○
69	Measurement/remaining length detection 1	○	×	○	○	○
70	Measurement/remaining length detection 2	○	×	○	○	○
71	Measurement/remaining length detection 3	○	×	○	○	○
72	Accelerating judgment acceleration	○	×	○	○	○
73	Reel rotational speed gain	○	×	○	○	○
74	Reel rotational speed bias	○	×	○	○	○
75	Reel rotational speed startup gain	○	×	○	○	○
76	Reel rotational speed startup timer	○	×	○	○	○
77	Predrive time	○	×	○	○	○
78	Predrive bias	○	×	○	○	○
79	—	—	—	—	—	—
80	Maximum diameter	○	×	○	○	○
81	Minimum diameter	○	×	○	○	○
82	Teaching speed	○	×	○	○	○
83	Velocity electronic gear ratio	○	×	○	○	○
84	Reel selection	○	×	○	○	○
85	Number of reel pulse	○	×	○	○	○
86	Reel diameter calculation cycle	○	×	○	○	○
87	MEAS/RMN length calculation switch	○	×	○	○	○
88	Material thickness unit	○	×	○	○	○
89	Maximum line acceleration	○	×	○	○	○
90	Stop judgmental speed	○	×	○	○	○
91	Detection output selection	○	×	○	○	○
92	Detection output holding selection	○	×	○	○	○
93	Run/Stop judgment selection	○	×	○	○	○
94	Run judgmental speed	○	×	○	○	○
95	Stop judgmental speed	○	×	○	○	○
96	—	—	—	—	—	—
97	—	—	—	—	—	—
98	—	—	—	—	—	—
99	—	—	—	—	—	—
100	—	—	—	—	—	—
101	—	—	—	—	—	—

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
102	—	—	—	—	—	—
103	—	—	—	—	—	—
104	—	—	—	—	—	—
105	—	—	—	—	—	—
106	—	—	—	—	—	—
107	—	—	—	—	—	—
108	Reel diameter output span (for bus)	×	×	×	×	×
109	Reel shaft rotation output span (for bus)	×	×	×	×	×
110	New reel rotation output span (for bus)	×	×	×	×	×
111	Reel switch selection (for tension controller bus)	×	×	×	×	×
112	Target tension	○	×	○	○	○
113	Control output	○	○	○	○	○
114	Torque output	○	×	○	○	○
115	100% reel shaft conversion torque	○	×	○	○	○
116	Estimated powder life time	○	×	○	○	○
117	Control output voltage for powder	○	×	○	○	○
118	Control output current for powder	○	×	○	○	○
119	—	—	—	—	—	—
120	—	—	—	—	—	—
121	—	—	—	—	—	—
122	—	—	—	—	—	—
123	—	—	—	—	—	—
124	—	—	—	—	—	—
125	—	—	—	—	—	—
126	—	—	—	—	—	—
127	Automatic control status	×	×	×	×	×
128	Tension setting	○	○	○	○	○
129	Manual setting	○	○	○	○	○
130	Stall setting	○	○	○	○	○
131	Start timer	○	×	○	○	○
132	Stop timer	○	×	○	○	○
133	Stop gain	○	×	○	○	○
134	Stop bias	○	×	○	○	○
135	Acceleration/deceleration torque setting	○	×	○	○	○
136	Gain 1	○	×	○	○	○
137	Gain 2	○	×	○	○	○
138	Internal taper ratio	○	○	○	○	○
139	External linear line taper ratio	○	○	○	○	○
140	New reel preset	○	○	○	○	○
141	New reel preset timer	○	×	○	○	○
142	Cutting torque	○	×	○	○	○
143	—	—	—	—	—	—
144	Broken line taper corner 1	○	×	○	○	○
145	Broken line taper ratio 1	○	×	○	○	○
146	Broken line taper corner 2	○	×	○	○	○
147	Broken line taper ratio 2	○	×	○	○	○
148	Broken line taper corner 3	○	×	○	○	○

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
149	Broken line taper ratio 3	○	×	○	○	○
150	Broken line taper corner 4	○	×	○	○	○
151	Broken line taper ratio 4	○	×	○	○	○
152	Broken line taper corner 5	○	×	○	○	○
153	Broken line taper ratio 5	○	×	○	○	○
154	Broken line taper corner 6	○	×	○	○	○
155	Broken line taper ratio 6	○	×	○	○	○
156	Broken line taper corner 7	○	×	○	○	○
157	Broken line taper ratio 7	○	×	○	○	○
158	Broken line taper corner 8	○	×	○	○	○
159	Broken line taper ratio 8	○	×	○	○	○
160	Proportional gain	○	×	○	○	○
161	Integral time	○	×	○	○	○
162	Dead band gain	○	×	○	○	○
163	Dead band width	○	×	○	○	○
164	Tension control filter	○	×	○	○	○
165	Static mechanical loss A	○	×	○	○	○
166	Static mechanical loss B	○	×	○	○	○
167	Kinetic mechanical loss A	○	×	○	○	○
168	Kinetic mechanical loss B	○	×	○	○	○
169	Mass correction gain A	○	×	○	○	○
170	Mass correction gain B	○	×	○	○	○
171	Mass correction bias A	○	×	○	○	○
172	Mass correction bias B	○	×	○	○	○
173	—	—	—	—	—	—
174	—	—	—	—	—	—
175	—	—	—	—	—	—
176	Control mode selection	○	×	○	○	○
177	Integral feedback limit	○	×	○	○	○
178	Feedback selection during the stop timer	○	×	○	○	○
179	Automatic control output polarity selection	○	×	○	○	○
180	Open-loop control ratio	○	×	○	○	○
181	Taper function selection	○	×	○	○	○
182	Selection of two reel's switching FUNC	○	×	○	○	○
183	Internal taper standard selection	○	×	○	○	○
184	—	—	—	—	—	—
185	—	—	—	—	—	—
186	Stall automatic calculation gain	○	×	○	○	○
187	New reel preset AUTO calculation gain	○	×	○	○	○
188	Control output upper limit	○	×	○	○	○
189	Control output lower limit	○	×	○	○	○
190	—	—	—	—	—	—
191	—	—	—	—	—	—
192	Load model	○	×	○	○	○
193	Rated current	○	×	○	○	○
194	Maximum torque correction	○	×	○	○	○
195	Nonlinear correction setting 0	○	×	○	○	○
196	Nonlinear correction setting 10	○	×	○	○	○

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
197	Nonlinear correction setting 20	○	×	○	○	○
198	Nonlinear correction setting 30	○	×	○	○	○
199	Nonlinear correction setting 40	○	×	○	○	○
200	Nonlinear correction setting 50	○	×	○	○	○
201	Nonlinear correction setting 60	○	×	○	○	○
202	Nonlinear correction setting 70	○	×	○	○	○
203	Nonlinear correction setting 80	○	×	○	○	○
204	Nonlinear correction setting 90	○	×	○	○	○
205	—	—	—	—	—	—
206	—	—	—	—	—	—
207	—	—	—	—	—	—
208	Powder life prediction operation selection	○	×	○	○	○
209	Weak excitation	○	×	○	○	○
210	Over current detection filter	○	×	○	○	○
211	Coil limit temperature	○	×	○	○	○
212	—	—	—	—	—	—
213	—	—	—	—	—	—
214	—	—	—	—	—	—
215	—	—	—	—	—	—
216	—	—	—	—	—	—
217	—	—	—	—	—	—
218	—	—	—	—	—	—
219	—	—	—	—	—	—
220	Maximum diameter teaching data	—	—	—	—	—
221	Minimum diameter teaching data	—	—	—	—	—
222	Selection of tension input	×	×	×	×	×
223	Selection of reel diameter input	×	×	×	×	×
224	Contact input monitor	○	×	○	○	○
225	Contact output monitor	○	×	○	○	○
226	General-purpose analog input 1 monitor	○	×	○	○	○
227	General-purpose analog input 2 monitor	○	×	○	○	○
228	General-purpose analog input 3 monitor	○	×	○	○	○
229	General-purpose analog output 1 monitor	○	×	○	○	○
230	General-purpose analog output 2 monitor	○	×	○	○	○
231	Analog output monitor for TENS control	○	×	○	○	○
232	Analog output monitor for new reel preset	○	×	○	○	○
233	Contact input monitor for reel DIA CALC	○	×	○	○	○
234	Contact output monitor for reel DIA CALC	○	×	○	○	○
235	Alarm Display	○	×	○	○	○
236	Network alarm device No.	○	×	○	○	○
237	Main unit ROM version	○	×	○	○	○
238	Network option ROM version	○	×	○	○	○
239	Communication signal monitor	○	×	○	○	○
240	Contact input 1 function selection	○	×	○	○	○

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
241	Contact input 2 function selection	○	×	○	○	○
242	Contact input 3 function selection	○	×	○	○	○
243	Contact input 4 function selection	○	×	○	○	○
244	Contact input 5 function selection	○	×	○	○	○
245	Contact input 6 function selection	○	×	○	○	○
246	—	—	—	—	—	—
247	—	—	—	—	—	—
248	Contact output 1 function selection	○	×	○	○	○
249	Contact output 2 function selection	○	×	○	○	○
250	—	—	—	—	—	—
251	—	—	—	—	—	—
252	—	—	—	—	—	—
253	—	—	—	—	—	—
254	—	—	—	—	—	—
255	—	—	—	—	—	—
256	Analog input mode selection	○	×	○	○	○
257	Analog input 1 function selection	○	×	○	○	○
258	Analog input 2 function selection	○	×	○	○	○
259	Analog input 3 function selection	○	×	○	○	○
260	—	—	—	—	—	—
261	—	—	—	—	—	—
262	—	—	—	—	—	—
263	—	—	—	—	—	—
264	Analog output mode selection	○	×	○	○	○
265	Analog output 1 function selection	○	×	○	○	○
266	Analog output 2 function selection	○	×	○	○	○
267	Analog output 1 gain	○	×	○	○	○
268	Analog output 2 gain	○	×	○	○	○
269	Analog output 1 bias	○	×	○	○	○
270	Analog output 2 bias	○	×	○	○	○
271	—	—	—	—	—	—
272	Two reel's switching FUNC output mode	○	×	○	○	○
273	Control output mode selection	○	×	○	○	○
274	Control output gain	○	×	○	○	○
275	New reel preset output gain	○	×	○	○	○
276	Control output bias	○	×	○	○	○
277	New reel preset output bias	○	×	○	○	○
278	—	—	—	—	—	—
279	—	—	—	—	—	—
280	—	—	—	—	—	—
281	—	—	—	—	—	—
282	—	—	—	—	—	—
283	—	—	—	—	—	—
284	—	—	—	—	—	—
285	—	—	—	—	—	—
286	—	—	—	—	—	—
287	—	—	—	—	—	—
288	Set setting password	○	×	○	○	○
289	Input setting password	○	×	○	○	○

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
290	Set monitor password	○	×	○	○	○
291	Input monitor password	○	×	○	○	○
292	Menu No.	○	×	○	○	○
293	Language selection	○	×	×	×	×
294	Operation mode selection	○	×	×	×	×
295	Selection of function to use 1	○	×	×	×	×
296	Selection of function to use 2	○	×	×	×	×
297	Memory cassette backup selection	○	×	×	×	×
298	Data copy selection	○	×	×	×	×
299	Data initialization selection	○	×	×	×	×
300	—	—	—	—	—	—
301	—	—	—	—	—	—
302	—	—	—	—	—	—
303	—	—	—	—	—	—
304	Alarm history 1	○	×	○	○	○
305	Alarm history 2	○	×	○	○	○
306	Alarm history 3	○	×	○	○	○
307	Alarm history 4	○	×	○	○	○
308	Alarm history 5	○	×	○	○	○
309	Alarm history 6	○	×	○	○	○
310	Alarm history 7	○	×	○	○	○
311	Alarm history 8	○	×	○	○	○
312	Alarm history holding selection	○	×	○	○	○
313	Alarm display time	○	×	○	○	○
314	Alarm operation selection 1	○	×	○	○	○
315	Alarm operation selection 2	○	×	○	○	○
316	Alarm operation selection 3	○	×	○	○	○
317	Alarm operation selection 4	○	×	○	○	○
318	—	—	—	—	—	—
319	—	—	—	—	—	—
320	Network mode selection	○	×	○	○	○
321	Station No. in N:N Network	○	×	○	○	○
322	MODBUS station No.	○	×	○	○	○
323	MODBUS format selection	○	×	○	○	○
324	CC-Link station No.	○	×	○	○	○
325	Number of occupied stations in CC-Link	○	×	○	○	○
326	Communication speed in CC-Link	○	×	○	○	○
327	CC-Link version	○	×	○	○	○
328	Extended cyclic in CC-Link	○	×	○	○	○
329	CC-Link IE network No.	○	×	○	○	○
330	CC-Link IE station No.	○	×	○	○	○
331	—	—	—	—	—	—
332	—	—	—	—	—	—
333	—	—	—	—	—	—
334	—	—	—	—	—	—
335	—	—	—	—	—	—
336	Continuous monitoring FUNC selection 1	○	×	×	×	×
337	Continuous monitoring FUNC selection 2	○	×	×	×	×

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
338	Continuous monitoring FUNC selection 3	○	×	×	×	×
339	Continuous monitoring FUNC selection 4	○	×	×	×	×
340	Continuous monitoring FUNC selection 5	○	×	×	×	×
341	Continuous monitoring FUNC selection 6	○	×	×	×	×
342	Continuous monitoring FUNC selection 7	○	×	×	×	×
343	Continuous monitoring FUNC selection 8	○	×	×	×	×
344	Continuous monitoring FUNC selection 9	○	×	×	×	×
345	Continuous monitoring FUNC selection 10	○	×	×	×	×
346	Continuous monitoring FUNC selection 11	○	×	×	×	×
347	Continuous monitoring FUNC selection 12	○	×	×	×	×
348	Continuous monitoring FUNC selection 13	○	×	×	×	×
349	Continuous monitoring FUNC selection 14	○	×	×	×	×
350	Continuous monitoring FUNC selection 15	○	×	×	×	×
351	Continuous monitoring FUNC selection 16	○	×	×	×	×
352	Continuous setting function selection 1	○	×	×	×	×
353	Continuous setting function selection 2	○	×	×	×	×
354	Continuous setting function selection 3	○	×	×	×	×
355	Continuous setting function selection 4	○	×	×	×	×
356	Continuous setting function selection 5	○	×	×	×	×
357	Continuous setting function selection 6	○	×	×	×	×
358	Continuous setting function selection 7	○	×	×	×	×
359	Continuous setting function selection 8	○	×	×	×	×
360	Continuous setting function selection 9	○	×	×	×	×
361	Continuous setting function selection 10	○	×	×	×	×
362	Continuous setting function selection 11	○	×	×	×	×
363	Continuous setting function selection 12	○	×	×	×	×
364	Continuous setting function selection 13	○	×	×	×	×
365	Continuous setting function selection 14	○	×	×	×	×
366	Continuous setting function selection 15	○	×	×	×	×

No.	Parameter name	Access restrictions				
		Panel operation	Analog I/O	Ethernet communication	RS-485 communication	CC-Link communication
367	Continuous setting function selection 16	○	×	×	×	×
368	Extended screen 1	○	×	×	×	×
369	Extended screen 2	○	×	×	×	×
370	Extended screen 3	○	×	×	×	×
371	Extended screen 4	○	×	×	×	×
372	Extended screen 5	○	×	×	×	×
373	Extended screen 6	○	×	×	×	×
374	Extended screen 7	○	×	×	×	×
375	Extended screen 8	○	×	×	×	×
376	Power standby display	○	×	×	×	×
377	Ethernet communication	○	×	×	×	×
378	SLMP station No.	○	×	×	×	×
379	—	—	—	—	—	—
380	—	—	—	—	—	—
381	—	—	—	—	—	—
382	—	—	—	—	—	—
383	—	—	—	—	—	—
384	Base torque in open-loop control	×	×	○	○	○
385	Direct taper rate	×	×	○	○	○
386	Link tension monitor filter	×	×	○	○	○
387	Tension input	×	○	○	○	○
388	Reel diameter input	×	○	○	○	○
389	—	—	—	—	—	—
390	—	—	—	—	—	—
391	—	—	—	—	—	—
392	—	—	—	—	—	—
393	—	—	—	—	—	—
394	—	—	—	—	—	—
395	—	—	—	—	—	—
396	—	—	—	—	—	—
397	—	—	—	—	—	—
398	—	—	—	—	—	—
399	—	—	—	—	—	—

7 TENSION CONTROL MODE

When the reel diameter calculation option LE7-DCA is connected, the LE7-40GU enables the Control mode selection to be changed between feedback control mode and open-loop control mode. In addition, when the reel diameter calculation option LE7-DCA is connected in feedback control mode, it operates as combined feedforward/feedback control that combines feedback control and open-loop control.
When open-loop control is selected in Control mode selection and power is turned on without LE7-DCA connection, the Control mode selection is changed to feedback control.

7.1 Function Difference Due to Control Mode

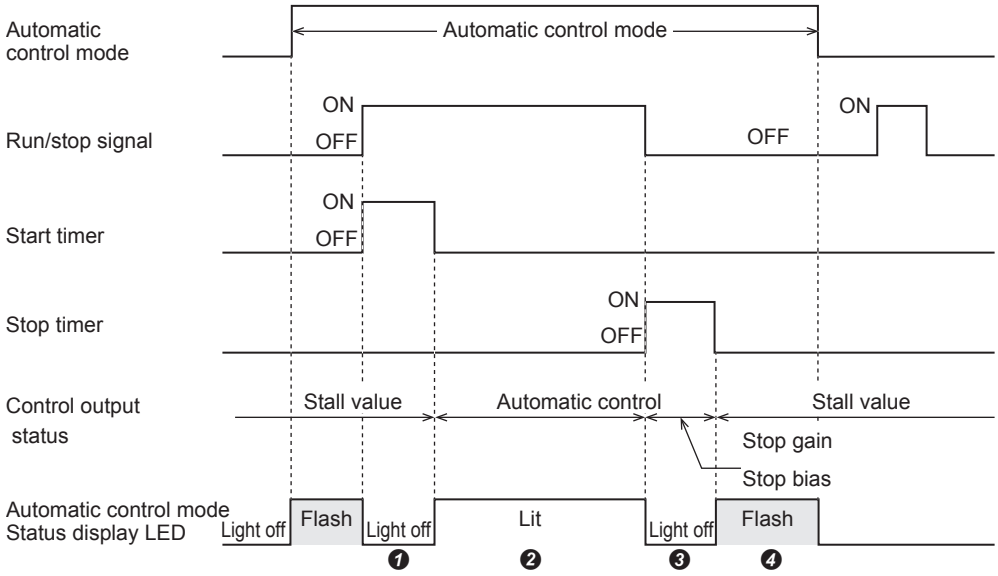
Available functions depend on Control mode selection and reel diameter calculation option connection available/not available.

Function	Control mode selection: Feedback control		Control mode selection: Open-loop control
	LE7-DCA connection: No	LE7-DCA connection: Yes	LE7-DCA connection: Yes
Tension display	○	○	×
Tension detection	○	○	×
External tension input/ output	○	○	×
External reel diameter input	○	×	×
Reel diameter calculation	×	○	○
Taper control	○	○	○
Feedback control	○	○	×
Open-loop control	×	○	○
Mechanical loss correction	○	○	○
Cutting torque	○	○	×
New reel preset	○	○	×
Manual control	○	○	○
Weak excitation	○	○	○
Control output correction	○	○	○

○: Available ×: Not available

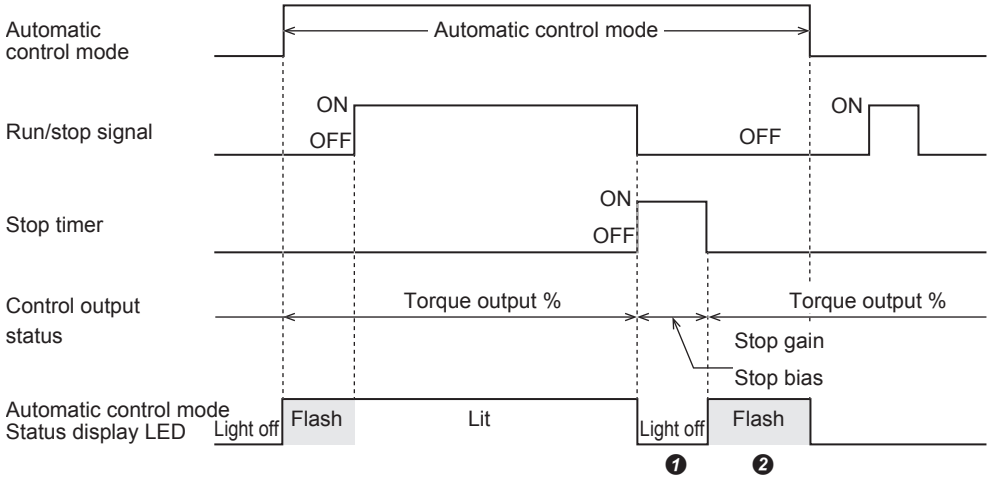
7.2 Feedback Control

❶With feedback control, turning on the run/stop signal while in automatic control mode activates the start timer, and the stall value of the control output while the start timer is active remains the same.
❷After the start timer finishes, automatic control takes over with the stall value as the starting point. During automatic control, target tension values are compared with tension data, and the control output is varied according to the difference.
❸Switching the run/stop signal from the on state to the off state activates the stop timer, and stop gain and stop bias are available while the stop timer is active.
❹After the stop timer finishes, the automatic control is stopped and the control output becomes the stall value.



7.3 Open-Loop Control

If the LE7-DCA is connected, it can be used by selecting open-loop control on the “Control mode selection” screen.
❶Switching the run/stop signal from the on state to the off state activates the stop timer, and stop gain and stop bias are available while the stop timer is active.
❷After the stop timer finishes, reel diameter calculation stops.



7.4 Combined Feedforward/Feedback Control

If the LE7-DCA is connected, combined feedforward/feedback control is active if open-loop control has not been selected on the “Control mode selection” screen.

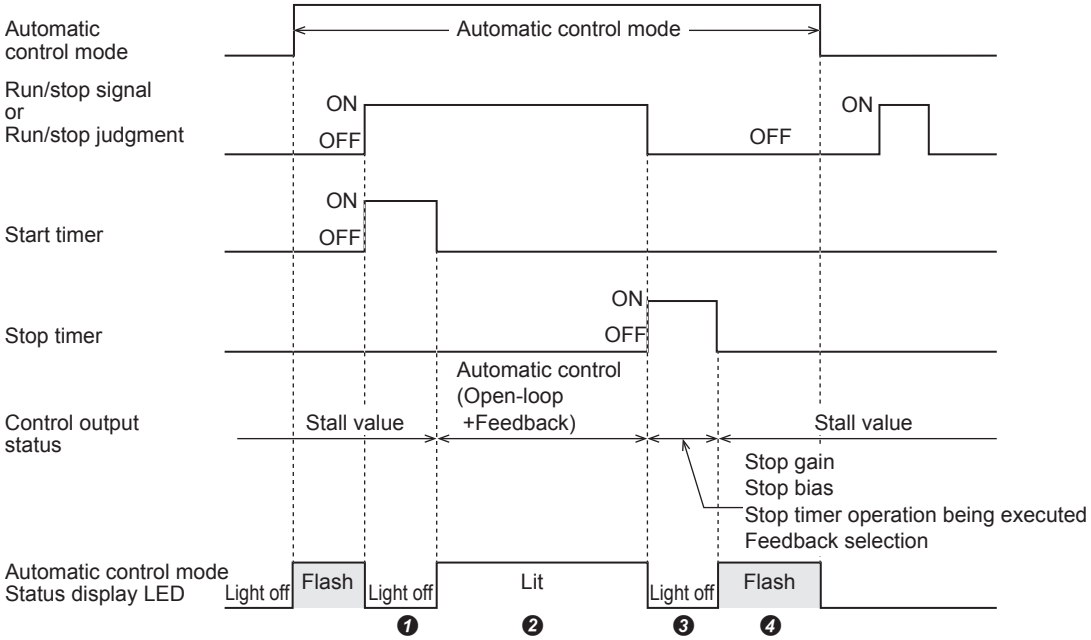
❶Turning on the run/stop signal while in automatic control mode activates the start timer, and the stall value of the control output while the start timer is active remains the same.

❷After the start timer finishes, automatic control with the stall value as the starting point is performed. During automatic control, torque output calculation for open-loop control is carried out, and target tension values are compared to tension data. Control output is calculated according to the difference and added to the torque output for open-loop control.

❸Switching the run/stop signal from the on state to the off state activates the stop timer, and stop gain and stop bias are available while the stop timer is active. It is possible to enable/disable feedback control during the stop timer using the feedback selection during the stop timer.

❹After the stop timer finishes, automatic control stops and the control output becomes the stall value.

Additionally, LE7-DCA performs an run/stop judgment based on the target line velocity and controls the run/stop status under automatic control according to the results of that judgment.



8 INITIAL SETTING MODE

When the LE7-40GU power supply is initially turned on, it will start up in the initial setting mode, so initial setting should be done by panel operation. Initial setting cannot be done from the network.
In initial setting mode, make the initial setting for the following items.
Additionally, after you complete the initial settings, preset the parameter setting values in accordance with the operation mode selection, Two-reel's switching function, and reel diameter calculation option connection available/not available status.

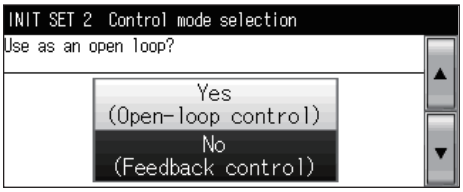
Setting	Remarks
Language selection	—
Control mode selection	Displayed only when LE7-DCA is connected.
Two-reel's switching function	—
Tension full scale	—
Zero adjustment	Displayed only during feedback control.
Span adjustment	Displayed only during feedback control.
Maximum diameter/minimum diameter	Displayed only when LE7-DCA is connected.
Velocity electronic gear ratio	Displayed only when LE7-DCA is connected.
Operation mode selection	—

8.1 Language Selection

You can switch between three languages — Japanese, English, and Chinese (simplified characters) — for the text displayed on the LE7-40GU panel LCD by changing the language selection.
<Setting Screen>

8.2 Control Mode Selection

Displayed only when LE7-DCA is connected. (If no LE7-DCA is connected, feedback control will be enabled and the following setting screen will not be displayed.)
<Setting Screen>



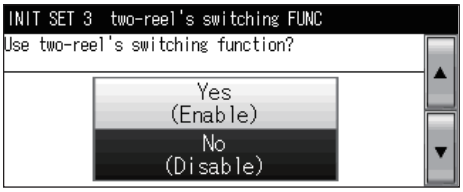
- If “Yes” is selected: Open-loop control will be enabled.
- If “No” is selected: Combined feedback control, a combination of feedback control and open-loop control, will enabled.

For details on open-loop control and combined feedforward/feedback control, refer to the following.
LE7-DCA APPLICATION MANUAL

8.3 Two-reel's Switching Function

Choose whether to use the two-reel's switching function.

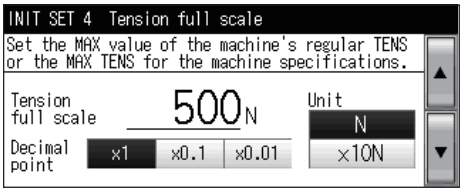
<Setting Screen>



8.4 Tension Full Scale

This setting is used as the reference for the tension display calculation and the tension monitor output calculation. Set the maximum value of the normal tension of the machine or the maximum tension of the mechanical specifications. Note that these values are different from the rated load of the tension detector.

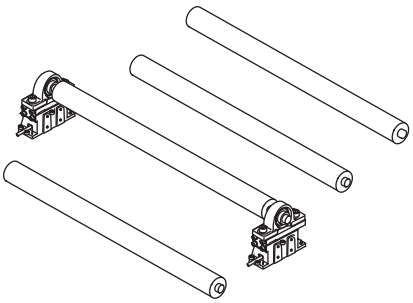
<Setting Screen>



8.5 Zero Adjustment

This operation is used to cancel the tare weight of the detection roller when the tension of the tension detector connected to the LE7-40GU is being set to zero. Setting screen is displayed only during feedback control.

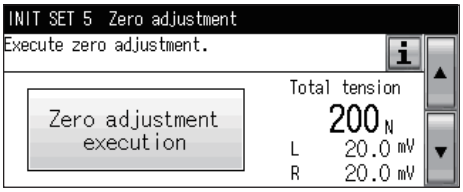
If you execute the zero adjustment process with nothing on the detection roller, the tension recorded at that time will be treated as zero.



However, when doing zero adjustment, if an unusual weight is clearly being applied to the tension detector — i.e. the output voltage of the detector is abnormal — an alarm will be displayed.

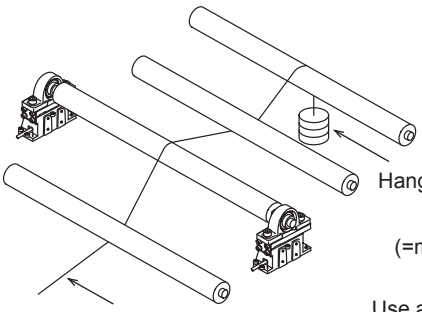
If zero adjustment causes an alarm to be displayed, save that calibration value exactly as it is, and record the alarm details in the alarm log regardless of what the alarm log retention setting is.

<Setting Screen>

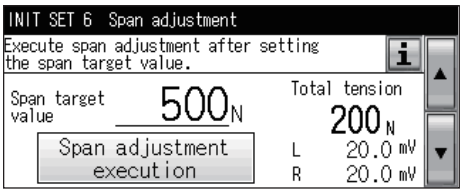


8.6 Span Adjustment

The purpose of this operation is to match the detected tension with the tension of the tension detector connected to the LE7-40GU. Setting screen is displayed only during feedback control.
Pass the string through the detection roller and its adjacent rollers. Make sure to pass the string along the same pass line of the materials as illustrated below. Hang a known weight or pull the string using a spring only.
Carry out span adjustment with the equipment in that state.

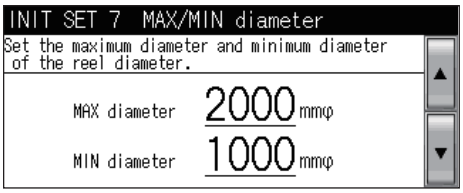


Set the tension load of the known weight. (Set the calibration target tension to the mass of the weight×9.8.) For accuracy, we recommend 1/3 or more of the tension full scale.
<Setting Screen>



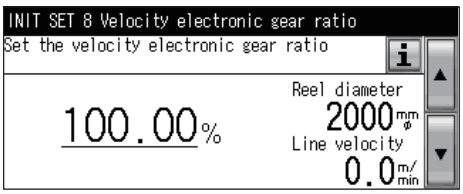
8.7 Maximum Diameter/Minimum Diameter

Displayed only when LE7-DCA is connected.
This is the setting parameter for maximum reel diameter/minimum reel diameter.
<Setting Screen>



8.8 Velocity Electronic Gear Ratio

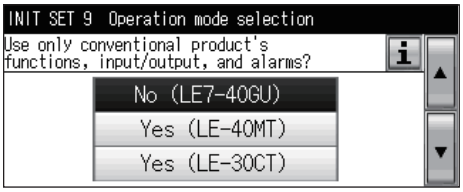
Displayed only when LE7-DCA is connected.
This parameter is for setting the pulse rate of the measure pulse for reel diameter calculation and target line velocity calculation to 1 pulse per 1 mm of measure roll circumference.
<Setting Screen>



8.9 Operation Mode Selection

Under Operation mode selection, you can select from the following operations.

<Setting Screen>



- If “No (LE7-40GU)” is selected: Operate under LE7-40GU mode.
- If “Yes (LE-40MT)” is selected: Operate under LE-40MT mode.
- If “Yes (LE-30CT)” is selected: Operate under LE-30CT mode.

LE7-40GU mode

Normal mode of LE7-40GU

Parameters related to new functionality can be used from the device’s initial state.

LE-40MT mode

This mode is for operating with the functionality of the LE-40MT, which is a conventional model.

Parameters related to new functionality that are not included in conventional models can automatically be disabled to simplify screen operation (parameter setting).

LE-30CT mode

This mode is for operating with the functionality of the LE-30CT, which is a conventional model.

Parameters related to new functionality that are not included in conventional models can automatically be disabled to simplify screen operation (parameter setting).

Point

- Parameters related to the two-reel's switching function and the reel diameter calculation option are automatically disabled in accordance with the setting value of the Two-reel's switching function and the availability/non-availability status of the reel diameter calculation option.
- New functionality can still be used in LE-40MT mode and LE-30CT mode by changing the Selection of function to use.

<List of operation modes>

Operation mode	Operation mode selection	Reel diameter calculation option	Two-reel's switching
1	LE7-40GU	Not available	Not available
2			Available
3		Available	Not available
4			Available
5	LE-40MT	Not available	Not available
6			Available
7		Available	Not available
8			Available
9	LE-30CT	Not available	Not available
10			Available
11		Available	Not available
12			Available

Functions to use in each operation mode

Functions to use	Related parameter	Operation mode		
		LE7-40GU Mode	LE-40MT Mode	LE-30CT Mode
Correction of tension calibration	Left manual zero calibration	○	—	○
	Right manual zero calibration			
	Left manual span calibration			
	Right manual span calibration			
Detection of tension upper limit and outside range	Tension upper limit detection	○	—	—
	Detection outside target tension range			
	Tension detection filter			
Acceleration calculation	Line acceleration	○*1	—	—
	Maximum line acceleration			
	Accelerating judgment acceleration			
Run/Stop judgment	Run/Stop judgment selection	○*1	—	—
	Run judgment speed			
	Stop judgment speed			
Constant slip control calculation	Reel rotational speed	○*1	○*1	○*1
	Constant slip ROTO speed command output			
	Reel rotational speed bias			
	Reel rotational speed gain			
	Reel rotational speed startup gain			
	Reel shaft rotational speed startup timer			
Taper control	Internal taper standard selection	○	—	—
	Broken line taper ratio 5 to 8			
	Broken line taper corner 5 to 8			
	Direct taper ratio			
Feedback control	Tension control filter	○	—	—
	Feedback integral value limit			
	Stall automatic calculation gain			
	Automatic control output polarity selection			
Open-loop control	Acceleration/deceleration torque setting	○*1	—	—
	Open-loop control ratio			
	Base torque in open-loop control			
Mass correction calculation	Mass correction gain A	○*1	—	—
	Mass correction bias A			
	Mass correction gain B			
	Mass correction bias B			
Mechanical loss calculation	Static mechanical loss A	○	○	—
	Static mechanical loss B			
Advanced function mechanical loss calculation	Mechanical loss function selection	○*1	—	—
	Kinetic mechanical loss A			
	Kinetic mechanical loss B			
Weak excitation	Weak excitation	○	—	○

Functions to use	Related parameter	Operation mode		
		LE7-40GU Mode	LE-40MT Mode	LE-30CT Mode
Powder torque output correction	Load model	○	—	—
	Rated current			
	Maximum torque correction			
	Nonlinear correction 0 to 90			
	Powder life prediction operation selection			
	Over current detection filter			
	Coil limit temperature			
Control output correction	Control output lower limit	○	—	—
	Control output upper limit			
	Control output gain			
	Control output bias			
	New reel preset gain			
	New reel preset bias			
	Control output mode selection			
General-purpose analog I/O correction function	Analog input mode selection	○	—	—
	Analog output mode selection			
	Gain for analog outputs 1 to 2			
	Bias for analog outputs 1 to 2			
Advanced function two-reel's switching control	Two-reel's switching FUNC output mode	○*2	—	—
	New reel preset AUTO calculation gain			
Predrive calculation	New reel rotational speed	○*2	○*2	—
	Predrive rotation speed command output			
	Predrive target rotation speed			
	Predrive time			
	Predrive bias			
Start timer	Start timer	○	○	—

○: Enabled, —: Disabled

*1 LE7-DCA connection: Yes

*2 LE7-DCA connection=Yes, and Two-reel's switching function=available

I/O functions in each operation mode

General-purpose contact input

Operation mode	General-purpose contact input					
	DI1	DI2	DI3	DI4	DI5	DI6
1	Run/Stop	Gain 1 ON/OFF	No function	No function	No function	Alarm reset ON/OFF
2	Run/Stop	Gain 1 ON/OFF	Reel change ON/OFF	Cut torque ON/OFF	No function	Alarm reset ON/OFF
3	Run/Stop	No function	No function	No function	No function	Alarm reset ON/OFF
4	Run/Stop	Reel change ON/OFF	Cut torque ON/OFF	No function	No function	Alarm reset ON/OFF
5	Run/Stop	No function	Gain 1 ON/OFF	Stall memory ON/OFF	No function	No function
6	Run/Stop	Reel change ON/OFF	Gain 1 ON/OFF	Stall memory ON/OFF	No function	No function
7	Run/Stop	No function	Gain 1 ON/OFF	Stall memory ON/OFF	No function	No function
8	Run/Stop	Reel change ON/OFF	Gain 1 ON/OFF	Stall memory ON/OFF	No function	No function
9	Run/Stop	No function	No function	No function	No function	No function
10	Run/Stop	No function	No function	No function	No function	No function
11	Run/Stop	No function	No function	No function	No function	No function
12	Run/Stop	No function	No function	No function	No function	No function

General-purpose contact output

Operation mode	General-purpose contact output	
	DO1	DO2
1	Tension lower limit detection	No function
2	Tension lower limit detection	No function
3	Tension lower limit detection	No function
4	Tension lower limit detection	No function
5	Tension lower limit detection	No function
6	Tension lower limit detection	No function
7	Tension lower limit detection	No function
8	Tension lower limit detection	No function
9	Tension lower limit detection	No function
10	Tension lower limit detection	No function
11	Tension lower limit detection	No function
12	Tension lower limit detection	No function

General-purpose analog input

Operation mode	General-purpose analog input		
	AI1	AI2	AI3
1	No function	No function	No function
2	No function	No function	No function
3	No function	No function	No function
4	No function	No function	No function
5	No function	No function	No function
6	No function	No function	No function
7	No function	No function	No function
8	No function	No function	No function
9	No function	No function	No function
10	No function	No function	No function
11	No function	No function	No function
12	No function	No function	No function

General-purpose analog output

Operation mode	General-purpose analog output	
	AO1	AO2
1	Tension monitor	No function
2	Tension monitor	No function
3	Tension monitor	A-axis Reel shaft rotational speed output
4	A-axis Reel shaft rotational speed output	B-axis Reel shaft rotational speed output
5	Tension monitor	No function
6	Tension monitor	No function
7	Tension monitor	A-axis Reel shaft rotational speed output
8	A-axis Reel shaft rotational speed output	B-axis Reel shaft rotational speed output
9	Tension monitor	Tension setting monitor
10	Tension monitor	Tension setting monitor
11	Tension monitor	Tension setting monitor
12	Tension monitor	Tension setting monitor

9 EXTERNAL TENSION INPUT AND REEL DIAMETER INPUT

9.1 Tension Input Method

The LE7-40GU has three ways to input tension: tension detector input, analog input, and link input. Analog input is enabled if the analog input function selection is set for tension input. If link tension input is not zero, then link input is enabled. If link input is zero, then tension detector input is enabled.

<Tension Input Order of Priority>

Order of priority	Setting method
1	Analog input
2	Link input (Ethernet communication, RS-485 communication, or CC-Link communication)
3	Tension detector input

Tension detector input

Sensor input type

Set the tension sensor to be connected.

The recommended input voltage range when using the strain gauge sensor is within ±20 mV.

Additionally, make the selection so that the difference in output voltage values between when the tension is zero and when a full scale tension load is applied to the sensor should be at least 3 mV.

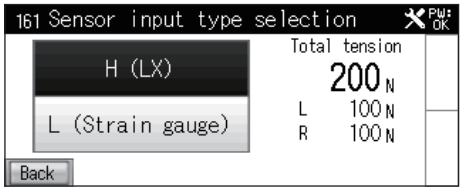
When using a strain gauge sensor with a rated output of 2 mV/V, 5 V DC will be supplied from the sensor power between red and black, which means that the rated output voltage will be 2 mV/V × 5 V=10 mV.

<Related Parameter>

Name	Parameter No.	Setting range
Sensor input type selection	32	0 (type LX), 1 (strain gauge)

<Setting Screen>

[Sensor input type selection]



Left/right input voltage monitor

The input voltage value from the tension detector is displayed as a real number.

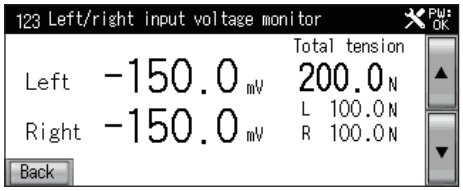
If the sensor input type is H (LX), one decimal place is displayed. If it is L (strain gauge), two decimal places are displayed.

This can be used to check for tension sensor errors and equipment installation defects.

If the voltage input monitor exceeds the overload alarm value during operation, the monitor tension blinks and the overload alarm is displayed.

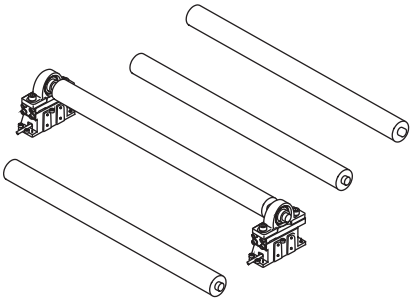
<Setting Screen>

[Left/right input voltage monitor]



Zero adjustment

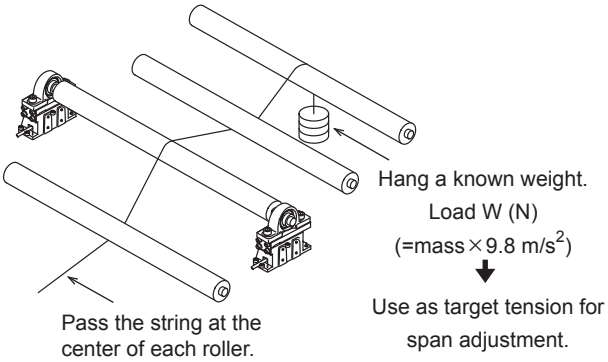
This operation is used to cancel the tare weight of the detection roller when the tension of the tension detector connected to the tension controller is being set to zero.
If you execute the zero adjustment process with nothing on the detection roller, the tension recorded at that time will be treated as zero.



However, when doing zero adjustment, if an unusual weight is clearly being applied to the tension detector (the output voltage of the detector is abnormal), an alarm will be displayed.
Even if an alarm is displayed as a result of zero adjustment, save that exact calibration value.
If you perform zero adjustment, manual span correction and manual zero correction will be reset to their initial values.
If you perform memory cassette retrieval, the zero adjustment value stored on the memory cassette will be applied.

Span adjustment

The purpose of this operation is to match the detected tension with the tension of the tension detector.
Pass the string through the detection roller and its adjacent rollers. Make sure to pass the string along the same pass line of the materials as illustrated below. Hang a known weight or pull the string using a spring only. And execute span adjustment under those conditions.
To perform span adjustment, first set the tension load of the known weight. (Set the calibration target tension to the mass of the weight × 9.8.)
For accuracy, we recommend 1/3 or more of the tension full scale.
If, as a result of performing the span adjustment, an unusual weight is clearly being applied to the tension detector (the output voltage of tension is abnormal), an alarm will be displayed.
Even if an alarm is displayed as a result of span adjustment, the exact calibration value is saved.



If you perform a span adjustment, manual span correction and manual zero correction will be reset to their initial values.
If you perform memory cassette retrieval, the span adjustment value stored on the memory cassette will be applied.

Tension display adjustment

These settings are used to shift the left and right tension displays intentionally.

The tension display can be shifted toward the span direction by using gain values or the offset direction by using bias values.

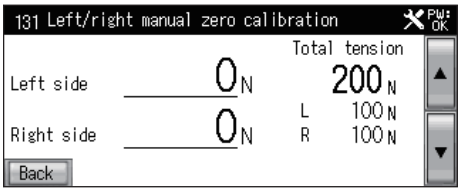
When the zero adjustment and span adjustment are performed, this setting is reset to the initial value.

<Related Parameter>

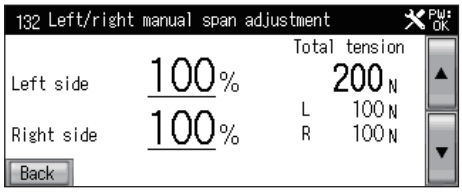
Name	Parameter No.	Setting range
Left manual zero calibration	37	-999 to 999
Left manual span calibration	39	50 to 300
Right manual zero calibration	38	-999 to 999
Right manual span calibration	40	50 to 300

<Setting Screen>

[Left manual zero calibration]
[Right manual zero calibration]



[Left manual span calibration]
[Right manual span calibration]



■Manual zero calibration

You can manually correct the zero point if it is misaligned after machine operation. The display's zero point can be adjusted manually by performing this correction.

Automatic control is carried out on the basis of the signal that results from adding the correction value that was set here to the tension signal from the tension detector.

Whenever auto zero adjustment or auto span adjustment is performed, this correction value is reset to zero.

■Manual span calibration

If auto span does not finish due to an "overload", "underload", "load imbalance", or a similar error that is displayed during auto span adjustment, then the span correction can be performed manually.

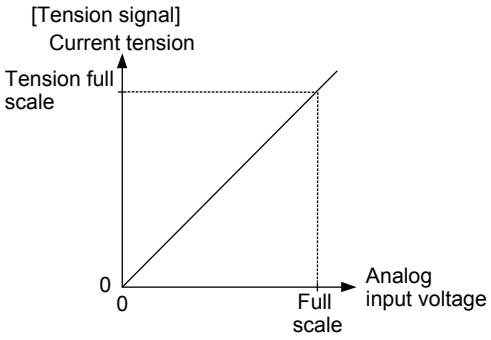
If the display (Wd) deviates from the load (Wt) during span adjustment, set the following correction value.

Manual span correction value=(Wt/Wd)×100 ϕ

If auto zero adjustment or auto span adjustment finishes, this correction value is reset to 100%.

Analog input

This input is used to input a tension signal from a source other than a type LX tension detector and strain gauge sensor. It inputs a signal between 0 and full scale voltage corresponding to tension between 0 and full scale tension.



Link input

This input is used to input a tension signal from a source other than a type LX tension detector, strain gauge sensor, and analog input. When the tension is input from the PLC through the network, the tension value is input into this parameter.
<Related Parameter>

Name	Parameter No.	Setting range
Link tension input	387	0 to 2000

9.2 Reel Diameter Input Method

The LE7-40GU has three ways to input reel diameter: the reel diameter calculation option LE7-DCA, analog input, and link input. If an LE7-DCA is connected, then using LE7-DCA calculation results is enabled. If analog input function selection is set to reel diameter input, analog input is enabled. If the link reel diameter input is not zero, then using settings from the network is enabled.

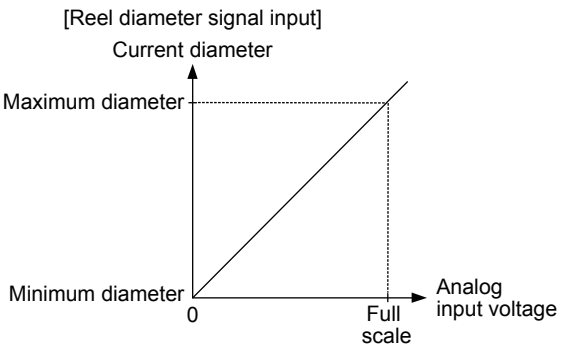
Order of priority	Setting method
1	Value calculated by LE7-DCA
2	Analog input
3	Network (Ethernet communication, RS-485 communication, and CC-Link communication)

Reel diameter calculation by LE7-DCA

For more information on reel diameter calculation by LE7-DCA, refer to the following.
LE7-DCA APPLICATION MANUAL

Analog input

Input the reel diameter signal during taper control using the external reel shape method. It inputs a signal between 0 and full scale voltage corresponding to the range from minimum diameter to maximum diameter. Additionally, if it is not possible to input a signal between 0 and full scale voltage corresponding to the range from minimum diameter to maximum diameter, then it is adjusted through reel diameter teaching.



Reel diameter teaching

When you input an analog reel diameter signal from an external source, e.g. using a touch lever or ultrasonic sensor, you can use it even if it is outside the reel diameter range of minimum diameter to maximum diameter corresponding to a signal voltage of 0 to full scale voltage, by teaching the equipment the relationship between signal voltage and reel diameter.
Calculating reel diameter from analog reel diameter input differs according to whether teaching is performed or not.
Formulas for calculating both cases are as follows.

<Teaching performed>

Current diameter=(maximum diameter-minimum diameter)×(input voltage-minimum diameter teaching voltage)÷(maximum diameter teaching voltage-minimum diameter teaching voltage)

<Teaching not performed>

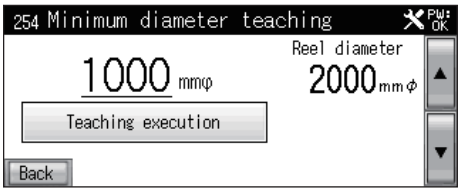
Current diameter=(maximum diameter-minimum diameter)×(input voltage-voltage of 0 V)÷(full scale voltage[*1]-voltage of 0 V)

*1 The full-scale voltage differs according to the analog input mode selection.

■Teaching procedure

1. Set the minimum diameter.

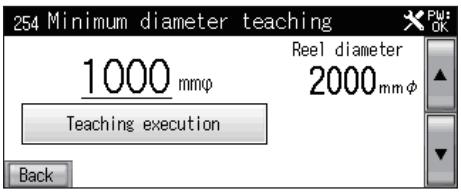
<Setting Screen>



2. Set the touch lever to the minimum diameter position or orient the minimum diameter reel frame toward the ultrasonic sensor.

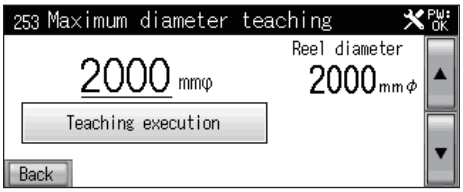
3. Turn on minimum diameter teaching execution.

<Setting Screen>



4. Set the maximum diameter.

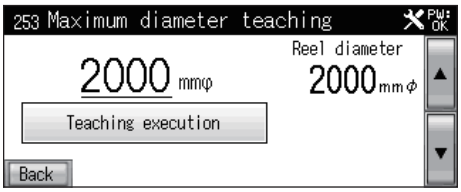
<Setting Screen>



5. Set the touch lever to the maximum diameter position or orient the maximum diameter reel frame toward the ultrasonic sensor.

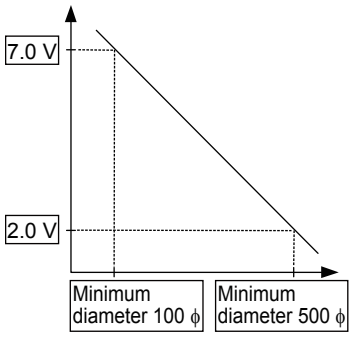
6. Turn on maximum diameter teaching execution.

<Setting Screen>



- The minimum diameter and maximum diameter teaching operations will only be executed if maximum diameter teaching execution is done first.
- You need to turn minimum and maximum teaching execution off and then on again to re-execute the teaching operation.

The figure below shows an example of input voltage reel diameter properties in an instance where the reel diameter input voltage for a minimum diameter of ϕ100 is 7.0 V and a reel diameter input voltage for a maximum diameter of ϕ500 is 2.0 V. The tension controller saves the properties taught in this instance and calculates reel diameter according to the actual input voltage.



- If analog input voltage is the same during minimum diameter and maximum diameter teaching, the reel diameter is set to the maximum diameter.

Link input

Use this to input the reel diameter signal during taper control using the external reel shape method. When the reel diameter is input from the PLC through the network, the reel diameter value is input into this parameter.

<Related Parameter>

Name	Parameter No.	Setting range
Link reel diameter input	388	0 to 2000

10 BASIC FUNCTIONS OF FEEDBACK CONTROL

10.1 Output When Operation is Stopped

While the machine is stopped (while the run/stop signal is OFF), the automatic operation is stopped and the control output is held at the same value. This held output is called "stall output". When the run/stop signal is turned from OFF to ON and the automatic control starts up, it uses this stall output value as the starting point.
Stall output consists of the following three statuses.

Stall memory output

- This output records the control output value right before the run/stop signal was turned OFF.
- If the machine is restarted without any replacement of the material reel frame (no reel diameter change) after the machine was stopped, the automatic control restarts using this stall value as the starting point.

Stall setting output

- Set an output value appropriate for the initial diameter of the material reel frame.
- If the initial diameter is set by the replacement of the material reel frame, the stall memory value is reset to this stall setting value and the automatic control starts with an output value appropriate for the initial diameter.

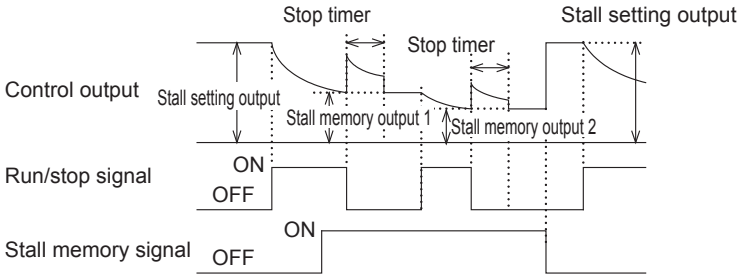
Automatic stall calculation output

- If the LE7-DCA is connected, the stall output value which matches the target tension and the current reel diameter is automatically calculated, so there is no need to change the stall setting according to the initial diameter of the material reel shaft and the target tension.
- To adjust the automatically calculated stall output, set the automatic stall calculation gain.
- When stall memory is turned on, stall memory output takes precedence.
- The automatic stall calculation output value is calculated as follows.

Automatic stall calculation output value=(target tension÷tension full scale)×(current reel diameter÷maximum diameter)×(automatic stall calculation gain÷100)

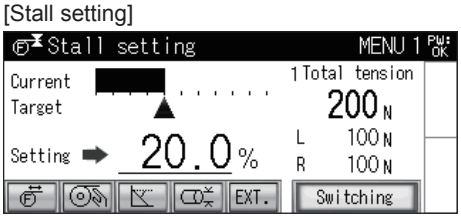
<Related Parameter>

Name	Parameter No.	Setting range
Stall setting	130	0.0 to 100.0
Automatically calculation stall gain	186	0 to 100

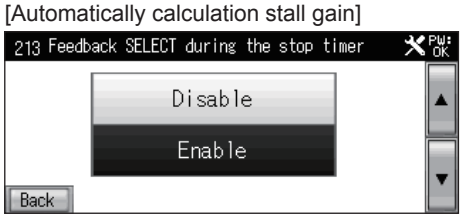


<Setting Screen>

[Stall setting]

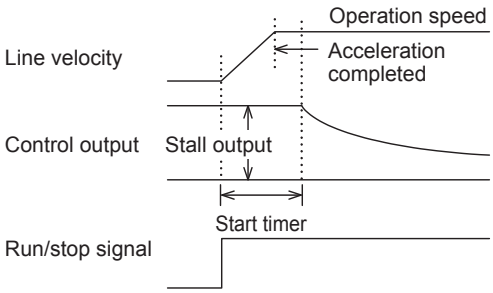


[Automatically calculation stall gain]



10.2 Output at the Start of Machine Operation

- The run/stop signal is turned ON or OFF according to the status of the machine (operating/stopping).
- Stall setting output or stall memory output is output while the run/stop signal is OFF.
- When the run/stop signal is turned from OFF to ON in automatic control mode, automatic operation starts up, using the output value right before the signal was turned ON as its base point. Automatic operation continues while the run/stop signal is on.
- If the start timer is used, it starts operating by turning the run/stop signal from OFF to ON. Since the control output is the stall output while the start timer is in operation, tension fluctuation due to acceleration at startup can be reduced by fixing the output during acceleration. Refer to the figure below.

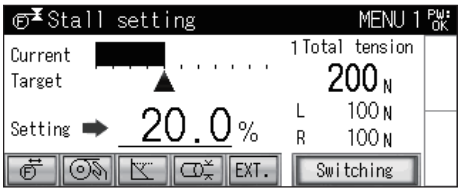


<Related Parameter>

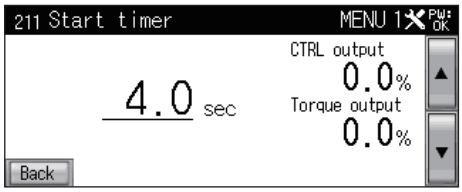
Name	Parameter No.	Setting range
Stall setting	130	0.0 to 100.0
Start timer	131	0.0 to 30.0

<Setting Screen>

[Stall setting]

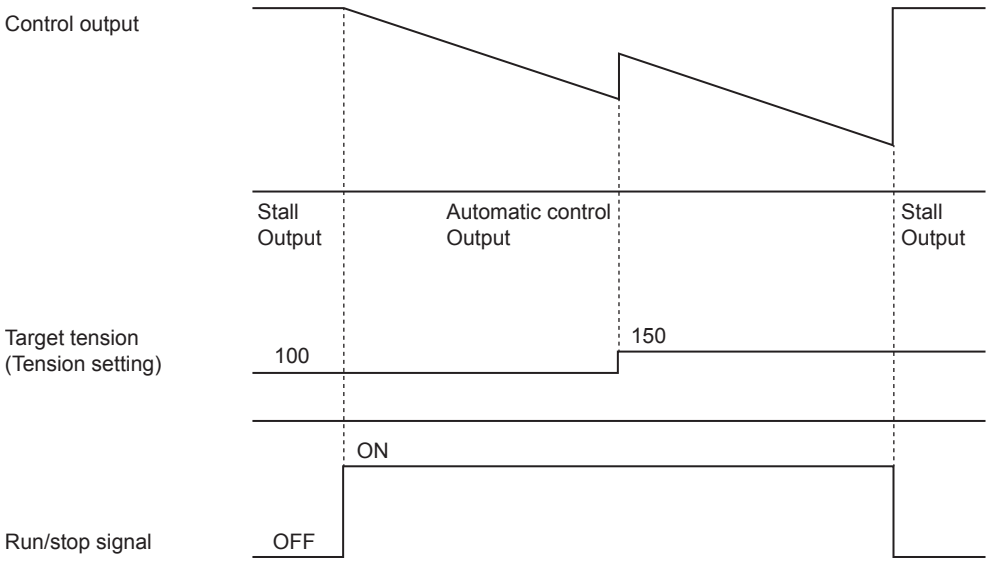


[Start timer]



10.3 Tension Setting During Operation

While the machine is operating (while the run/stop signal is ON), automatic control (feedback control) is activated in order to bring current tension in line with target tension. The target tension can be varied by changing the tension setting.

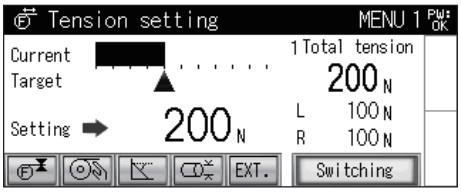


<Related Parameter>

Name	Parameter No.	Setting range
Tension setting	128	0 to tension full scale

<Setting Screen>

[Tension setting]

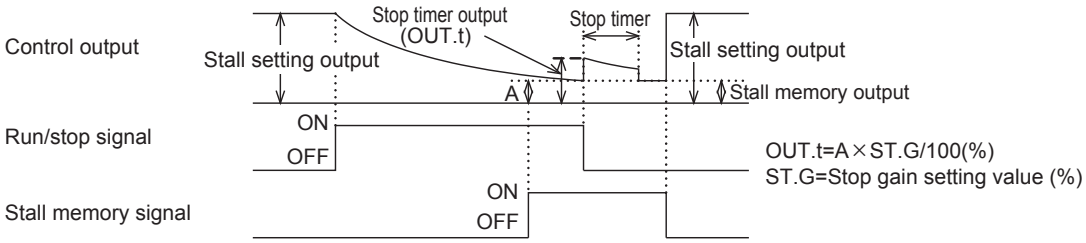


11 FUNCTIONS AVAILABLE UNDER FEEDBACK CONTROL

11.1 Inertia Compensation While Stopped

Machine operation while stopped

When the machine stops, the stop timer and stop gain operate to reduce the tension fluctuation caused by the inertia of the reel frame.



- If the run/stop signal is turned from ON to OFF during automatic operation, the stop timer activates the moment the signal is turned OFF.
- The output during stop timer activation is calculated according to the following formulas and is based on the output immediately prior to the run/stop signal turning OFF in accordance with the setting values for stop gain and stop bias.
- Control output activation while the stop timer is running is determined according to the feedback selection during the stop timer. If the feedback selection during the stop timer is 0, feedback control continues, using the control output immediately after the start timer activated as the base point. If the feedback selection during the stop timer is 1 (unavailable), the control output immediately after the stop timer was activated is maintained.
- After the stop timer finishes, either the output value right before the run/stop signal was turned OFF (stall memory output) or the stall setting output value is output, depending on the ON/OFF status of the stall memory signal.
- While the manual operation is being executed (while the manual control mode key is being pressed), the stop timer does not function.
- The control output value immediately after the stop timer is activated is calculated using the following formula. (The maximum value is limited to 100%.)

OUT.t=(AÈST.G+ST.B)/100 (%)

OUT.t=control output (%) immediately after stop timer activation

A=control output (%) immediately before stop timer activation

ST.G=Stop gain setting value (%)

ST.B=Stop bias setting value (%)

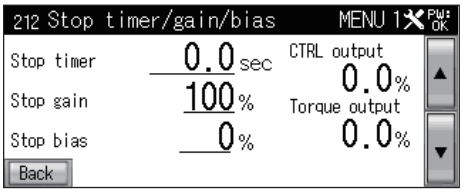
- If inertia compensation is not required while the machine is stopped, the initial setting does not need to be changed.
- The stop gain is usually set to 100% or more for unwinding and 100% or less for winding.

<Related Parameter>

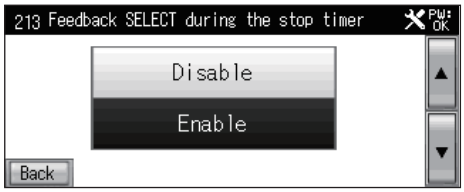
Name	Parameter No.	Setting range
Stop timer	132	0.0 to 100.0
Stop gain	133	5 to 400
Stop bias	134	0 to 100
Feedback selection during the stop timer	178	0 to 1

<Setting Screen>

[Stop timer]
[Stop gain]
[Stop bias]



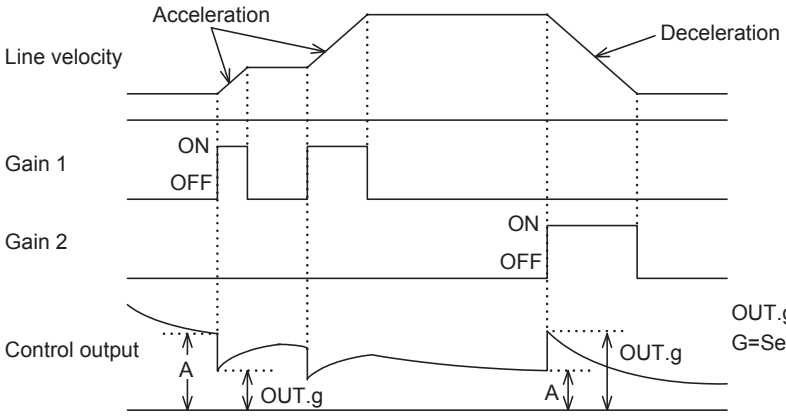
[Feedback selection during the stop timer]



11.2 Inertia Compensation While Driving

Operations of gain 1 and gain 2

The functions of Gain 1 and Gain 2 are used to reduce the tension fluctuation caused by the inertia of materials at rapid acceleration/deceleration of the machine.
If the gain 1 or 2 signal is turned ON while automatic operation is being executed, the output value at the moment when the signal is turned ON is increased by the gain value according to the setting value of gain 1 or 2. After that, automatic control continues, using this value as the base point. (The functionality of gain 1 and gain 2 does not work during manual operation.)
This setting is unnecessary if inertia compensation during acceleration/deceleration is unnecessary.



The control output value right after the gain 1 or 2 signal is turned ON is calculated with the following formula. (The maximum value is limited to 100%.)
OUT.g=A×G/100 (%)

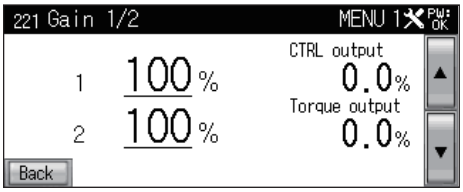
- OUT.g=control output (%) immediately after the gain signal is turned on
- A=The control output generated right before the gain signal is turned ON (%)
- G=Setting value of Gain 1 or 2 (%)

<Related Parameter>

Name	Parameter No.	Setting range
Gain 1	136	5 to 400
Gain 2	137	5 to 400

<Setting Screen>

[Gain 1]
[Gain 2]



11.3 Taper Control

Taper tension control (taper control) is a control mode that varies the operation tension according to variations in reel diameter.

Taper control is used primarily for reel winding, and it is used for the purpose of preventing tightness and misalignment of the reel materials during winding, by reducing operation tension in accordance with the increase in reel diameter.

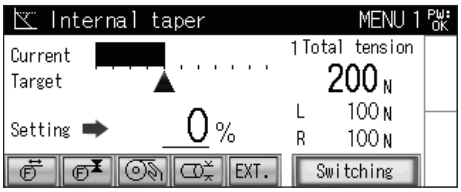
Four types of taper control are available: internal taper, straight line taper (external), broken line taper (external), and direct taper ratio.

<Related Parameter>

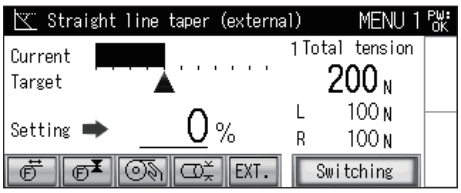
Name	Parameter No.	Setting range
Internal taper ratio	138	0 to 80
External straight line taper ratio	139	0 to 100
Broken line taper corner 1	144	1 to 2000
Broken line taper corner 2	146	1 to 2000
Broken line taper corner 3	148	1 to 2000
Broken line taper corner 4	150	1 to 2000
Broken line taper corner 5	152	1 to 2000
Broken line taper corner 6	154	1 to 2000
Broken line taper corner 7	156	1 to 2000
Broken line taper corner 8	158	1 to 2000
Broken line taper ratio 1	145	0 to 100
Broken line taper ratio 2	147	0 to 100
Broken line taper ratio 3	149	0 to 100
Broken line taper ratio 4	151	0 to 100
Broken line taper ratio 5	153	0 to 100
Broken line taper ratio 6	155	0 to 100
Broken line taper ratio 7	157	0 to 100
Broken line taper ratio 8	159	0 to 100
Direct taper ratio	385	0.0 to 100.0

<Setting Screen>

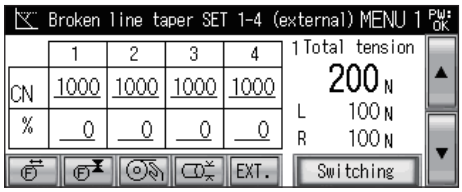
[Internal taper ratio]



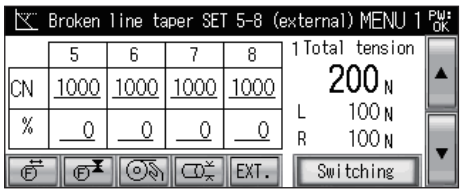
[External straight line taper ratio]



[Broken line taper corners 1 to 4]
[Broken line taper ratios 1 to 4]



[Broken line taper corners 5 to 8]
[Broken line taper ratios 5 to 8]



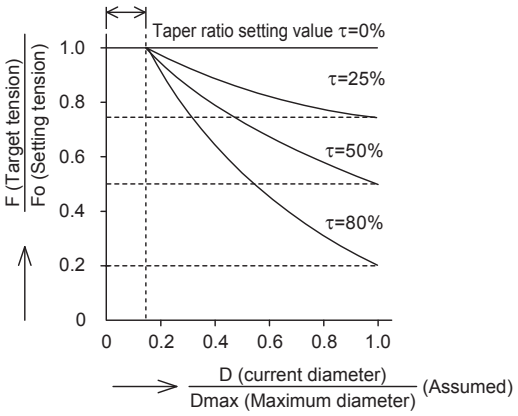
Internal taper

Internal taper, which can be used only for feedback control, is a function that reduces target tension in accordance with the increase in reel diameter.
Under automatic control, control output while fixed tension control is being performed is compared to the reel diameter, and the increase in control output based on this proportional relationship is used to estimate the increase in reel diameter.
Because internal taper control output is calculated by estimating the reel diameter, reel diameter signal input is not required.
However, because the diameter reel is estimated based on the control output, it will be affected by factors which include machine friction (mechanical loss) and changes in actuator torque characteristics. (That influence can be reduced through mechanical loss correction and maximum torque correction.)

Tension characteristics

The tension prior to adding the mechanical loss correction is 100% (setting tension) when the control output is either 0 or the stall output, and the target tension is reduced according to the increase in the control output. (The standard value of 100% internal taper [setting tension] is determined according to the internal taper standard selection.)
By using the control × output times the maximum torque correction as the maximum rated torque (Tmax) of the actuator at 100%, the target tension is reduced in accordance with the reel diameter, based on the formulas shown in the figures below.

Mechanical loss correction

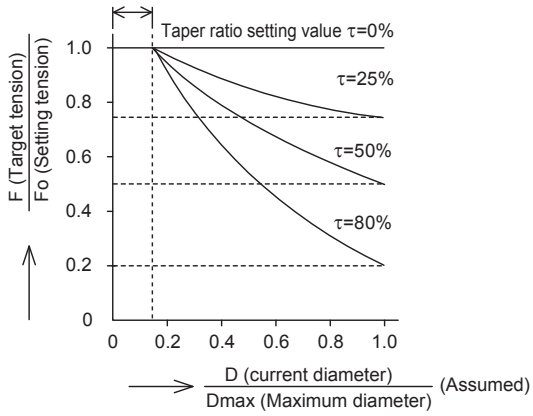


=control output × maximum torque correction/100

$Dmax=2\frac{Tmax\ (maximum\ rated\ torque\ of\ actuator)}{FS\ (full\ scale\ tension)}$

(Internal taper standard selection=0 standard)

Mechanical loss correction+stall output



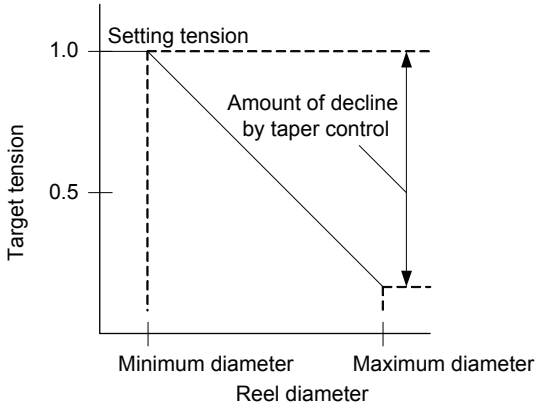
=control output × maximum torque correction/100

$Dmax=2\frac{Tmax\ (maximum\ rated\ torque\ of\ actuator)}{FS\ (full\ scale\ tension)}$

(Internal taper standard selection=Stall)

Linear line taper ratio (external)

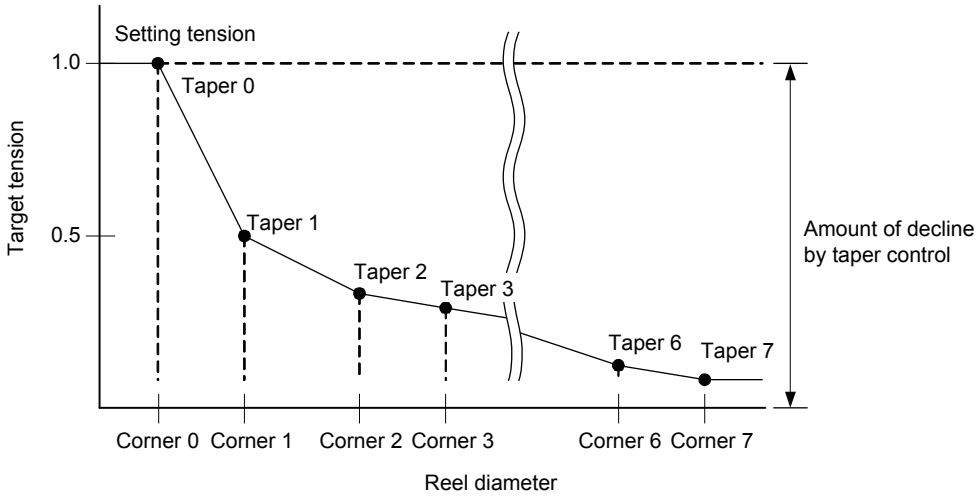
This function changes the target tension value with a constant tension taper rate according to the increase of the reel diameter.
The external taper can be used by inputting a reel diameter signal with analog inputs or links, or by connecting the LE7-DCA to the tension controller.



External taper (straight line)

Broken line taper (external)

The broken line taper function changes the taper ratio to a specified one at a specified reel diameter.
Since you can set the corner and taper ratio with a maximum of eight points, and the taper ratio setting has no restriction on the magnitude relations between the set ratios, the tension can be increased according to the increase in the reel diameter.
The external taper can be used by inputting a reel diameter signal with analog inputs or links, or by connecting the LE7-DCA to the tension controller.



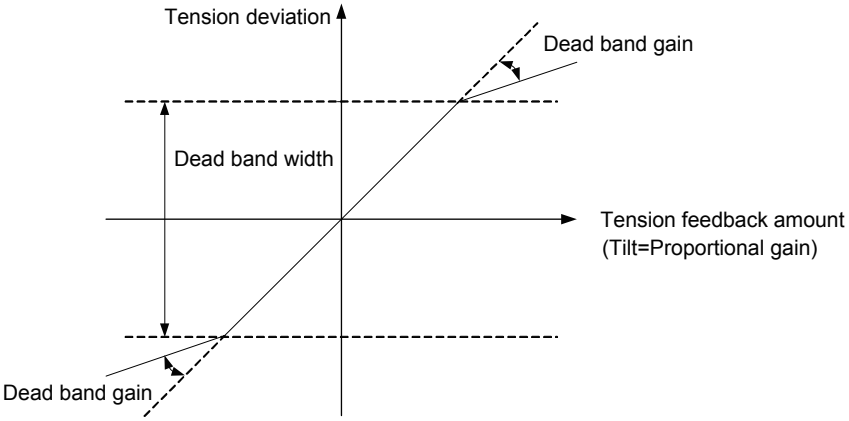
External taper (broken line)

Direct taper

This function is used to input the taper ratio directly from a PLC.
The tilt of the taper can be set arbitrarily by setting the reel diameter and the taper ratio in the PLC and inputting the set taper ratio to the direct taper ratio.

11.4 Control Responsiveness During Operation

If the tension is not stable while the automatic operation is being executed, adjust the proportional gain and integral time.
If it takes too long time to reach the target tension at startup or after the tension setting value has been changed, adjust the dead band gain or dead band width.



1. Proportional gain/Integral time

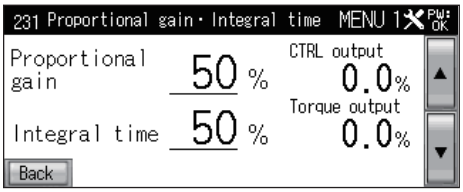
- If the tension is not stable while the automatic operation is being executed, adjust the proportional gain and integral time to adjust the control gain.

<Related Parameter>

Name	Parameter No.	Setting range
Proportional gain	160	0 to 100
Integral time	161	1 to 100

<Setting Screen>

[Proportional gain]
[Integral time]



<Proportional Gain>

- Output values are corrected in proportion to the deviation between the target tension and the actual tension value.
- The larger the gain value is, the sooner the actual value reaches the target tension. In this case, hunting can occur frequently.
- Setting range: 0 to 100% (Initial setting value=50%)
- The value of the output correction doubles for the change of +12%.

<Integral Time>

- Set the temporal responsiveness for the deviation between the target tension and the actual tension value.
- The smaller the value is, the more the responsiveness improves. In this case, hunting can occur frequently.
- The larger the value is, the more the control stabilizes. However, responsiveness at startup and after the tension setting value has been changed is worse.
- The value of the time constant doubles with every 12% increase.
- Adjust the integral time and proportional gain by changing their values gradually and alternately.

2. Dead band gain/Dead band width

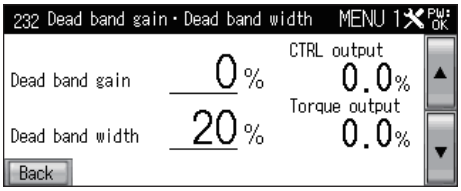
- If it takes too much time to reach the target tension at startup or after the tension setting value has been changed, adjust them. (Normally, these do not need to be changed from their initial values.)

<Related Parameter>

Name	Parameter No.	Setting range
Dead band gain	162	Proportional gain of 0 to 100
Dead band width	163	0 to 100

<Setting Screen>

[Dead band gain]
[Dead band width]



<Dead Band Gain>

- If the current tension value is out of the range of the dead band gain set against the target tension, the dead band gain value is added to the proportional gain value.
- If the setting value is large, the time taken for the tension to fall within the range of the dead band width can be reduced. However, hunting can occur easily when the set value is too large. Adjust the responsiveness appropriately with the adjustment of the dead band width and proportional gain.
- Setting range: 0 to 100% (Initial setting value=0%)

<Dead Band Width>

- Set the deviation between the target tension and the current tension value when the proportional gain is switched.
- If the setting value is small, the time taken for the dead band gain to be added to the proportional gain gets longer and responsiveness becomes quicker. However, hunting can occur easily.
- Setting range: 0 to 50% (initial setting value=50%)

11.5 Output Limit During Operation

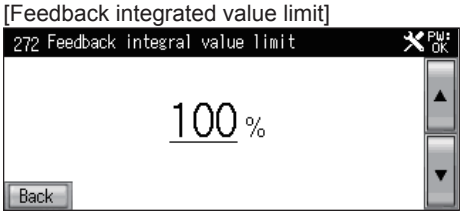
The feedback integrated value limit is the setting for the upper and lower limits of the integrated values that result from feedback control calculations.
By lowering this value, you can place a limit on the values output by feedback control.

<Related Parameter>

Name	Parameter No.	Setting range
Feedback integrated value limit	177	0 to 101

<Setting Screen>

[Feedback integrated value limit]



11.6 Mechanical Loss Correction

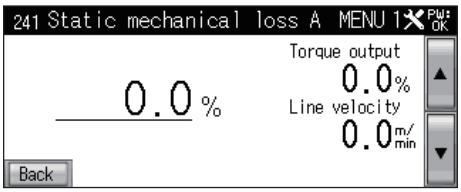
This function cancels out the mechanical loss caused by the reel shaft, free guide rolls, and other parts of the equipment. The static mechanical loss setting, which adds the mechanical loss setting value to the control output, functions by canceling out the maximum static friction before reel shaft rotation. The kinetic mechanical loss setting functions by canceling out kinetic friction after reel shaft rotation.

<Related Parameter>

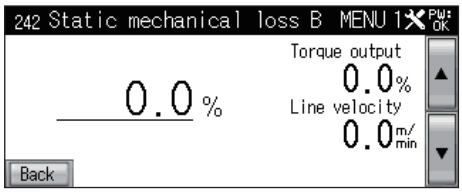
Name	Parameter No.	Setting range
Static mechanical loss A	165	-100 to +100
Kinetic mechanical loss A	167	-100 to +100
Mass correction gain A	169	0 to 100
Static mechanical loss B	166	-100 to +100
Kinetic mechanical loss B	168	-100 to +100
Mass correction gain B	170	0 to 100
Mass correction bias A	171	0 to 100
Mass correction bias B	172	0 to 100

<Setting Screen>

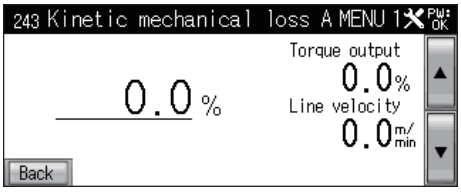
[Static mechanical loss A]



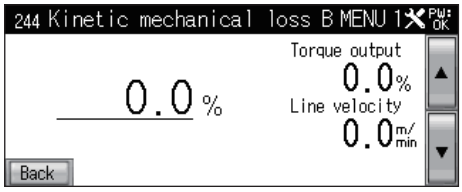
[Static mechanical loss B]



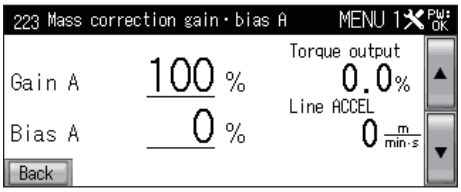
[Kinetic mechanical loss A]



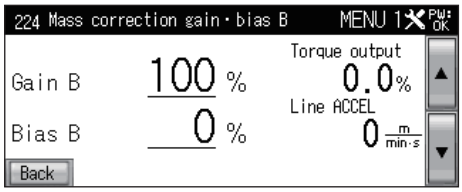
[Kinetic mechanical loss B]



[Mass correction gain A]
[Mass correction bias A]



[Mass correction gain B]
[Mass correction bias B]



Fixed mechanical loss

If the Selection of function to use 1.bit10 is set to the OFF state, the adjustment value is fixed and does not change according to the reel diameter.

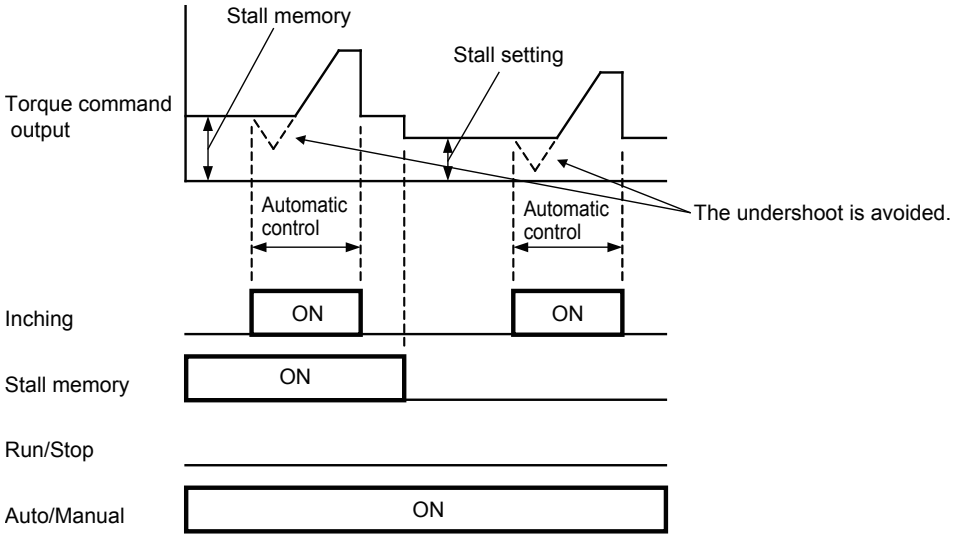
In this case, the static mechanical loss setting is enabled. (When the LE7-DCA is not used, the Mechanical loss function selection is set to 1: fixed.)

11.7 Inching Control

Inching control, by responding to the inching motion of the machine, is able to avoid undershooting of the control input and reduce slack in the material when the “inching” signal is turned ON/OFF. When the “inching” contact command is set to the on state with auto/manual set to manual and run/stop set to stop under feedback control, automatic control starts up, using the stall value as the lower limit value of the control output.

The stall memory is not updated when inching is turned from ON to OFF.

The lower limit value of the control output is switched depending on the ON/OFF status of the “stall memory” contact command.



11.8 Tension Detection

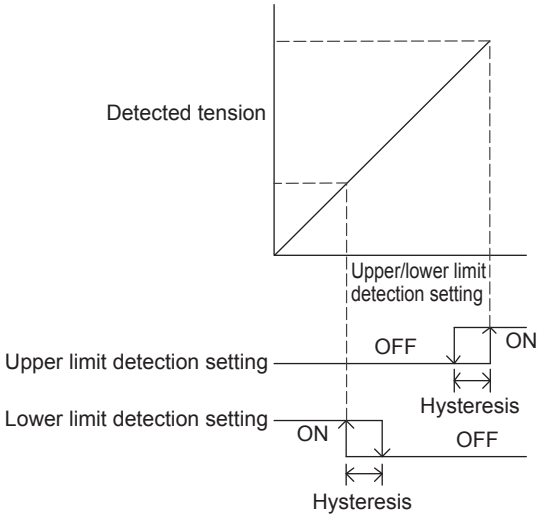
Upper/lower limit detection

Tension detection upper/lower limit setting

The upper/lower limit detection output turns ON if the detected output goes outside the limit settings.

Even if the tension value exceeds the detection range and returns, unless the value goes beyond the hysteresis range before returning, the contact life is not turned OFF.

Both the upper limit and lower limit of the hysteresis range are 1/64 of the tension full scale setting, or the five least significant digits of the tension value.

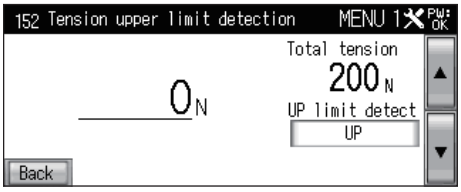


<Related Parameter>

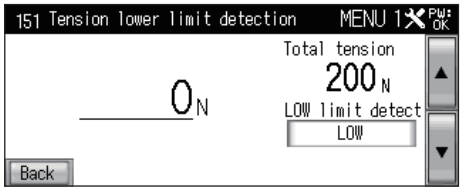
Name	Parameter No.	Setting range
Tension upper limit detection	16	0 to 2000
Tension lower limit detection	17	0 to 2000

<Setting Screen>

[Tension upper limit detection]



[Tension lower limit detection]

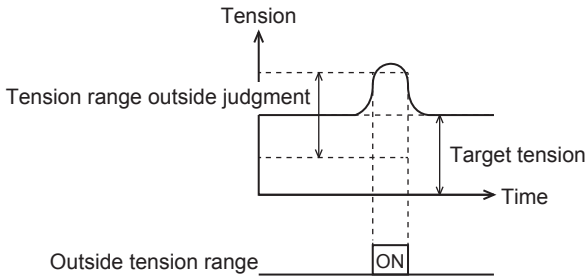


Outside range detection

Tension range outside judgment

This sets the value for determining whether the contact output is outside the tension range.
A contact output outside of the tension range is turned ON when the tension monitor value is outside the tension range according to the tension full scale value (based on the target tension value) and the setting value that judges if the contact output is outside the tension range.

- Tension range outside judgment is OFF: Target tension-(tension full scale value × outside tension range judgment value/100)≤tension monitor value, or tension monitor value ≤ target tension+(tension full scale value × outside tension range judgment value/100)
- Tension range outside judgment is ON: Tension monitor<target tension-(tension full scale value × outside tension range judgment value/100), or target tension+(tension full scale value × outside tension range judgment value/100)<tension monitor

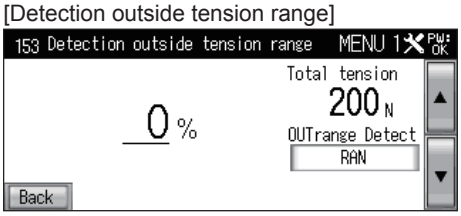


<Related Parameter>

Name	Parameter No.	Setting range
Detection outside tension range	18	0 to 50

<Setting Screen>

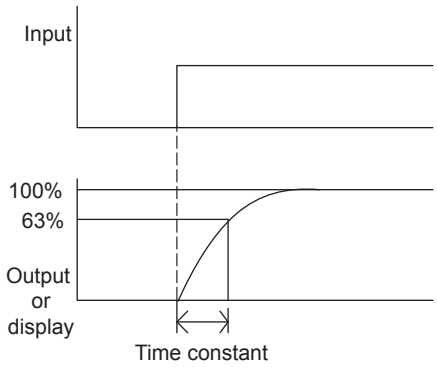
[Detection outside tension range]



11.9 Tension Filter

Set a filter for the tension data used in each calculation. The larger this setting value is, the slower the tension changes. The smaller this setting value is, the sooner the tension changes. If the set value is too small, even a tiny tension fluctuation might affect operation. Set an operation speed that is appropriate for the machine status.

- Tension display filter: The filter for the total tension monitor, left and right tension monitor (excluding links)
- Tension output filter: The filter for the monitored tension output (analog output) and the tension output % monitor
- Tension filter for link data: The filter for the total tension monitor, left tension monitor, and right tension monitor in the network
- Tension filter for control: The filter for the tension data with the feedback control
- Tension detection filter: The filter for the tension data in the upper/lower limit detection



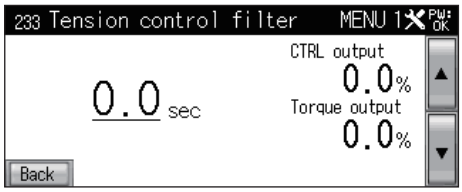
<Related Parameter>

Name	Parameter No.	Setting range
Tension display filter	19	0.5 to 8.0
Tension output filter	21	0.5 to 8.0
Link Tension Filter	386	0.5 to 8.0
Tension control filter	164	0.5 to 8.0
Tension detection filter	20	0.5 to 8.0

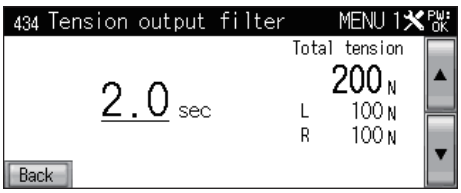
<Setting Screen>

[Tension display filter]

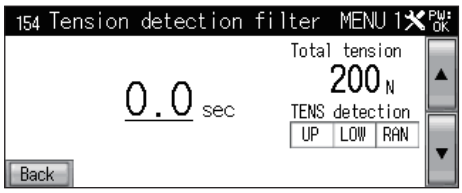
[Tension control filter]



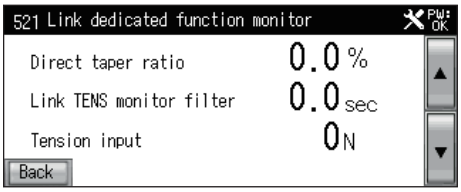
[Tension output filter]



[Tension detection filter]



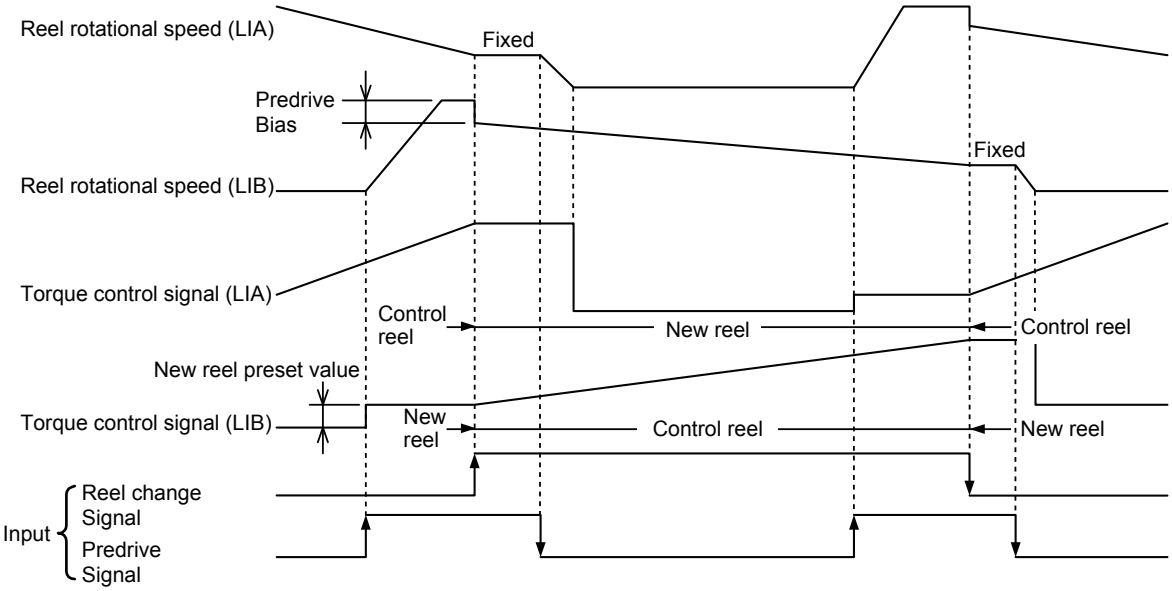
[Tension link filter]



12 TWO-REEL'S SWITCHING

12.1 New Reel Preset

When the reel switching setting is 1 (reel switching), two-reel's switching control can be performed.



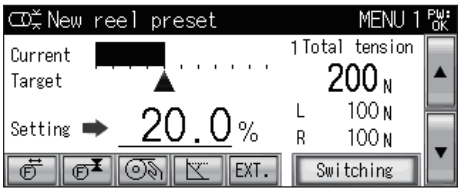
- This function switches the operations of the control reel and new reel of the torque control signal by turning ON or OFF the reel change signal along with the reel change. When the reel change signal is turned OFF and ON, the torque control signal (L1A) operates as the new reel and the torque control signal (L1B) operates as the control reel. When the reel change signal is turned ON and OFF, the torque control signal (L1A) operates as the control reel and the torque control signal (L1B) operates as the new reel.
- When the predrive signal turns on while in the new reel status, a new reel preset value is output from the torque control signal set as the new reel. This torque control signal is used as the torque limit value.
- When the reel change signal is changed, the new reel status switches to the control reel status, and the new reel preset timer is activated. During the operation of the timer, the mechanical loss correction setting value is added to the new reel preset for the torque control signal. Automatic control starts from this control output value after the preset timer finishes.
- When the reel change signal is changed, the other torque control signal switches from the control reel status to the new reel status, and it maintains the control output value it had when the reel change signal changed. The predrive signal is turned OFF, and the control output is reset to 0 when the reel shaft rotational speed reaches 0.

<Related Parameter>

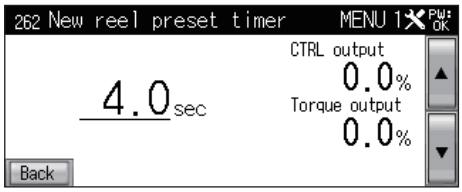
Name	Parameter No.	Setting range
New reel preset	140	0.0 to 100.0
Preset timer	141	0.0 to 30.0

<Setting Screen>

[New reel preset]



[Preset timer]

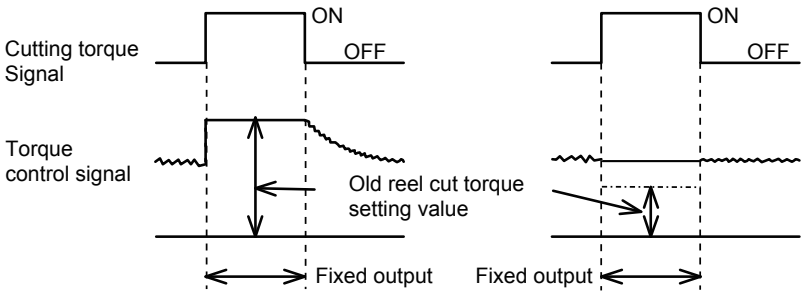


12.2 Cutting Torque

When the old reel cut torque signal is turned ON or OFF according to the cutting operation while the automatic paper splicing is in operation, the lower limit value of the control output at the cutting operation can be limited and the materials can be cut easily.

- When the old reel cut torque signal is turned on, the control output value immediately before the signal is turned ON is fixed as the control output. If the control output is less than the cut torque setting value, it becomes the cut torque setting value. (The cut torque setting value is the lower limit for the control output.)
- When the reel change signal turns on, the value of the control output switches to the new reel preset value. Although the reel change signal is given priority over the old reel cut torque signal, turn off the old reel cut torque signal before the new reel preset timer stops.

<Operational Timing of Cut Torque>

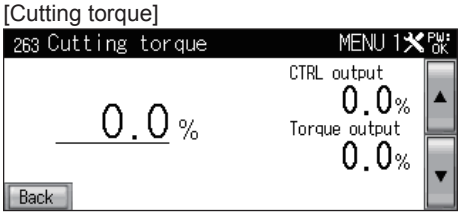


<Related Parameter>

Name	Parameter No.	Setting range
Cutting torque	142	0.0 to +100.0

<Setting Screen>

[Cutting torque]

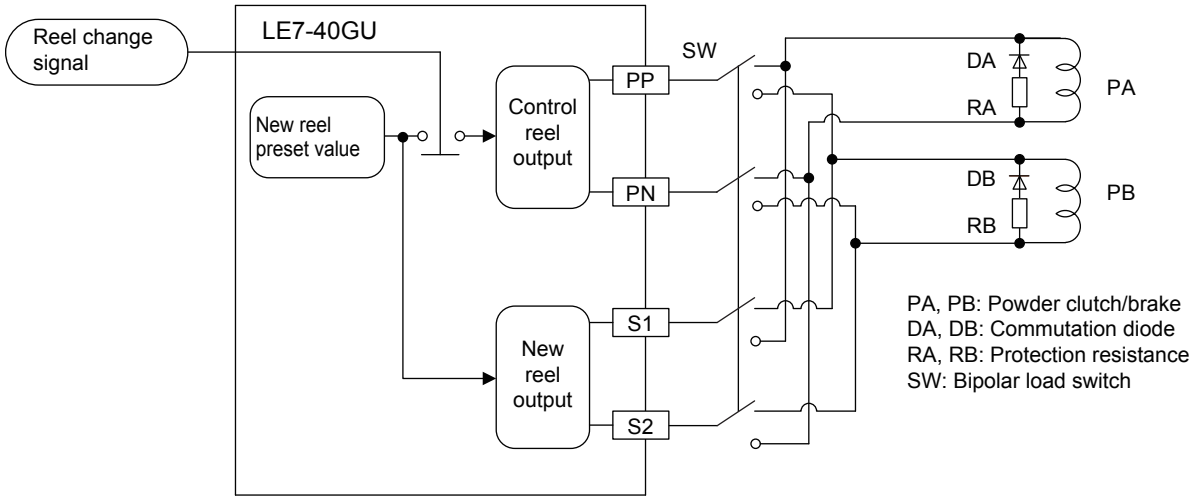


12.3 Switching Two-reel's Switching Output Modes

This lets you adjust the [PP]-[PN] terminal (tension control output for 24 V DC clutch/brake) and [S1]-[S2] terminal (two-reel's switching new reel output for 24 V DC clutch/brake) to match the reel change signal, and to select between switching and not switching between the control reel and new reel internally. If you set the two-reel's switching output mode selection to internal switch available, then you don't need a bipolar selector switch for switching the load.

If Two-reel's switching OUT mode SELECT=Without internal switching

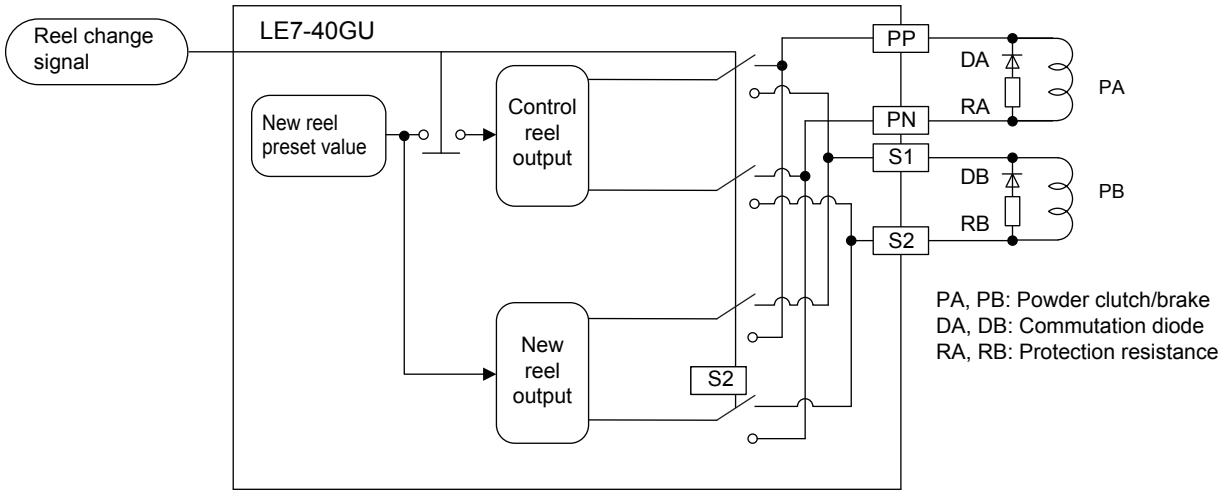
Switch the load bipolar selector switch according to the reel change signal, as shown in the figure below.



Reel change signal	PA	PB
OFF	Control reel [PP]-[PN]	New reel [S1]-[S2]
ON	New reel [S1]-[S2]	Control reel [PP]-[PN]

If Two-reel's switching OUT mode SELECT=With internal switching

Switch the output of the [PP]-[PN] and [S1]-[S2] terminals inside the LE7-40GU according to the reel change signal, as shown in the figure below.



Reel change signal	PA	PB
OFF	Control reel [PP]-[PN]	New reel [S1]-[S2]
ON	New reel [PP]-[PN]	Control reel [S1]-[S2]

13 CONTROL OUTPUT CORRECTION

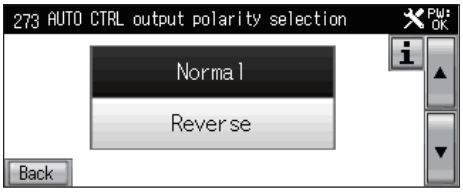
13.1 Automatic Control Output Polarity Reversal

Select a direction of the calculation of the automatic control output.
If you set it to 1 (reverse), the calculation result is multiplied by -1 to reverse the direction of additions and subtractions of the automatic control output.
<Related Parameter>

Name	Parameter No.	Setting range
Automatic control output polarity selection	179	0 (normal), 1 (reverse)

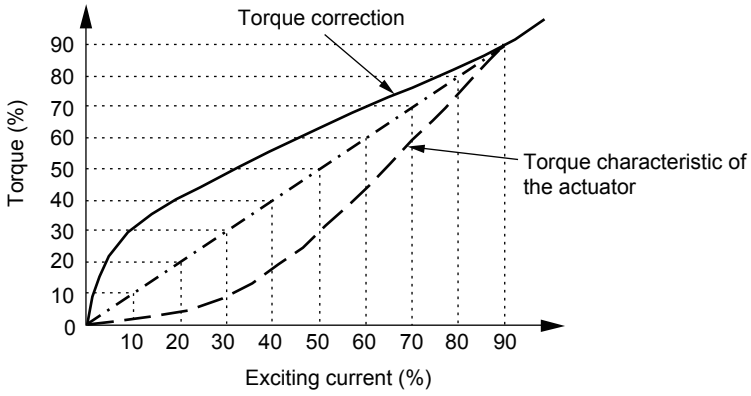
<Setting Screen>

[Automatic control output polarity selection]



13.2 Nonlinear Torque Correction

When the powder clutch/brake, or hysteresis clutch/brake is used, the transmission torque exceeds the rated torque whenever the rated current (coil temperature: 75℃) flows. The safety ratio differs for each model. In addition, the exciting current transmission torque characteristic is a non-linear characteristic. This characteristic differs for each model. This torque characteristics can be corrected by using the maximum torque correction and nonlinear correction function, and the open-loop control can be performed more accurately. When Mitsubishi Electric's powder clutch/brake or hysteresis clutch/brake is used, set the load model number according to the actuator to preset each setting of the maximum torque correction and the nonlinear correction automatically.
When the values preset in each setting after the load model number setting are changed, the value of the load model setting is set to “999”. The nonlinear characteristic is corrected as shown in the figure below.



Precautions

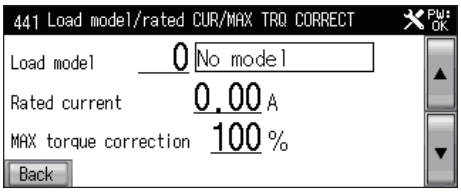
Do not use the nonlinear correction function of the power amplifier side when this function is used.

<Related Parameter>

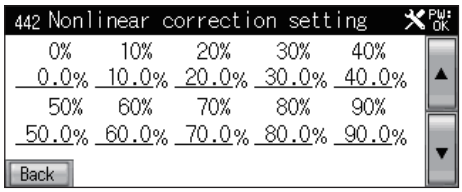
Name	Parameter No.	Setting range
Maximum torque correction	194	50 to 250
Nonlinear correction 0	195	0 to 100
Nonlinear correction 10	196	0 to 100
Nonlinear correction 20	197	0 to 100
Nonlinear correction 30	198	0 to 100
Nonlinear correction 04	199	0 to 100
Nonlinear correction 50	200	0 to 100
Nonlinear correction 06	201	0 to 100
Nonlinear correction 70	202	0 to 100
Nonlinear correction 80	203	0 to 100
Nonlinear correction 90	204	0 to 100
Load model	192	0 to 999

<Setting Screen>

[Maximum torque]
[Load model]



[Nonlinear correction settings 0 to 90]



Load model number

Powder clutch/brake number

Powder clutch		Powder brake	
Model name	**Load model number**	**Model name**	**Load model number**
ZKG-5AN	101	ZKG-5YN	51
ZKG-10AN	102	ZKG-10YN	52
ZKG-20AN	103	ZKG-20YN	53
ZKG-50AN	104	ZKG-50YN	54
ZKG-100AN	105	ZKB-0.06YN	1
ZKB-0.06AN	81	ZKB-0.3YN	2
ZKB-0.3AN	82	ZKB-0.6N	3
ZKB-0.6AN	83	ZKB-1.2XN	4
ZKB-1.2BN	84	ZKB-2.5XN	5
ZKB-2.5BN	85	ZKB-5XN	6
ZKB-5BN	86	ZKB-10XN	7
ZKB-10BN	87	ZKB-20XN	8
ZKB-20BN	88	ZKB-40XN	9
ZKB-40BN	89	ZKB-2.5HBN	21
ZKB-5HC	121	ZKB-5HBN	22
ZKB-10HC	122	ZKB-10HBN	23
ZKB-20HC	123	ZKB-20HBN	24
ZKB-5CM2	111	ZKB-40HBN	25
ZKB-10CM2	112	ZKB-2.5WN	41
ZKB-20CM2	113	ZKB-5WN	42
ZKB-40CM2	114	ZKB-10WN	43
ZKB-1.2B4-909	131	ZKB-20WN	44
ZKB-5B4-909	132	ZKB-40WN	45
ZKB-10B2-909	133	ZA-0.6Y	11

Powder clutch		Powder brake	
Model name	**Load model number**	**Model name**	**Load model number**
ZKB-20B2-909	134	ZA-1.2Y1	12
ZA-0.6A1	91	ZA-2.5Y1	13
ZA-1.2A1/AN	92	ZA-5Y1	14
ZA-2.5A1/AN	93	ZA-10Y1	15
ZA-5A1/AN	94	ZA-20Y1	16
ZA-10A1/AN	95	ZA-40Y	17
ZA-20A1	96	ZKA-2W	61
ZKA-1A1	141	ZKA-6W	62
ZKA-2A1	142	ZKA-10W	63
ZKA-6A2	143	ZKA-20W	64
ZKA-10A2	144	ZKA-45W	65
ZKA-20A3	145	—	—
ZKA-45AT	146	—	—
ZKA-65AT	147	—	—
ZKA-100AT	148	—	—

Hysteresis clutch/brake

Hysteresis clutch		Hysteresis brake	
Model name	**Load model number**	**Model name**	**Load model number**
ZHA-0.6B	151	ZHY-0.6B	71
ZHA-1.2A	152	ZHY-1.2A	72
ZHA-2.5A	153	ZHY-2.5A	73
ZHA-5A	154	ZHY-5A	74
ZHA-1.2A1	171	ZHY-1.2A1	161
ZHA-2.5A1	172	ZHY-2.5A1	162
ZHA-5A1	173	ZHY-5A1	163
ZHA-10A	155	ZHY-10A	75
ZHA-20A	156	ZHY-20A	76
ZHA-40A	157	ZHY-40A	77
ZHA-60A	158	ZHY-60A	78
—	—	ZHY-100A2	79

13.3 Control Output Limits

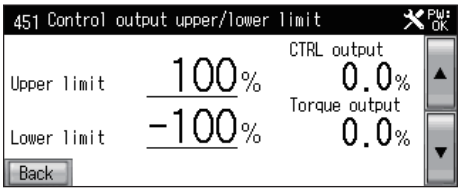
These functions are used to set the upper limit value and the lower limit value of the control output. This function reduces the undershoot and the overshoot of the control output caused by the rapid tension change. When the setting value is -101 or 101, values up to the maximum output value of the DA converter can be output.

<Related Parameter>

Name	Parameter No.	Setting range
Control output upper limit	188	Control output lower limit to 101
Control output lower limit	189	-101 to control output upper limit

<Setting Screen>

[Control output upper limit]
[Control output lower limit]



14 I/O FUNCTIONS

14.1 Output for Clutch/Brake

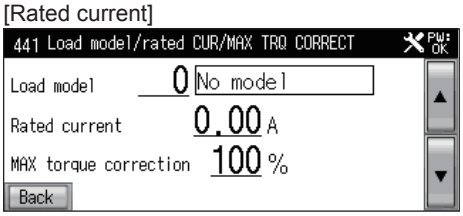
Constant voltage control/constant current control switching

You can switch the output control method for clutch/brake and 24 V clutch/brake tension control output.
In the case of open-loop control, stable torque can be obtained by eliminating the influence of resistance temperature properties of the clutch/brake coil by using the constant current control method. In the case of constant current control, it is necessary to set the maximum output current according to the rated current of the clutch/brake to be controlled.
When the rated current setting=0, the output control method is the constant voltage control method, and output for clutch/brake can vary from 0 V to (24+α) V in accordance with the value of the control output between 0 and 100%. When the rated current setting ≠ 0, the output control method is the constant current control method, and output for clutch/brake can vary from 0 A to (rated current setting value) A in accordance with the value of the control output between 0 and 100%. Additionally, when you set the load type, the rated current value matching Mitsubishi Electric's powder clutch/brake is preset automatically.
<Related Parameter>

Name	Parameter No.	Setting range
Rated current	193	0.00 to 4.00

<Setting Screen>

[Rated current]



Output current limit

The total current value of the tension control output combined with the clutch/brake output for the new/old reel output has a clutch/brake output current limit to prevent it from exceeding the limit value of 4.0 A.
The clutch/brake output has a rated output current of 3.6 A, and it can go up to 4.0 A as the maximum output current.
The average electrical power*2 of the clutch/brake output (voltage value × current value × unit of time*1) is calculated, and if it exceeds the rated average electrical power the clutch/brake output current limit changes from the maximum output current of 4.0 A to the rated output current of 3.6 A, and the clutch/brake output rating exceeded alarm is triggered. The clutch/brake output rating exceeded alarm is triggered the moment the rated average electrical power is exceeded.
After the current limit reaches the rated output current of 3.6 A, the current limit returns from the rated output current of 3.6 A to the maximum output current of 4.0 A once the average electric energy falls to a level below the rated average electric energy.
If the output current value of the clutch/brake output exceeds the limit value, the output value of the clutch/brake output is limited to keep the output current below the limit value.

*1 unit of time:10 minutes
*2 rated average electrical power: 74.5 W

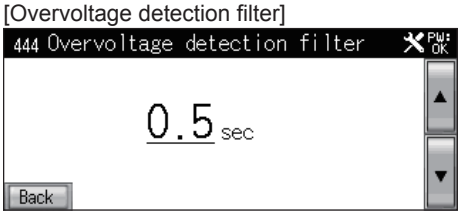
Overvoltage detection

If overcurrent flows through the clutch/brake output for the tension control output or two-reel's switching output, short-circuit protection is activated and the output is interrupted.
If the short-circuit protection works, the clutch/brake output for tension output and two-reel's switching output becomes 0%, and the clutch/brake control output short-circuit alarm is triggered.
Additionally, by setting the current detection filter, it is possible to adjust the filter in response to the short-circuit protection current monitor, and you should use it to prevent malfunctions involving counter-electromotive force during relay switching of the clutch/brake output terminals.
<Related Parameter>

Name	Parameter No.	Setting range
Overvoltage detection filter	210	0.0 to 2.0

<Setting Screen>

[Overvoltage detection filter]



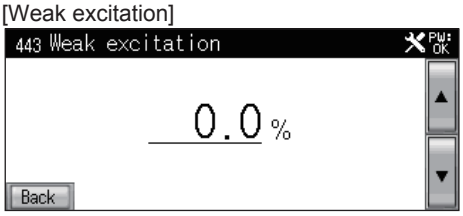
Weak excitation

This ensures that the powder clutch/brake is affected by weak excitation without completely setting the output to zero, even if control output meets the conditions for the OFF state due to a contact input signal to which the panel's output ON/OFF switch or output ON/OFF function has been assigned. This is effective for increasing torque during low rotation speeds and for improving thread engagement at startup. Additionally, weak excitation is adjusted according to the reel shaft rotation level even when the material is removed (normally 5 to 10%).
<Related Parameter>

Name	Parameter No.	Setting range
Weak excitation	209	0.0 to 100.0

<Setting Screen>

[Weak excitation]



14.2 Analog Output Monitor for Output Control/Two-Reel Switching New Reel

Control output correction

Control output mode

Change the full scale of tension control output for motor, two-reel's switching new reel output for motor, tension control output for electro-pneumatic converter.

Control output mode	SA-SN	NRO-SN	EAP-EAN
0	0 to +5 V		0 to 20 mA
1	-5 to +5 V		0 to 20 mA
2	0 to +10 V		0 to 20 mA
3	-10 to +10 V		0 to 20 mA
4	0 to +8 V		0 to 20 mA
5	-8 to +8 V		0 to 20 mA
6	0 to +2.7 V		0 to 20 mA
7	-2.7 to +2.7 V		0 to 20 mA
8	+1 to +5 V		4 to 20 mA

Output bias, gain specification

These settings are for setting bias and gain for analog output.

These settings are used to shift outputs intentionally. Output changes are calculated using the following formula.

- Output after bias/gain calculation=calculated output×output gain+output bias

14.3 General-Purpose Analog Inputs

Input function switching

Analog input setting	0 V input voltage	Full scale input voltage
Unavailable	Unavailable	Unavailable
Tension setting	0	Tension full scale value
Stall setting	0	100.0
Taper ratio setting	0	100 (or 80)*1
Tension signal input	0	Tension full scale value
Reel diameter signal input	Minimum diameter value	Maximum diameter value
Manual setting	0 (or -100.0)*2	100.0
New reel preset setting	0	100.0

*1 If the taper ratio setting value is 80 and taper function selection is 1 (internal), the maximum value limit applies. Otherwise, the maximum value limit applies if the setting value is 100.

*2 If the manual setting value is -100.0 and the analog output mode is set to 1, 3, 5, or 7 with positive/negative output, then the minimum value limit applies. Otherwise, the minimum value limit applies if the setting value is 0.

Input correction

Changes the analog input full scale.

Analog input mode	AI1	AI2	AI3
0	0 to +5 V		
1	0 to +10 V		

14.4 General-Purpose Analog Output

Output function switching

Analog output setting	Minimum output	Maximum output
Unavailable	Unavailable	Unavailable
Tension monitor	Tension full scale×-10%	Tension full scale×110%
Reel diameter monitor	(Maximum diameter-maximum diameter)×-10%	(Maximum diameter-maximum diameter)×110%
Tension setting monitor	0	Tension full scale
Rotational speed command for A-axis	0	Maximum reel shaft rotational speed
Rotational speed command for B-axis	0	Maximum reel shaft rotational speed

Output correction

Changes the analog output full scale.

Analog output mode	AO1	AO2
0	0 to +5 V	
1	0 to +10 V	

Output bias, gain specification

These settings are for setting bias and gain for analog output. These settings are used to shift outputs intentionally. Output changes are calculated using the following formula.

- Output after bias/gain calculation=calculated output×output gain+output bias

14.5 Contact Input

Input function switching

Contact input setting	Contact ON	Contact OFF
Run/Stop	Run	Stop
Reel change for A-axis/B-axis	B-axis control	A-axis control
Control output OFF/ON	Control output OFF	Control output ON
Auto/Manual	Automatic control	Manual control
Stall memory ON/OFF	Stall memory ON	Stall memory OFF
Gain 1 ON/OFF	Gain 1 ON	Gain 1 OFF
Gain 2 ON/OFF	Gain 2 ON	Gain 2 OFF
Inching ON/OFF	Inching ON	Inching OFF
Cutting torque ON/OFF	Cutting torque ON	Cutting torque OFF
Constant tension ON/OFF	Constant tension ON	Constant tension OFF
Alarm reset ON/OFF	Alarm reset ON	Alarm reset OFF

Contact input for reel diameter calculation option

For using method of contact input for reel diameter calculation option, refer to the following.

LE7-DCA APPLICATION MANUAL

14.6 Contact Output

Output function switching

Contact input setting	Contact ON	Contact OFF
Unavailable	Unavailable	Unavailable
Tension lower limit detection	Current tension=Tension lower limit or less	Normal status
Tension upper limit detection	Current tension=Tension upper limit or more	Normal status
Detection outside tension range	Current tension=Outside the tension range	Normal status
Alarm occurrence detection	Alarm occurrence	Normal status

Contact output for reel diameter calculation option

For using method of contact output for reel diameter calculation option, refer to the following.

📖LE7-DCA APPLICATION MANUAL

15 MEMORY MANAGEMENT

15.1 Parameter Initialization

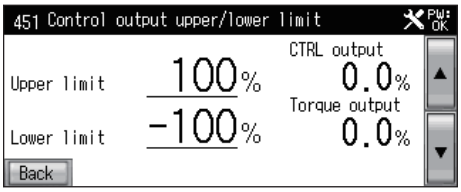
All settings data can be returned to the state in which it was shipped from the factory. Be careful, as this operation will return all set data to the state in which it was shipped from the factory.

<Related Parameter>

Name	Parameter No.	Setting range
Data initialization	299	0 to 1

<Setting Screen>

[Control output lower limit]



15.2 Menu Switching

The parameter settings can be changed according to the material change by storing the parameter settings in menus 1 to 8 and switching the menu numbers. In addition, the data of each menu number can be copied to another menu number.

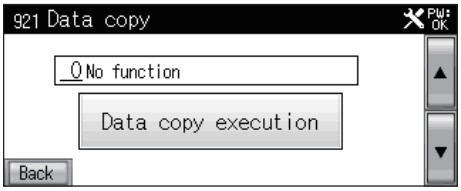
<Related Parameter>

Name	Parameter No.	Setting range
Menu No.*1	292	1 to 8
Data copy selection	298	0 (No function), 1 (Copy to Menu 1), 2 (Copy to Menu 2), 3 (Copy to Menu 3), 4 (Copy to Menu 4), 5 (Copy to Menu 5), 6 (Copy to Menu 6), 7 (Copy to menu 7), 8 (Copy to Menu 8), 9 (Read from memory cassette), 10 (write to memory cassette), 11 (Check with memory cassette)

*1 Refer to ☞ Page 40 Menu Number Switching for the setting operations.

<Setting Screen>

[Data copy selection]



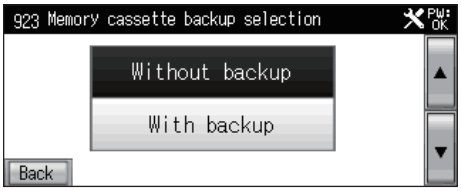
15.3 Memory Cassettes

Once the LD-8 EEPROM memory cassette has been loaded, it is possible to write parameter data to the memory cassette, read parameter data from the memory cassette, and compare the parameter data of the memory cassette with the parameter data of the unit itself.
Additionally, the automatic backup function operates in accordance with the setting of the memory cassette backup selection. This function causes the setting value that was set when the power was turned off to be automatically transferred to the memory cassette when the power is turned ON the next time.
<Related Parameter>

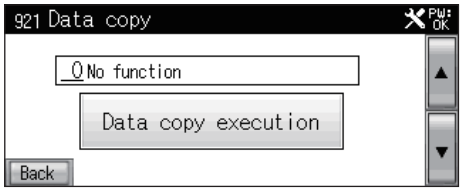
Name	Parameter No.	Setting range
Memory cassette backup selection	297	0 to 8
Data copy selection	298	0 (No function), 1 (Copy to Menu 1), 2 (Copy to Menu 2), 3 (Copy to Menu 3), 4 (Copy to Menu 4), 5 (Copy to Menu 5), 6 (Copy to Menu 6), 7 (Copy to menu 7), 8 (Copy to Menu 8), 9 (Read from memory cassette), 10 (write to memory cassette), 11 (Check with memory cassette)

<Setting Screen>

[Memory cassette backup selection]



[Data copy selection]



15.4 Parameter Protection

Parameter protection can disable parameter setting and monitoring if the password input doesn't match the password setting. The setting password prevents end users and operators from changing system parameters by mistake. The monitor password prevents analysis of machine operation from the parameter setting values of the tension controller.

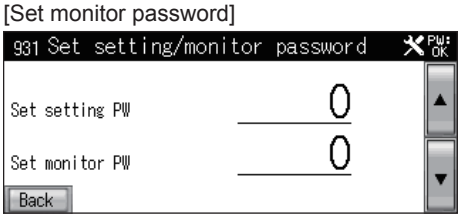
- If setting password is set to setting password input, all parameter settings can be done.
- If setting password is not set to setting password input, then the ability to set parameters that have setting password protection applied on the parameter list is disabled.
- If monitor password is set to monitor password input, all password settings and monitoring can be done.
- If monitor password is not set to monitor password input, then the ability to set and monitor parameters that have monitor password protection applied on the parameter list is disabled.

<Related Parameter>

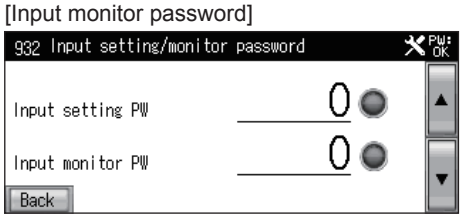
Name	Parameter No.	Setting range
Setting password setting	288	0 to 32000
Setting password input	289	0 to 32000
Monitor password setting	290	0 to 32000
Monitor password input	291	0 to 32000

<Setting Screen>

[Set setting password]
[Set monitor password]



[Input setting password]
[Input monitor password]



16 ALARMS

16.1 Alarm Information

Alarm number	Alarm name	Alarm description	Alarm trigger conditions		Power supply Reset
			Sensor input type selection (LX)	Sensor input type selection (strain gauge)	
0	Empty	—	—	—	—
1	Excessive load left	Left input voltage exceeded rating and caused excessive load.	• Left input voltage=±180.0 mV or more • Run/Stop=ON	—	Unnecessary
2	Excessive load right	Right input voltage exceeded rating and caused excessive load.	• Right input voltage=±180.0 mV or more • Run/Stop=ON	—	Unnecessary
3	Monitor data imbalance between left and right	Difference of left/right tension monitor exceeded 30% or more of tension full scale.	• Difference between left and right tension monitors=tension FS×0.3 or more • Run/Stop=ON	• Difference between left and right tension monitors=tension FS×0.3 or more • Run/Stop=ON	Unnecessary
4	Empty	—	—	—	—
5	Empty	—	—	—	—
6	Empty	—	—	—	—
7	Zero adjustment excessive load	Input voltage exceeded rating and caused excessive load during zero adjustment.	Left/right input voltage=±150.0 mV or more	—	Unnecessary
8	Zero adjustment load imbalance	Difference of left/right input voltage was 30% or more of rating during zero adjustment.	Left/right input voltage difference=45.0 mV or more	Left/right input voltage difference=4.50 mV or more	Unnecessary
9	Span adjustment below load on left	Span width of left input voltage was 5% or less of rating during span adjustment.	Span width of left input voltage=7.5 mV or less	—	Unnecessary
10	Span adjustment below load on right	Span width of right input voltage was 5% or less of rating during span adjustment.	Span width of right input voltage=7.5 mV or less	—	Unnecessary
11	Span adjustment excessive load on left	Left input VOL for TENS full scale conversion exceeded rating and caused excessive load during span ADJ.	Left input voltage for tension FS calculation=±150.0 mV or more	Left input voltage for tension FS calculation=±25.00 mV or more	Unnecessary
12	Span adjustment excessive load on right	Right input VOL for TENS full scale conversion exceeded rating and caused excessive load during span ADJ.	Right input voltage for tension FS calculation=±150.0 mV or more	Right input voltage for tension FS calculation=±25.00 mV or more	Unnecessary
13	Span adjustment load imbalance	Difference of left/right input voltage exceeded 30% or more of rating during span adjustment.	Left/right input voltage difference=45.0 mV or more	Left/right input voltage difference=4.50 mV or more	Unnecessary
14	Empty	—	—	—	—
15	Empty	—	—	—	—
16	Outside maximum diameter	Reel diameter monitor exceeded the maximum diameter.	• Reel diameter monitor>maximum diameter • Run/Stop=ON		Unnecessary
17	Outside minimum diameter	Reel diameter monitor fell below the minimum diameter.	• Reel diameter monitor<minimum diameter • Run/Stop=ON		Unnecessary
18	Outside line velocity	Line speed monitor exceeded 1000.0 m/min.	Line speed monitor>1000.0 m/min.		Unnecessary
19	Outside line acceleration	Line acceleration monitor exceeded maximum acceleration.	• Line acceleration monitor>maximum acceleration • Run/Stop=ON		Unnecessary
20	Outside reel shaft rotational speed	Reel shaft rotational speed monitor exceeded maximum reel shaft rotational speed.	• Reel shaft rotational speed monitor>maximum reel shaft rotational speed • Run/Stop=ON		Unnecessary
21	Empty	—	—	—	—
22	Empty	—	—	—	—

Alarm number	Alarm name	Alarm description	Alarm trigger conditions		Power supply Reset
			Sensor input type selection (LX)	Sensor input type selection (strain gauge)	
23	Empty	—	—	—	—
24	Empty	—	—	—	—
25	Empty	—	—	—	—
26	Sensor power supply short circuit	Overcurrent flowed to power circuit for sensor.	Sensor power circuit current=300 mA or more		Necessary
27	Outside electronic gear setting range	Speed teaching results exceeded setting range for electronic gears.	• Speed teaching results<90.00% • Speed teaching results>180.00%		Unnecessary
28	Empty	—	—	—	—
29	Empty	—	—	—	—
30	Empty	—	—	—	—
31	Clutch/brake output short circuit	Clutch/brake current value exceeded the rating.	• PP-PN output current value>4.5 A • S1-S2 output current value>4.5 A		Necessary
32	Clutch/brake overload	Clutch/brake temperature rise exceeded the tolerable value.	• Coil temperature>coil temperature limit value • Run/Stop=ON		Unnecessary
33	Powder maintenance	Clutch/brake powder near end of life.	• Reel diameter monitor<minimum diameter • Run/Stop=ON		Unnecessary
34	Clutch/brake output over rating	Current of clutch/brake output exceeds rating	(PP-PN output current value+S1-S2 output current value)>4.0 A *Clutch/brake control output short circuit receives priority.		Unnecessary
35	Empty	—	—	—	—
36	Empty	—	—	—	—
37	Empty	—	—	—	—
38	Empty	—	—	—	—
39	Empty	—	—	—	—
40	Empty	—	—	—	—
41	No input function	Can't find corresponding input function.	Unassigned input was used.		Unnecessary
42	No request command	Can't find corresponding request command.	Unassigned request command was used.		Unnecessary
43	No request code	Can't find corresponding request code.	Unassigned request code was used.		Unnecessary
44	Outside data range	Write data exceeds setting range.	Write data<setting lower limit Setting upper limit<write data		Unnecessary
45	Write-prohibit	Attempting to write to write prohibit data	• Writing to monitor data • Password mismatch+write to password protection data • Run/stop=run+write to data protected while running • Selection of function to use OFF+write to Selection of function to use parameter		Unnecessary
46	CC-Link version mismatch	Does not match master station's CC-Link version.	Master station version: 1.10, tension controller version: 2.00		Unnecessary
47	Empty	—	—	—	—
48	Empty	—	—	—	—
49	Empty	—	—	—	—
50	Empty	—	—	—	—
51	RAM memory error	RAM setting parameter data error	RAM setting parameter data checksum mismatch		Necessary
52	ROM memory error	ROM setting parameter data error	ROM setting parameter data checksum mismatch		Necessary
53	ROM writing error	ROM-Write failed	Mismatch occurred three times while comparing ROM write data with ROM read data.		Necessary
54	Menu copy error	Copied to active menu No.	Menu number=Execute data copy at data copy selection: on		Unnecessary
55	Memory cassette error	Error when accessing memory cassette	• Memory cassette accessed while memory cassette not installed • Mismatch while comparing data during memory cassette comparison operation		Unnecessary
56	Option communication error	Communication error with option adapter	A data read/write error of extension option occurred five times in a row.		Necessary
57	PWM output error	Command value of the clutch/brake PWM output doesn't match the monitor value.	• The status of command value×(0.8)<PWM monitor value<command value×(1.2) is continued for 5 seconds or longer. • Output OFF/ON=OFF(output ON status)		Necessary

Alarm number	Alarm name	Alarm description	Alarm trigger conditions		Power supply Reset
			Sensor input type selection (LX)	Sensor input type selection (strain gauge)	
58	Empty	—	—	—	—
59	Empty	—	—	—	—
60	Empty	—	—	—	—
61	Empty	—	—	—	—
62	Empty	—	—	—	—
63	Empty	—	—	—	—

16.2 Alarm Display

Set the alarm display holding time at the occurrence of an alarm.

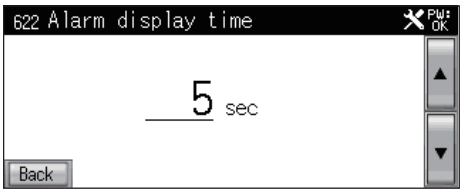
- When 0 is set, alarms are not displayed. When 301 is set, the hold setting is enabled. (The alarm display persists until the alarm reset input is input.)
- If a network alarm occurs after a word device has been accessed from the network via a request command, the device number which caused the alarm is displayed. If a network alarm is stored by the alarm display, the data is set for this monitor. If anything other than a network alarm is stored or the alarm reset is on, 0 is set for this monitor.

<Related Parameter>

Name	Parameter No.	Setting range
Alarm display time	313	0 to 301

<Setting Screen>

[Alarm display time]



16.3 Alarm History

Eight alarm histories (0 to 7) are displayed. Alarm 0 is the latest one.

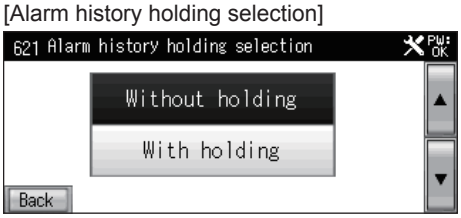
- When an alarm occurs, the data of the alarms which occurred in the past is shifted to the previous alarm in the alarm history, and alarm 0 is updated to be latest. When the number of generated alarms exceeds eight, the data of the alarm history 7 is discarded and all the data of the other Alarms is shifted to the previous alarm in the alarm history.
- The alarm history remains even when the Alarm display time is set to zero, and the data remains in alarms 0 to 7.
- If the Alarm history holding selection is set to disable (setting value: 0), the alarm history will be cleared when power is interrupted. To hold power outage, set the Alarm history holding selection to able (setting value: 1).

<Related Parameter>

Name	Parameter No.	Setting range
Alarm history holding selection	312	0 to 1

<Setting Screen>

[Alarm history holding selection]



16.4 Alarm Operation Switching

You can select whether or not alarms are triggered and displayed by changing the Alarm operation selection.

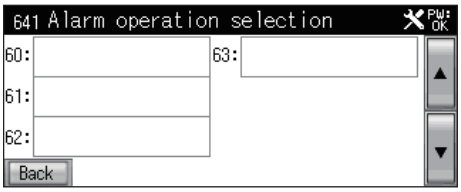
- If the Alarm operation selection is disabled, the corresponding alarm will not be triggered or displayed.
- Alarms that require power off or power standby cannot be disabled.
- If the clutch/brake control output short-circuit alarm occurs, “O.C” is displayed on the monitor display (red).

<Related Parameter>

Name	Parameter No.	Setting range
Alarm operation selection 1	314	0 to 0xFFFF
Alarm operation selection 2	315	0 to 0xFFFF
Alarm operation selection 3	316	0 to 0xFFFF
Alarm operation selection 4	317	0 to 0xFFFF

<Setting Screen>

[Alarm operation selections 1 to 4]



REVISIONS

Revision date	Revision	Description
July 2018	A	First edition

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