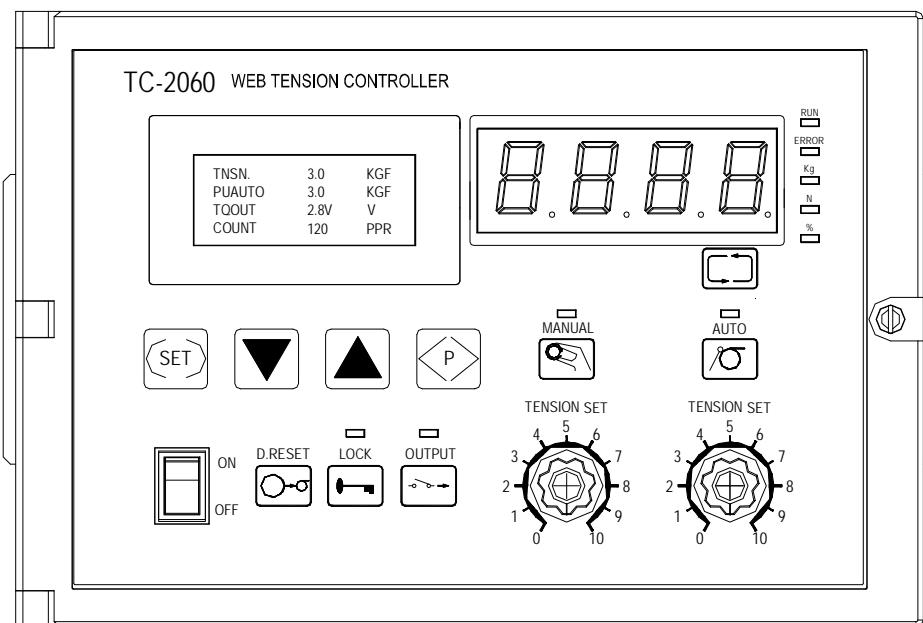


High Performance Tension Controller TC – 2060

Instruction Manual



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Contents

1. Introduction	-----	3
1.1 Function and feature	-----	4
1.2 Operation panel	-----	4
1.3 Function of DIP switch	-----	4
2. Installation and Wiring	-----	5
2.1 Installation	-----	5
2.2 Wiring	-----	6
2.3 Dimension	-----	9
3. Parameters and Explanation	-----	10
3.1 Setup of parameters	-----	10
3.2 Automateic detection&setting of fast reset	-----	11
3.3 Structure diagram of parameters	-----	12
3.4 List of parameters	-----	13
3.5 Parameter Explanation	-----	23
4. Adjustments and Test Run	-----	32
4.1 Test Run Procedure	-----	32
4.2 Function Setting for DIP Switch	-----	32
4.3 Adjustment of Tension Detector (Load Cell)	-----	32
4.4 The Central Winding or Unwinding Control	-----	34
5. Abnormal Message	-----	35
6. Specification	-----	36
7. Application	-----	38
7.1 The Central Unwinding Tension Control (corporated with magnetic powder brake)	-----	38
7.2 The Central Unwinding Tension Control (corporated with motor-drive direct torque control – Feed in)	-----	50
7.3 The Central Winding Tension Control (corporated with drive direct torque control – Driving)	-----	63

	7.4 The Central Winding Tension Control (corporated with drive speed control – Magnetic Powder Clutch driving)	-----	64
8.	Communication	-----	76

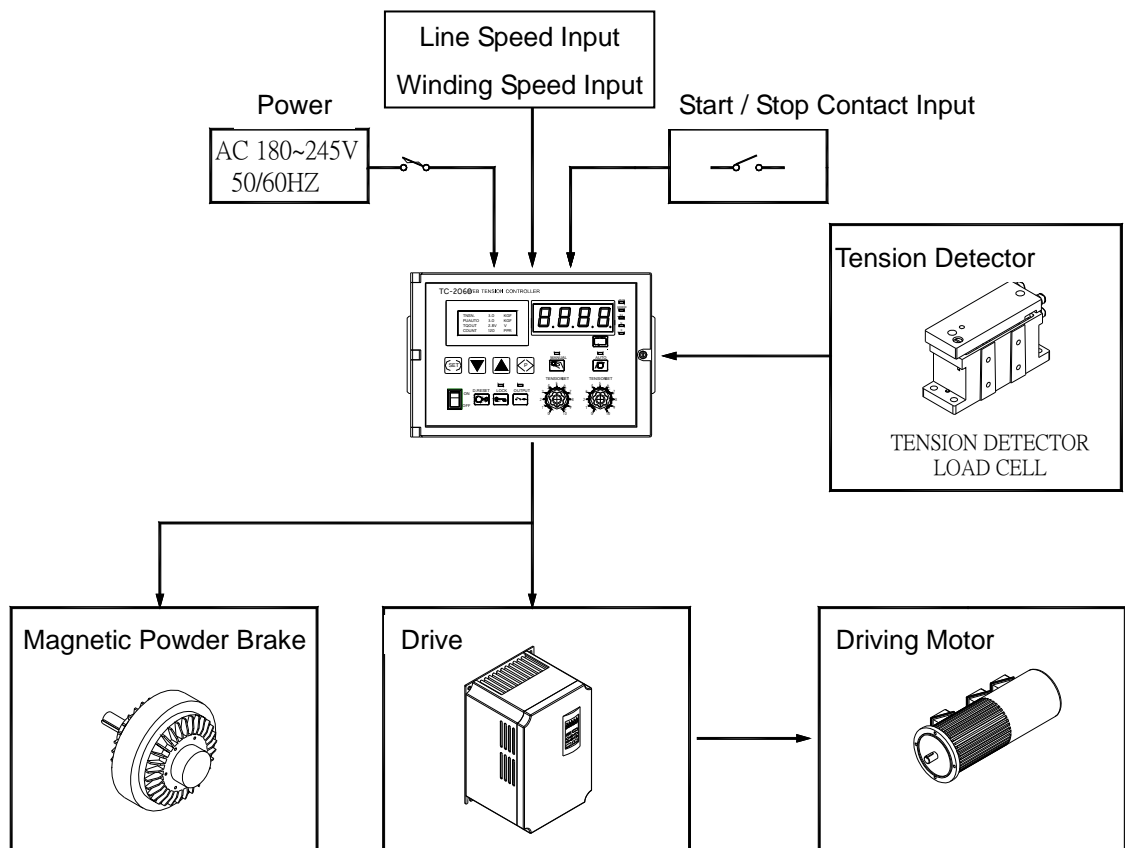
1. Introduction

1-1 Function and feature

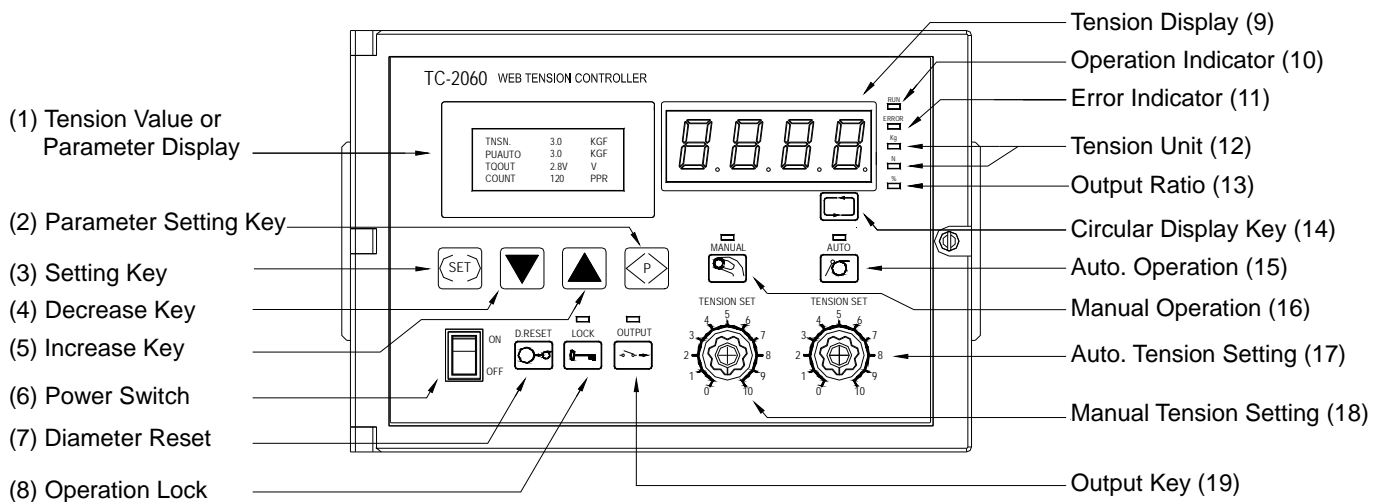
TC-2060 High Performance Tension Controllers receives the signal from LMS series Tension Detector (Load Cell) to control the web tension for the unwinding of long materials, the guiding of middle roller, the rewinding of web material automatically. They can output 0~10Vdc, 4~20ma of torque or speed command signal to drive the servomotor drive, inverter. TC-2060 even contains the driving amplifier (0~24Vdc max. 5A output) to control the magnetic powder clutch, brake, or hysteresis clutch and brake to get constant tension control.

Features:

- (1) Setting up simple parameters to get tension control.
- (2) High-tension stability, multifunctional parameters, which is adaptable to different kinds of material processing of industrial machine.
- (3) Setting up and operating digitally, it is easy to operation and management.
- (4) Having function of field economizing to the magnetic powder clutch, it can improve the issue of thread engagement and control effectively for low speed-high torque and acceleration and deceleration in the start of motor.



1.2 Operation panel



- (1) Tension Value or Parameter Display:** Normal display is tension Kg value or output state display; Parameter display is the display of parameter name and content.
- (2) Parameter Setup Key:** It includes “Taping Setup” key and “Fast Zero Reset” key; Pressing it for 3 seconds is the function of “Taping Setup”, pressing it for 10 seconds is the function of “Fast Zero Reset”
- (3) Input/Change Key:** It is an “input” key in normal state, and becoming ‘Change/Input’ key at the setting of parameter. It also includes “automatic detection” key (pressing key for 10 seconds)
- (4) Decrease Key:** Decrease value or jump down to the next value in the setting of tension or parameter.
- (5) Increase Key:** Increase value or jump up to the next value in the setting of tension or parameter.
- (6) Power Switch:** Power Operation ON/OFF.
- (7) Diameter Reset:** The key of diameter reset.
- (8) Operation Lock:** The key of operation lock.
- (9) Tension Display(LED):** Display tension value(Kg, N, %), it is switched by the circular display key.
- (10) Operation Indicator:** Light ON at operation (Only the controller has output and control), when the Light is flashing, it means the controller is in retention tension control (The “STALL” terminal is enabled).
- (11) Error or Fault Indicator:** Error indication (when the light is flashing, it means the output is at max. or 0V, but the tension value isn't at the setting value).
- (12) Tension Unit:** Display the tension value(Kg, N, %).
- (13) Output Ratio:** The light ON, the LED display is the output ratio.
- (14) Circular Display Key:** The switch key for LED display function.
- (15) Auto. Operation Lamp:** Automotive operation mode.
- (16) Manual Operation Lamp:** Manual operation mode.
- (17) Auto. Tension Setting knob:** Adjust tension setting (The Auto. Operation Lamp is ON). (The internal parameter could be selected by ▲▼ key or using this knob to adjust tension, or input from terminal of external VR).
- (18) Manual Tension Setting Knob:** Adjust the tension setting (The Manual Operation Lamp is ON). (The internal parameter could be selected by ▲▼ key or using this knob to adjust tension, or input from terminal of external VR).

(19)Output Key: Whwn the OUTPUT lamp is ON, controller has output(Output Key control the controller's output); When the lamp is OFF, controller doesn't have output.

1.3 Function of DIP switch

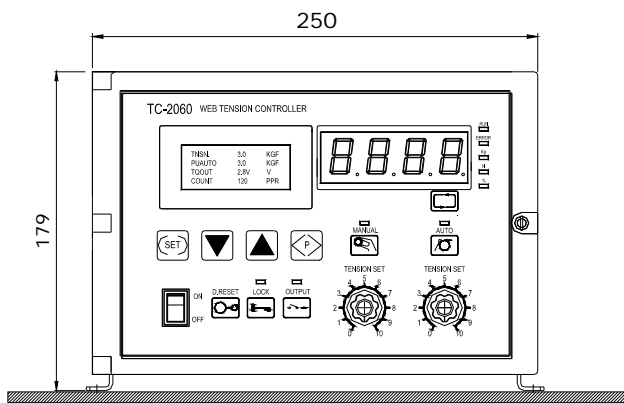
- Function of SW1: Control feedback loop **TQOUT,NROUT,SPOUT,FBKOUT**; Signal Selection (-10V~0~+10Vdc / -5V~0~+5Vdc switching).

2. Installation and Wiring

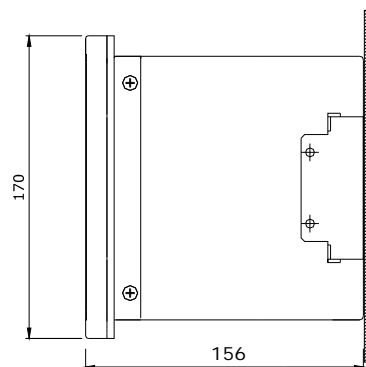
2.1 Installation:

Do not install this product in a place with dust, oil, smoke, conductive ash, or corrosive gas. Do not put it in an environment with high temperature, humidity, wind or rain. Besides, do not install it in a place with vibration or impact condition, otherwise the product will be in fault, damaged or cracked.

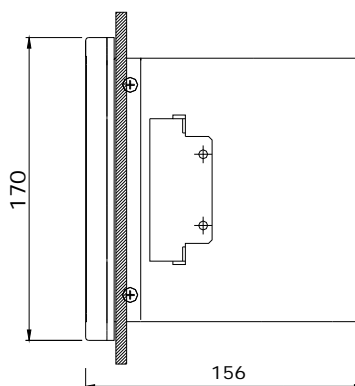
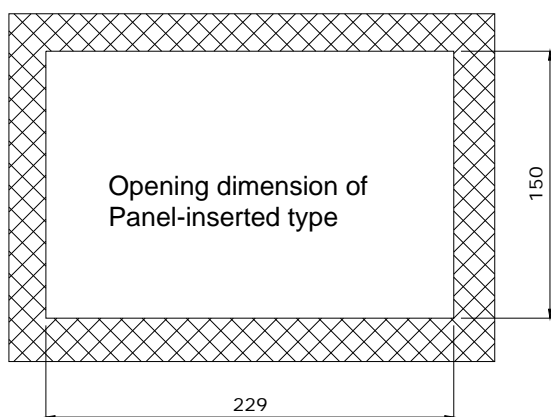
❖ **Do not set the panel faceup**



Floor Mounted



Wall Mounted



Panel-inserted Mounted

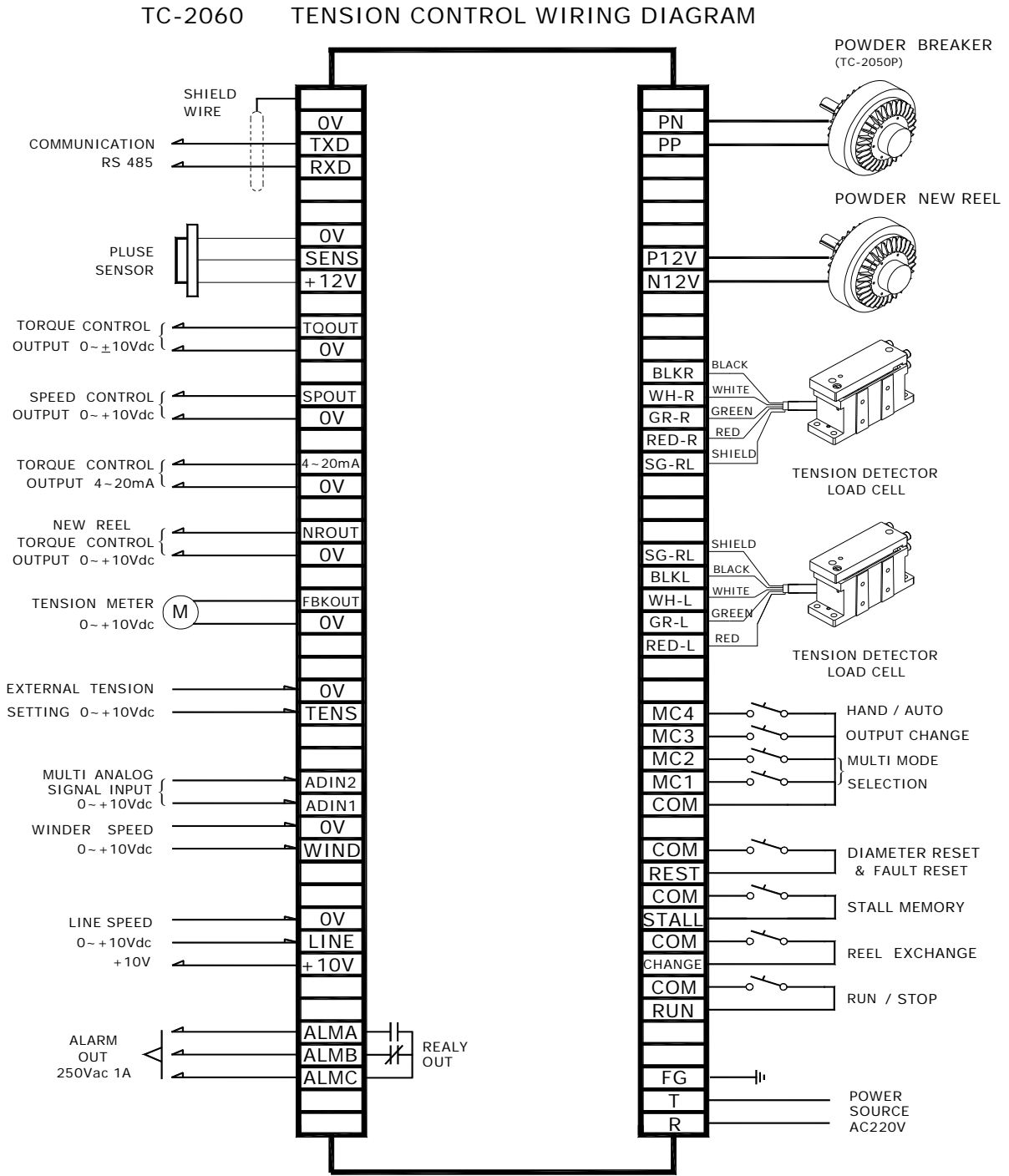
Unit: mm

2.2 Wiring

Wiring method and cautions

- Please select the shielding cable as for I/P and O/P signal line, following the wiring diagram listed below in wiring.
- The wire diameter of Power Line is 0.75mm (minimum).
- Please also select shielding cable or independent cable as for I/P line at the digital input terminal.
- Please do not put the cable of control signal and the power cable in one pipe or bundle them together.
- Please do the grounding well. (Select the wire with above 2.0mm diameter).
- Concerning interference and noise please control the length of wire within 10m.

Wiring Diagram: Example of "Compression" LOAD CELL



The above wiring method of load cell is for detecting "Compression";
 If the load cell is used for detecting "TENSION", the wiring method will be changed as follow

- GR-L → WHITE
- WH-L → GREEN
- GR-R → WHITE
- WH-R → GREEN

Note:

- ◆ For “PULL-STRETCH” LOAD CELL, only switch the green wire and white wire of LOAD CELL(white wire connect to “GR”; green wire connect to “WH”).
- ◆ When TC-2060 leaves factory, the default line speed has been set to the maximum speed (the terminal of “+10V” is shorted to the terminal of “LINE”), otherwise the TC-2050P can't be operated normally. If the TC-2060 will follow the production speed of system, opening the short connection between the terminal “+10V” and “LINE”, and input voltage 0 ~ +10V to the terminal of “LINE”.
- ◆ In the application of “Central Winding”, if there is no feedback speed signal, please also input voltage 0 ~ +10V to the terminal of “WIND”, it can avoid the calculation error of diameter (the diameter will be calculated to maximum value, and the “SPOUT” speed voltage will be less when the diameter is more).

Wiring of Tension Detector

- (1) The tension detector (Load Cell) can be used for detecting “PULL-STRETCH” Load or “Compression” Load, but make sure the value should be increased at positive polarity. “GR” is negative (black wire), and “WH” is positive (red wire), It means the voltage is increased with tension increasing (positive signal).

For detecting “Compression” Load:

Left (white wire to WH-L, green wire to GR-L)

Right (white wire to WH-R, green wire to GR-R)

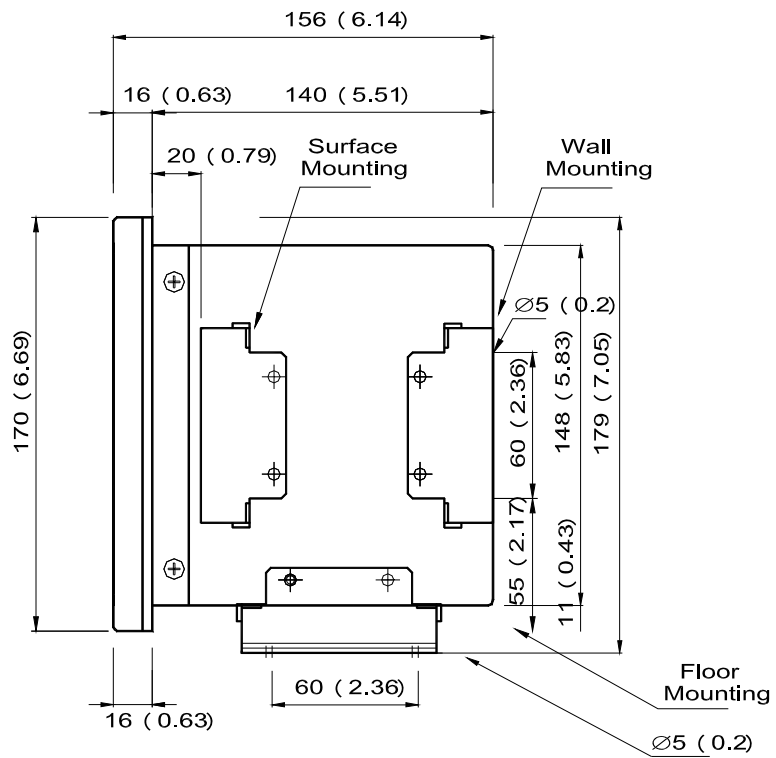
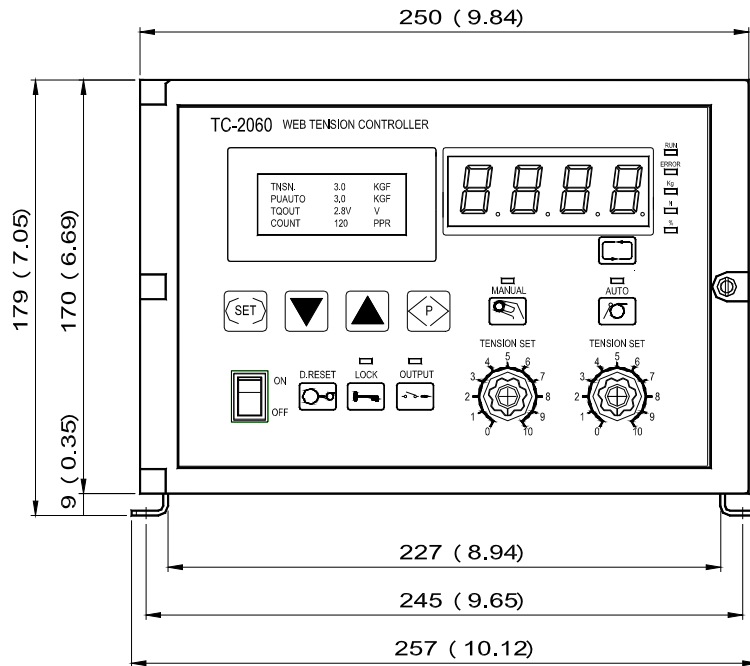
For detecting “PULL-STRETCH” Load:

Left (white wire to GR-L, green wire to WH-L)

Right (white wire to GR-R, green wire to WH-R)

- (2) When only one detector (Load Cell) is used, the circuit should be shorted between unused input terminal of [GR-L] [WH-L], [GR-R] [WH-R]. The setup selection should be R-REEL (right detection) or L-REEL (left detection) in the parameter “LOADCELL SELECT”.

2.3 Dimension



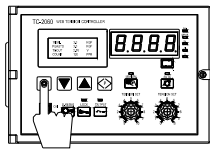
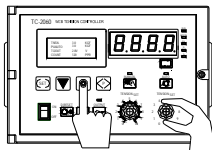
UNIT:mm (inch)

3. Parameter and Explanation

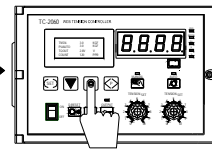
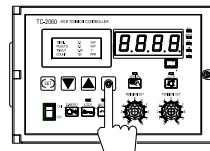
3.1 Setup of parameters

Production Operation

Tension Setting



Taper Tension Setting



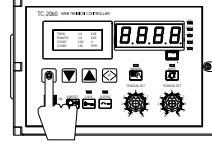
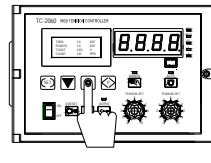
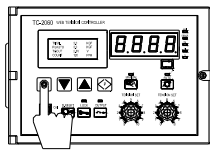
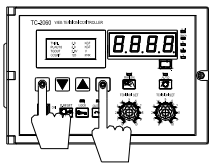
Press \downarrow/\uparrow Key, changing tension setting, the tension display will be flashing. (or it can be adjusted by VR)

After setting, press \rightarrow key, then tension setting is completed.

Press \leftarrow key, going to "taper tension setting", then the parameter is flashing.

Press \downarrow/\uparrow Key, changing "taper tension setting", after setting, press \rightarrow key, then the setting is completed.

Parameter Setting Procedure

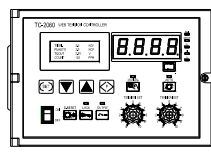
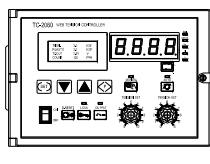
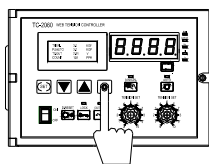


Press \rightarrow key at the same time, then going to "parameter setting"

Press \rightarrow key, the parameter begin to flash

Press \downarrow/\uparrow Key, changing Parameter content

After setting, press \rightarrow key, then the "parameter setting" is completed.

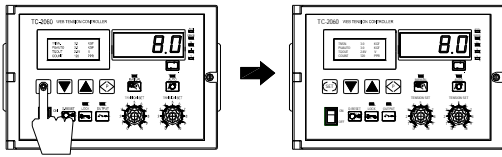



If parameter doesn't be changed, press \downarrow/\uparrow or \leftarrow key, jumping to the reserved parameter being modified

If doesn't press any key, it will exit out the "parameter setting" after 10 seconds

3.2 The operation of automatic detection and the setting of fast reset

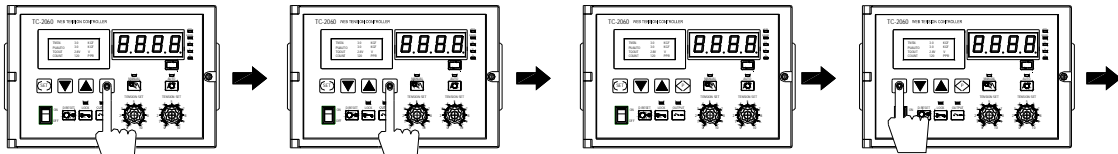
Automatic Detection Setup





Pressing  key for 10 seconds , going to the state of automatic detection (the value of "SV" is flashing)

After detecting it will jump out automatically (the value of "SV" stops flashing)


Fast “ ZERO Reset “ Setup

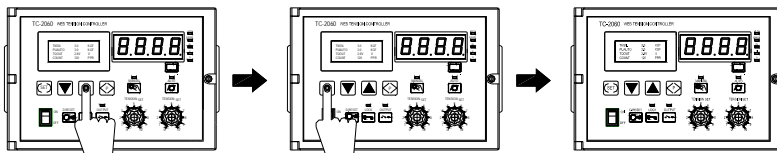



Pressing  key for 10 seconds , going to " Fast ZERO Reset Setup "


(" PV " shows " TAPE " in the time of 5 seconds) , pressing  Key continuously

After 10 seconds " PV " shows Reset parameter

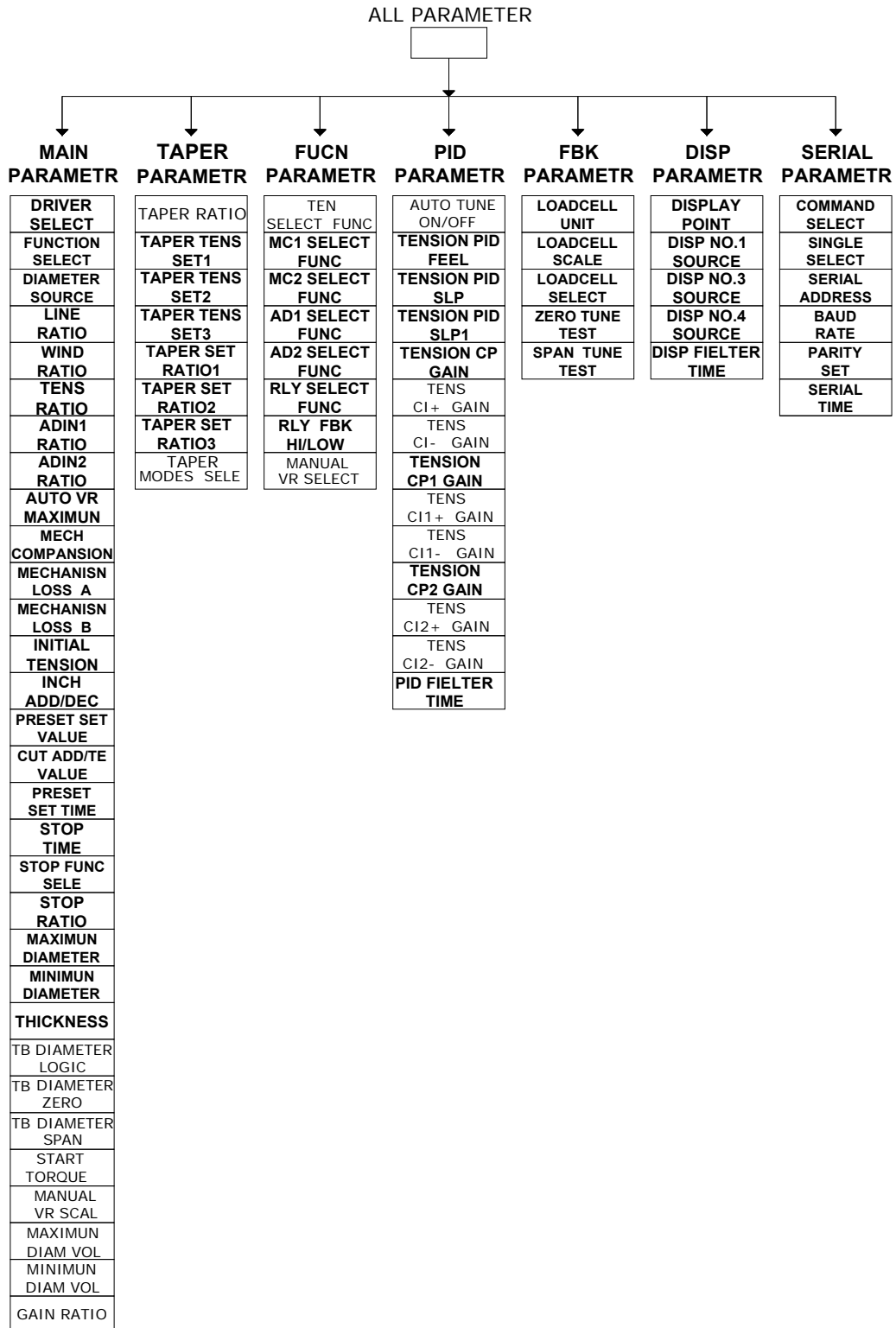
Pressing  Key , making " PV " display flashing (Removing the materials on the roller , which is installed load cell



Pressing  key for modifying " Reset " value

After setting Pressing  key , then the " Reset Setup " is completed

3.3 Structure diagram of parameters



3.4 List of parameters

MAIN PARAMETER GROUP

SYMBOL	SYMBOL DESCRIPTION	EXPLANATION
MAIN PARAMETER	Main parameter	Function programming for main parameter
TAPER PARAMETER	Taper function of parameter group	Function programming for taper tension
FUNC PARAMETER	Function parameter group	Assigned function programming for Digital & Analog Input
PID PARAMETER	PID parameter group	Function programming for PID
FBK PARAMETER	Specification parameter group	Function programming for specification
DISP PARAMETER	Display parameter group	Function programming for display
SRIAL PARAMETER	Communication parameter group	Function programming for communication
INSI PARAMETER	Cipher parameter group	Function programming for Cipher

3.4.1:MAIN PARAMETER

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DRIVE SELECT	Selection of drive	MOTOR (TORQUE)	0: POWER(CLUTCH) 1: MOTOR(TORQUE) 2: E/P REQUULATOR	0: Magic powder clutch 1: Motor(torque control) 2: Current to Pressure Converter
FUNCTION SELECT	Selection of winding and unwinding	WINDER	0: WINDER, 1: UNWIND	0: Winding 1: Unwinding (Settting can't be changed in the RUN)
DIAMETER SOURCE	Source of diameter detection	DIVIDER	0: DIVIDER 1: SENSOR 2: TB(DIAMETER) 3:DIVIDER(INT)	0: Computing of line speed and winding speed 1: Proximity switch length calculation 2: External diameter signal terminal input 3: parameter of MAXIMUM_DIAHI and MINIMUM_DIALO
LINE RATIO	Ratio of line speed signal input	100.0%	10~500.0%	LINE terminal input
WIND RATIO	Ratio of winding feedback signal	100.0%	0~500.0%	WIND terminal input

TENS RATIO	Ratio of signal	100.0%	0~500.0%	TENS terminal input
ADIN1 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN1 terminal input
ADIN2 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN2 terminal input
AUTO VR MAXIMUN	Ratio of signal	100.0%	0~100.0%	Use range(%) of tension setting for panel's VR (including Terminal "TENS")
MECH COMPANSION	Acceleration compensation	100.0%	0~999.9%	Compensation amount in acceleration
MECHANISN LOSS A	Static friction compensation of A reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
MECHANISN LOSS B	Static friction compensation of B reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
INITIAL TENSION	Initial tension compensation	30.0%	0~100.0%	Compensation setting for initial tension
INCH ADD/DEC	Setting value of tension increase and decrease	5Kg	0~FULL SCALE Kg	MC1~2 termial assigned
PRESET SET VALUE	Pre-setting value of new shaft tension	50.0%	0~100.0%	Constant Value(Output from terminal "NROUT", "P12V", "N12V")
CUT ADD/TE VALUE	Increased tension in changing reel and cutting material	100.0%	0~500.0%	T this value are actual cutting material's tension
PRESET SET TIME	Time of changing reel	5.0SEC	0~10.0SEC	Time of changing reel procedure
STOP TIME	STOP time	10.0S	0.0~60.0S	The time of stop when the "RUN" terminal is opened
STOP FUNC SELE	Mode selection in stop	PID ON	0: PID ON 1: STOP RATIO 2:STOP STALL	0: PID continue control within the STOP time 1: Follow "STOP RATIO" to brake 3:Hold voltage in terminal out1
STOP RATIO	Brake value within the STOP time	100.0%	0~500.0%	Brake is multiplied owing to "STOP RATIO" multiply by the diameter value
MAXIMUN DIAMETER	Maximum diameter	1000mm	300~5000mm	
MINIMUN DIAMETER	Minimum diameter	100mm	50~300mm	

THICKNESS	Thickness setting of winding material	120um	10~10000um	When the parameter "DIAMETER SOURCE" is set to "SENSOR", this parameter will be displayed
TB DIAMETER LOGIC	Logic selection of supersonic	0~10VDC	0 = 0~10VDC 1 = 10~0VDC	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER ZERO	Zero point adjustment of supersonic	0.0V	-5.00V~+5.00V	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER SPAN	Multiple ratio of supersonic	100.0%	0~500.0%	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
START TORQUE	Start torque compensation	0V	0 ~ +10Vdc	When "RUN" terminal starts, then output torque compensation right away
MANUAL VR SCAL	Maximum bias adjustment value (Bias Adjustment) of "MANUAL VR" of panel at the automatic state	0V	0~+10VDC	When the parameter "MANUAL VR SELECT" is set to "AUTO BIAS SET", this parameter will be available
MAXIMUN _DIAM VOL	Maximum diameter for Taper Tension special purpose (Taking terminal "OUT1" as standard)	10.00V	0~10.00Vdc	When the parameter "DIAMETER SOURCE" is set to "DIVIDER", this parameter will be displayed. The maximum diameter voltage in the taper tension (This parameter and the next parameter are the range of taper tension)
MINIMUN _DIAM VOL	Minimum diameter for Taper Tension special purpose	0.0V	0~10.00Vdc	When the parameter "DIAMETER SOURCE" is set to "DIVIDER",

	(Taking terminal “OUT1” as standard)			<p>this parameter will be displayed.</p> <p>The minimum diameter voltage in the taper tension (This parameter and the previous parameter are the range of taper tension)</p>
GAIN RATIO	Output Ratio of “OUT1”	100%	0~500%	<p>This parameter is enabled by terminal “MC1” and “MC2”.</p> <p>※ Magnifying or reducing output in increasing speed and decreasing speed to achieve the function of acceleration and deceleration compensation (This parameter must be larger than 100% in acceleration compensation, less than 100% in deceleration compensation)</p>

3.4.2:TAPE PARAMETER

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TAPER RATIO	Linear taper tension	100.0%	0~200.0%	<p>Taper ratio is valid only the above TAPER MODE is set to linear(the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%)</p>

TAPER TENS SET1	The #1 turning point's setting value of non-linear taper tension	300mm	0~2000mm	According to diameter value(under the turning point, the tension won't be tapered)
TAPER TENS SET2	The #2 turning point's setting value of non-linear taper tension	500mm	0~2000mm	According to diameter value
TAPER TENS SET3	The #3 turning point's setting value of non-linear taper tension	800mm	0~2000mm	According to diameter value
TAPER SET RATIO1	Taper Ratio between #1 turning point and #2 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO2	Taper Ratio between #2 turning point and #3 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO3	Taper Ratio above #3 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER MODES SELE	Mode setting of taper tension curve	LINER	0: LINER 1: NON-LINER	0: Linear 1: Non-Linear (multi sectional, irregular)

3.4.3:FUNC PARAMETER(parameter setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TEN SELECT FUNC	Source selection of tension setting	PLANE TENSION	0: PLANE TENSION 1: PUSH TENSION 2: EXT VR TENSION	0: Operation panel's VR setting 1: Up / Down key setting 2: Input of Terminal "TENS"

MC1 SELECT FUNC	Function selection of MC1 terminal	INCHING ADD	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
MC2 SELECT FUNC	Function selection of MC2 terminal	INCHING DEC	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
AD1 SELECT FUNC	Function selection of AD1 Analog Input	NO FUNCTION	0: NO FUNCTION 1: NEW REELVALUE 2: TAPER (linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
AD2 SELECT FUNC	Function selection of AD2 Analog Input	NO FUNCTION	0: NO FUNCTION 1: NEW REELVALUE 2: TAPER (linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
RLY SELECT FUNC	Mode selection of relay action	LOW	0: HIGH 1: LOW 2: ALARM	Relay's function output selection 0: in high tension 1: in low tension 2: abnormal
RLY FBK HI/LOW	Active point of tension detection's relay	3.0%	0~100.0%	Following the above assigned mode; when it is set to "HIGH", relay will be active if it is higher than the active point, when it is set to "LOW", relay will be active if it is lower than active point
MANUAL VR SELECT	Operation MANUAL VR Select	MANUAL %	0=MANUAL % 1=AUTO BIAS SET	0=MANUAL % :Manual 1=AUTO BIAS SET:

3.4.4: P I D PARAMETER(parameter setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
AUTO TUNE ON/OFF	“automatic detection”(PID)	OFF	0:OFF 1:ON	On “automatic detection”
TENSION PID FEEL	Dead band of tension	0.1KG	0~Scale (parameter)	Tension will not be corrected within this range
TENSION PID SLP	Section 1 breakpoint of tension error	0.5KG	0~ Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP will be regarded as section 1
TENSION PID SLP1	Section 2 breakpoint of tension error	1.0KG	0~Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP1 will be regarded as section 2
TENSION CP GAIN	Tension error ratio of section 1	30.0%	0~500.0%	The section within PID FEEL and PID SLP will be corrected by PI
TENS CI+ GAIN	The rising time of section 1 tension error integrator	150S	0~5000S	
TENS CI- GAIN	The falling time of section 1 tension error integrator	150S	0~5000S	
TENSION CP1 GAIN	Tension error ratio of section 2	30.0%	0~500.0%	The section within PID FEEL and PID SLP1 will be corrected by PI
TENS CI1+ GAIN	The rising time of section 2 tension error integrator	75S	0~5000S	
TENS CI1- GAIN	The falling time of section 2 tension error integrator	75S	0~5000S	
TENSION CP2 GAIN	Tension error ratio of section 3	30.0%	0~500.0%	The section which is small than SLP1 will be corrected by PI
TENS CI2+ GAIN	The rising time of section 3 tension error integrator	10S	0~5000S	
TENS CI2- GAIN	The falling time of section 3 tension error integrator	10S	0~5000S	
PID FILTER TIME	The filter time of tension feedback	100ms	0~500ms	The filter time of load cell feedback signal

3.4.5:FBK PARAMETER (feedback parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
LOADCELL UNIT	The unit of tension detecting and display	Kgf	0: Kgf 1: N	
LOADCELL SCALE	Specification of load cell	50.0KG	0~1000Kg	Load cell's specification(single side)
LOADCELL SELECT	Load cell's quantity and right-left side Selection	REELS	0: REELS 1: L- REEL 2: R- REEL	0: Two side detection 1: Left single side 2: Right single side
ZERO TUNE TEST	Load cell's tension Zero Reset Correction	0.0KG	-SCALE~+SCALE	
SPAN TUNE TEST	Load cell's tension highest point correction	0~500%	0~500%	

3.4.6:DISP PARAMETER(parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DISPLAY POINT	The decimal point number of tension setting	1	0~2(the value of tension setting and display are valid)	The number setting of decimal point(the value of tension setting and display)
DISP NO.1 SOURCE	The first row LCD source selection display	SV	0: LINE INPUT 1: WIND INPUT 2: TENSION INPUT 3: ADIN1 4: ADIN2 5: TQ OUT 6: NR OUT 7: SP OUT 8:FBK OUT 9:SLP	0: Voltage of "LINE" terminal 1: Voltage of "WIND" terminal 2: Tension setting's value 3: Voltage of "ADIN1" terminal 4: Voltage of "ADIN2" terminal 5: Voltage of torque command 6: Voltage of "NR OUT" terminal 7: Voltage of "SP OUT" terminal 8: Voltage of "FBK OUT" terminal 9: Error amount
DISP NO.3 SOURCE	The third row LCD source selection display	TQ OUT	10:PID VOL 11:DIAMETER 12:COUNT 13:FEEDBACK 14:FBK-L CELL 15:FBK-R CELL 16:SERIAL STATUS 17:FBK(SERIAL)	10: Voltage of error amount compensation 11: Diameter amount 12: Counting length amount 13: Total amount of tension 14: Left side load cell's tension 15: Right side load cell's tension 16: Communication status
DISP NO.4 SOURCE	The fourth row LCD source selection display	SP OUT		

			18:SV(FEEDBACK) 19:SPAN SCALE	17: Total amount of tension 18: Filter (Total tension value) 19: Display rate of Load cell SPAN
DISP FILTER TIME	Display time	5.0S	0~20.0S	The filter time of display value

3.4.7:SERI PARAMETER(communication)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
COMMAND SELECT	Selection of digital input command	OUTSIDE TB	0:OUTSIDE TB 1:SERIAL 2:TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Digital input & parameter & SV tension setting value are controlled by RS-485 communication 2: Digital input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SINGLE SELECT	Selection of analog input command	OUTSIDE TB	0:OUTSIDE TB 1:SERIAL 2:TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Analog input & parameter & SV tension setting value are controlled by RS-485 communication 2: Analog input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SERIAL ADDRESS	Communication address (the number of station)	0	0, 1~31	☆ When the communication function is set, the following parameter will be displayed 0: Don't send back, all receive 1~31: station address
BAUD RATE	Communication baud rate	9600	(0)=4800 bps (1)=9600 bps (2)=19200 bps	There are three kinds of baud rate can be set

PARITY SET	Parity setting	NO PARITY	0: NO PARITY 1: EVEN PARITY 2: ODD PARITY	
SERIAL TIME	Communication delay interval of time	15 ms	5~65ms	The delay time between command message and response message

3.4.8:INSI PARAMETER (cipher parameter)

PASSWORD	Cipher parameter	0	0~9999	0: Can change any parameter 1234: Reset to DEFAULT (The power must be off and start again after setting) 1~9999: Can't change parameter value
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3.5 Parameter Explanation

Fun1: FMAIN PARAMETER(parameter setting)

DRIVER SELECT: Drive selection; Three kinds of drive can be selected; Magnetic Powder Clutch, Torque control of motor, or Current to Pressure Converter (All the three output terminals are different)

FUNCTION SELECT: Selection of Rewinding and Unwinding; Selecting movement of rewinding and unwinding. If the torque command is opposed to the trend of tension-increase or tension-decrease, reversing the rotary direction of drive or connecting terminal "MC3" to terminal "COM", the polarity will be reversed, then the setting is completed.

DIAMETER SOURCE: Source of diameter detecting

DIVIDER: LINE signal of line speed and WIND signal of winding speed doing division calculation, and calculate the diameter amount.

SENSOR: Using proximity switch to calculate the length, matching with MAXIMUM DIAMETER, MINIMUM DIAMETER and THICKNESS of reel materials to calculate diameter.

TB: External "ADIN1" and "ADIN2" terminal are input diameter signal("ADIN1" and "ADIN2" must be set separately.

LINE RATIO: The ratio(10 ~ 500%) of line speed signal input, which can be used to correct this station speed and the ratio of the former station.

WIND RATIO: The ratio(0 ~ 500%) of winding feedback signal, which can correct the ratio of speed feedback of this station.

TENS RATIO: The ratio(0 ~ 500%) of external tension setting.

ADIN1 RATIO: The ratio(0 ~ 500%) of multi-function analog input terminal "ADNI1".

ADIN2 RATIO: The ratio(0 ~ 500%) of multi-function analog input terminal "ADNI2".

AUTO VR MAXIMLW: Range setting of operation panel, including "TENS"(the percentage of full scale); for example, there have two of the maximum weight of load cell, 50Kg x 2, so the maximum load is 100Kg, this parameter is set to "20%", then the range of operation panel is 100Kg x 20% = 20Kg, it means the VR can be set from 0 to 20Kg.

MECH COMPANSION: Acceleration compensation; the torque or speed compensation will be executed based on the line speed(LINE terminal) variation per time.

MECH ANISN LOSS A: Mechanical static friction compensation of A reel, the setting is enough if the reel's state is between moving and static.

MECH ANISN LOSS B: Mechanical static friction compensation of B reel, the setting is enough if the reel's state is between moving and static.

INITIAL TENSION: Compensation of initial tension, which compensates the initial diameter tension of initial diameter when the line speed(LINE terminal) is 0V.

INCH ADD/DEC: Setting amount of tension increase / decrease, it is assigned by multi-function terminal for tension jog increase setting or tension jog

decrease setting("SV" + "INCH ADD" or "DEC" equal to the actual tension setting value).

PRESET SET VALUE: New reel's tension pre-setting value, this setting are sent from terminal "PRV", "NRV"(0~24V), "NROUT"(0~+10V) separately for providing new reel's pre-tension.

CUT ADD/TE VALUE: The increased-tension in changing reel and cutting materials. In the time of changing reel, tension setting value of changing reel and cutting materials.

PRESET SET TIME: The time of changing reel. It will be enabled every time that "CHANGE" terminal (Vs "COM" terminal) be opened or closed. The corresponding cutting movement will be executed within this time.

STOP TIME: STOP TIME will be enabled and counted when "RUN" terminal(Vs "COM" terminal)is opened. There are two kinds of selection will be provide; One is PID is controlled continuously, the other is STOP RATIO for brake. In general, this parameter must be set as same as the time of speed decrease(the time from system off to zero speed). When the "RUN" terminal is opened, STOP TIME will be the delay time of system until the motor is stopped.

STOP FUNC SELE: The mode selection at stop. The measures be done within STOP TIME(same as above).

STOP RATIO: The brake amount within STOP TIME; If select STOP RATIO within STOP TIME, the brake amount will be the setting value of parameter multiply the current diameter amount.

MAXIMUN DIAMETER: The maximum diameter amount of winding reel or unwinding reel.

MINIMUN DIAMETER: The minimum diameter amount of winding reel or unwinding reel.

THICKNESS: The thickness setting of winding materials. It is used to provide to SENSOR for calculating diameter. This parameter is only displayed when DIAMETER SOURCE is assigned to SENSOR.

TB DIAMETER LOGIC: Logic selection of supersonic

TB DIAMETER ZERO: Zero point adjustment of supersonic

TB DIAMETER SPAN: Multiple ratio of supersonic of external diameter input.

START TORQUE: Start torque compensation. When "RUN" terminal is started, the start torque compensation is sent out immediately, it can adjust this parameter to overcome the slow start, which is caused by mechanical static friction.

MANUAL VR SCAL: Maximum bias adjustment value (Bias Adjustment) of "MANUAL VR" of panel at the automatic state

MAXIMUN _DIAM VO: Maximum diameter for Taper Tension special purpose (Taking terminal "OUT1" as standard) When the parameter "DIAMETER SOURCE" is set to "DIVIDER", this parameter will be displayed.

The maximum diameter voltage in the taper tension (This parameter and the next parameter are the range of taper tension)

MINIMUN _DIAM VOL: Minimum diameter for Taper Tension special purpose (Taking terminal "OUT1" as standard)

The minimum diameter voltage in the taper tension (This parameter and the previous parameter are the range of taper tension)

GAIN RATIO: Output Ratio of “OUT1”: This parameter is enabled by terminal “MC1” and “MC2”.

※ **Magnifying or reducing output in increasing speed and decreasing speed to achieve the function of acceleration and deceleration compensation**

(This parameter must be larger than 100% in acceleration compensation, less than 100% in deceleration compensation)

Fun2: TAPER PARAMETER GROUP

TAPER MODE SELE: Mode setting of taper tension curve

0:LINER: Linear

1:NON-LINER: Non-linear(multi-sectional, irregular)

TAPER RATIO: Linear taper tension; this parameter is valid when the “TAPER MODE SELE” is set to linear(the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%).

When select “**NON-LINER**”(Non-linear), the following parameters will be valid.

TAPER TENS SET1: The #1 turning point's setting value of non-linear taper tension; according to diameter amount, under the turning point, the tension won't be tapered.

TAPER TENS SET2: The #2 turning point's setting value of non-linear taper tension; when diameter amount is between this parameter and “TAPER TENS SET1”, then “TAPER SET RATIO1”(Taper Ratio) is the taper amount.

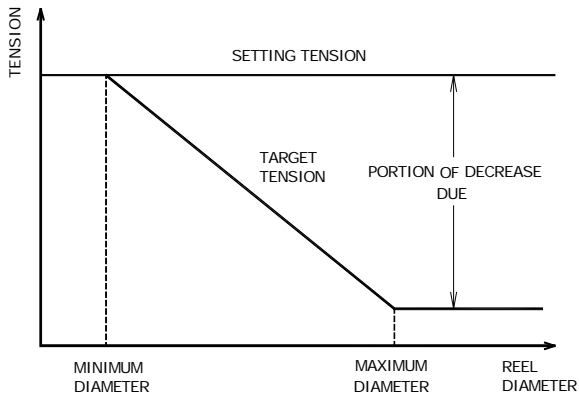
TAPER TENS SET3: The #3 turning point's setting value of non-linear taper tension; when diameter amount is between this parameter and “TAPER TENS SET2”, then “TAPER SET RATIO2”(Taper Ratio) is the taper amount.

TAPER SET RATIO1: The taper ratio between #1 turning point and #2 turning point(this parameter is multiplier), setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%.

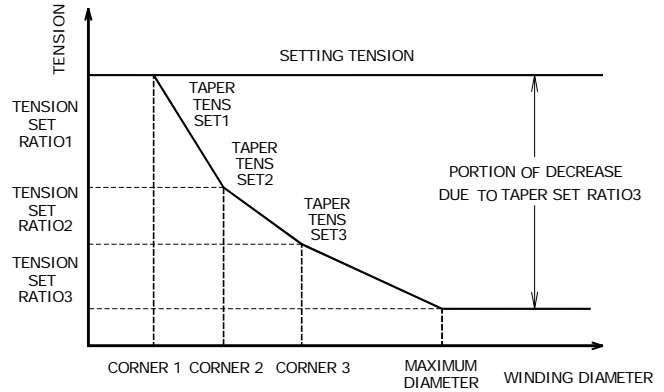
TAPER SET RATIO2: The taper ratio between #2 turning point and #3 turning point(this parameter is multiplier), setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%.

TAPER SET RATIO3: The taper ratio above #3 turning point(this parameter is multiplier), setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%.

LINEAR LINE TAPER



NON-LINEAR LINE TAPER



Fun3: FUNC PARAMETER(parameter setting)

TENSION SELECT FUNC: Source selection of tension setting

0:PLANE TENSION Operation panel's **VR** setting

1:PUSH TENSION Setting of UP/DOWN key

2:EXT VR TENSION **TENS** terminal input

MC1 SELECT FUNC: **MC1** terminal's function selection

0:INCHING ADD0 : Jog-increase tension setting

1:INCHING DEC : Jog-decrease tension setting

2:OUT REMOTE : Output signal is controlled by external remote control

3: :OUTPUT GAIN: parameter of Gain ratio enable

MC2 SELECT FUNC: **MC2** terminal's function selection

0:INCHING ADD0 : Jog-increase tension setting

1:INCHING DEC : Jog-decrease tension setting

2:OUT REMOTE : Output signal is controlled by external remote control

3: :OUTPUT GAIN: parameter of Gain ratio enable

AD1 SELECT FUNC: **AD1** analog input's function selection

0:NO FUNCTION

1:NEW REELVALUE: New roller's tension setting

2:TAPER (linear) : Taper tension setting

3:TENSION(FBK): Taper detection input(when LOADCELL isn't exist, Input Power: 0 ~ +/- 10V)

AD2 SELECT FUNC: **AD2** analog input's function selection

0:NO FUNCTION

1:NEW REELVALUE: New roller's tension setting

2:TAPER (linear) : Taper tension setting

3:TENSION(FBK): Taper detection input(when LOADCELL isn't exist, Input Power: 0 ~ +/- 10V)

RLY SELECT FUNC: Mode selection of relay movement

0:HIGH In High tension

1:LOW In Low tension

2:ALARM: Abnormal

RLY FBK HI/LOW: Tension detection's relay moving point; according to the above parameter "RLY SELECT FUNC" setting, if the mode is set to "HIGH", detection is higher than relay moving point, then the relay will be active; if the mode is set to "LOW", detection is lower than relay moving point, then the relay will be active.

Fun4: PID PARAMETER GROUP

TENSION PID FEEL: Tension's dead band be allowed; the range is 0~Scale, when the difference between tension setting and actual feedback value is smaller than this parameter, then PID doesn't need to correct.

TENSION PID SLP: The first section of tension's slip breakpoint; the range is 0 ~ Scale, the difference(slip) between tension setting value and actual feedback value is breakpoint. The value is between "TENSION PID FEEL" and "TENSION PID SLP", then the parameters value of "TENSION CP GAIN", "TENSION CI+ GAIN", "TENSION CI- GAIN" will be as correction.

TENSION PID SLP1: The second section of tension slip; the range is 0 ~ Scale, the slip value is the second section. The value is between "TENSION PID SLP" and "TENSION PID SLP1", then the parameters value of "TENSION CP 1 GAIN", "TENSION CI1+ GAIN", "TENSION CI1- GAIN" will be as correction, if the value is larger than "TENSION PID SLP1", then the parameter value of "TENSION CP2 GAIN", "TENSION CI2+ GAIN", "TENSION CI2 - GAIN" will be as correction.

TENSION CP GAIN: The first section's tension slip ratio(0~500%)

TENSION CI+ GAIN: The rising time of the first section's tension error integrator(0~500S); when the setting value is larger than the actual value, the integrator must increase progressively.

TENSION CI- GAIN: The falling time of the first section's tension error integrator(0~500S); when the setting value is smaller than the actual value, the integrator must decrease progressively.

"CP", "CI+", "CI-" will be as the calculation factor for **PID** in the first section breakpoint(when the setting value is larger or smaller than actual value, integrator can set the increased or decreased integral time separately. The more value of "CP" is, the more amount of positive compensation is. The more value of "CI" is, the more integral time is(correction will be more slow).

TENSION CP1 GAIN: The second section's tension slip ratio(0~500%)

TENSION CI1+ GAIN: The rising time of the second section's tension error integrator(0~500S); when the setting value is larger than the actual

value, the integrator must increase progressively.

TENSION CI1- GAIN: The falling time of the second section's tension error integrator(0~500S); when the setting value is smaller than the actual value, the integrator must decrease progressively.

“**CP1**”, “**CI1+**”, “**CI1-**” will be as the calculation factor for **PID** in the second section breakpoint(when the setting value is larger or smaller than actual value, integrator can set the increased or decreased integral time separately. The more value of “**CP**” is, the more amount of positive compensation is. The more value of “**CI**” is, the more integral time is(correction will be more slow).

TENSION CP2 GAIN: The third section's tension slip ratio(0~500%)

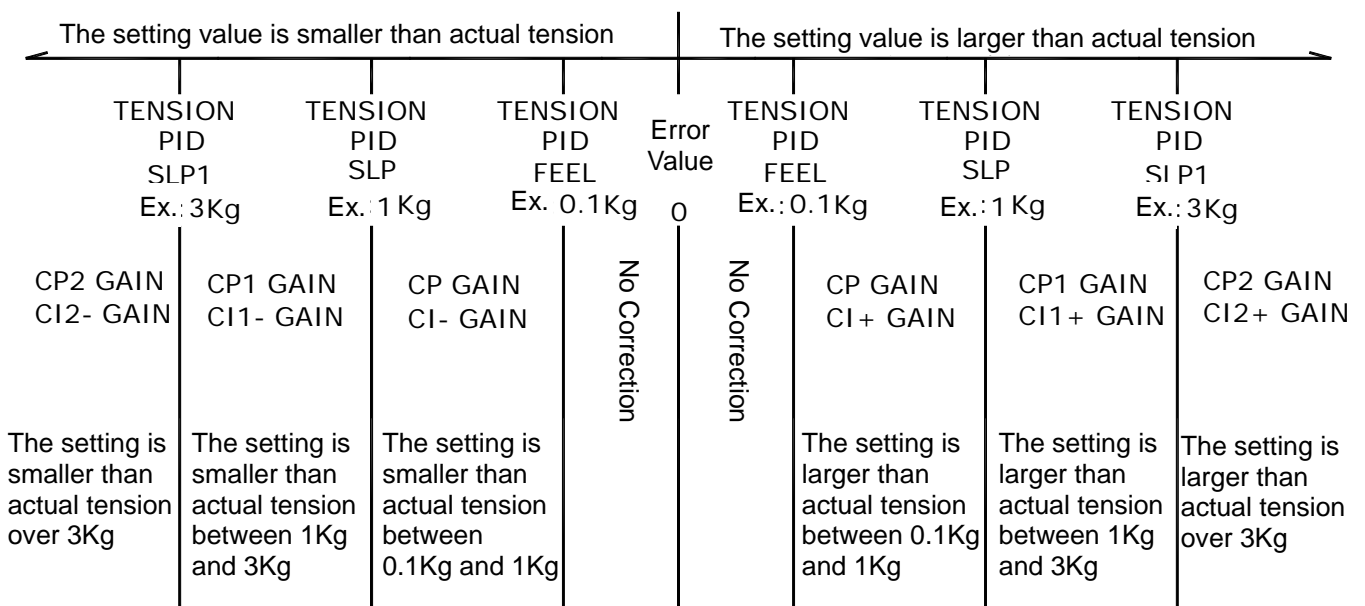
TENSION CI2+ GAIN: The rising time of the third section's tension error integrator(0~500S); when the setting value is larger than the actual value, the integrator must increase progressively.

TENSION CI2- GAIN: The falling time of the third section's tension error integrator(0~500S); when the setting value is smaller than the actual value, the integrator must decrease progressively.

“**CP2**”, “**CI2+**”, “**CI2-**” will be as the calculation factor for **PID** in the second section breakpoint(when the setting value is larger or lower than actual value, integrator can set the increased or decreased integral time separately. The more value of “**CP**” is, the more amount of positive compensation is. The more value of “**CI**” is, the more integral time is(correction will be more slow).

The difference between setting value and actual tension value

PID Correction Diagram



PID FILTER TIME: The filter time of tension feedback, the filter time of load cell's signal feedback(the longer the time is, the slower the PID is)

Fun5: FBK PARAMATER GROUP

LOADCELL UNIT: The unit of tension detection and display; the setting is: **0:Kgf** and **1:N**

LOADCELL SCALE: The specification of load cell; the range is 0 ~ 1000Kg, it is selected from load cell(single side) corresponding Kg.

LOADCELL SELECT: The selection of load cell quantity and left-right side

0:REELS Two sides detection

1:L-REEL Single and left side

2:R- REEL Single and right side

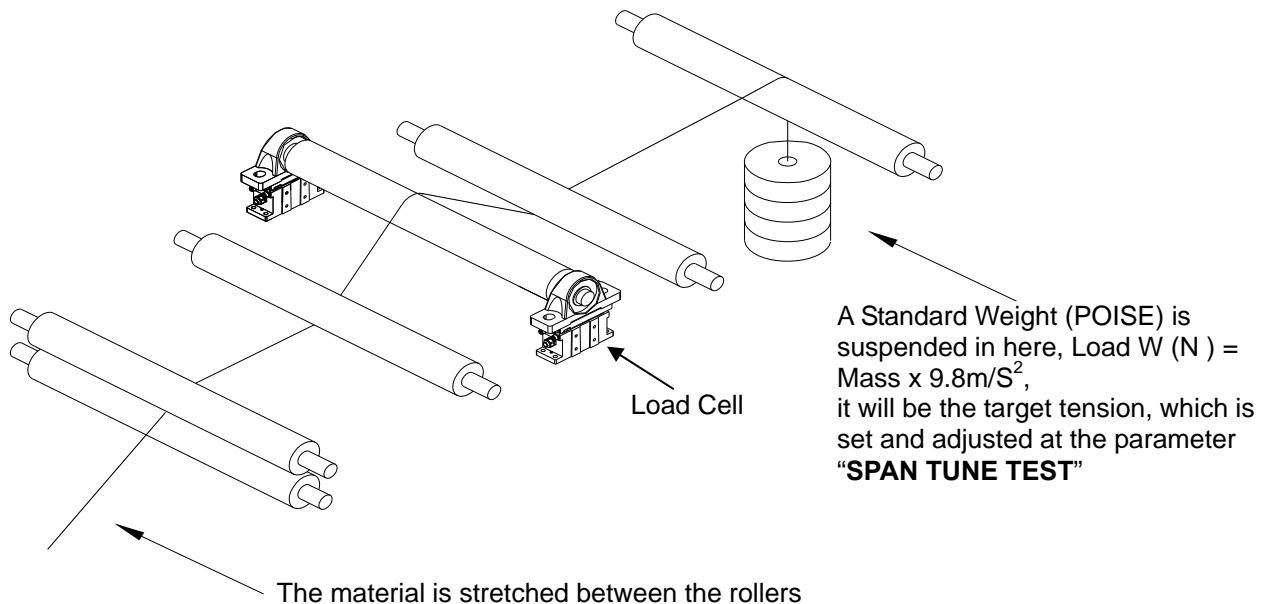
ZERO TUNE TEST: The zero reset correction of load cell's tension; the range is $-\text{SCALE} \sim +\text{SCALE}$.

Load Cell Zero Reset Correction: When load cell is installed at machine(including roller), adjusting the display value to "0.0Kg", then press "SET" key, the zero reset is completed.

SPAN TUNE TEST: The highest point correction of load cell's tension(0 ~ 500Kg).

Load cell highest point correction:

See the following Fig.: Drawing – LOAD(The load should be close to the full scale of Kg no. of load cell.



Example:

If the load is 20Kg, pressing UP/DOWN key for adjusting SPAN value until the tension display is 20Kg, press SET key, then load cell highest point correction is completed.

- ◆ If "LOADCELL L-ALARM"(Left side) and "LOADCELL R-ALARM "(right side) are displayed, it means the polarity of detector(load cell) is opposite, please swap the GREEN wire and WHITE wire of detector each other, and excuse the correction of ZERO and SPAN again.
- ◆ ZERO RESET and HIGHEST POINT correction should be completed within one time; when the ZERO RESET correction is completed, pressing SET key first, let SPAN display be flashing, suspending a Standard Weight(POISE), the setting SPAN value, if the Standard Weight doesn' t be suspended, SET key should also be pressed, make SPAN display be flashing, if the SPAN display doesn' t flash, the parameter setting will be exited after 5 seconds.

Fun6: DISP PARAMATER GROUP

PUSV: Decimal point's No. setting of tension setting and display(This parameter is vlad only in the state of tension setting and display).

Setting "0" : It means no decimal point.

SPr: Display percentage(0 ~ 50 times); when SPr is set to 1 time, the display is basic unit, the top line display percentage(fixed one digit of decimal point).

Src: Source selection of top line display

0:LINE INPUT 1:WIND INPUT 2TENSION INPUT 3:ADIN1	0:LINE terminal voltage 1:WIND terminal voltage 2: Tension setting value 3: ADIN1 terminal voltage
4:ADIN2 5:TORQUE OUT 6:NR OUT 7:SP OUT	4: ADIN2 terminal voltage 5: Torque commend voltage 6:NR OUT terminal voltage 7:SP OUT terminal voltage
8:FBK OUT 9:SLP 10:PID VOL 11:DIAMETER 12:COUNT 13:FEEDBACK 14:FBK-L CELL 15:FBK-R CELL 16:SERIAL STATUS 17:FBK(SERIAL) 18:SV(FEEDBACK) 19:SPAN SCALE	8: Voltage of "FBK OUT" terminal 9: Error amount 10: Voltage of error amount compensation 11: Diameter amount 12: Counting length amount 13: Total amount of tension 14: Left side load cell's tension 15: Right side load cell's tension 16: Communication status 17: Total amount of tension 18: Filter (Total tension value) 19: Display rate of Load cell SPAN

FUN 7: SERI PARAMATER GROUP (Please refer **8. Communication**)

FUN 8: INSD PARAMATER GROUP YUNN

1234: Restore to **DEFAULT**

0: Could change any value of parameter

1~9999: Can't change any value of parameter

4. Adjustments and Test Run

4.1 Test Run Procedure

The required preparation and task for automatic operation should be proceeded as the following adjustment:

- (1) Controller installation and wiring.
- (2) Controller DIP switch setting, tension detector adjustment
- (3) To do drive system check through by manual operation.
- (4) Proceeding operation check in the automatic control mode.
- (5) Adjusting operation parameter based on requirement.
- (6) Abnormal check.
- (7) Adjustment ends.

4.2 DIP Switch Function Setting

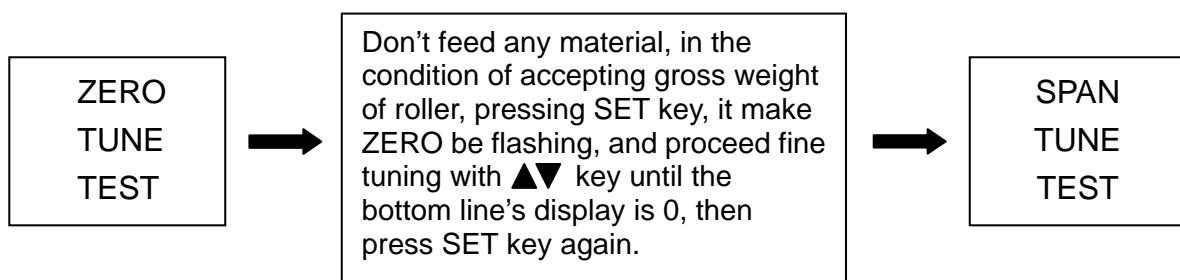
According to the required mode, setting DIP switch's state.

SW1 Function: Control loop of "TQ OUT", "NROUT", "SPOUT", "FBKOUT"; signal selection (switching between -10~0~+10Vdc and -5~0~+5Vdc)

4.3 Adjustment of Tension Detector(Load Cell)

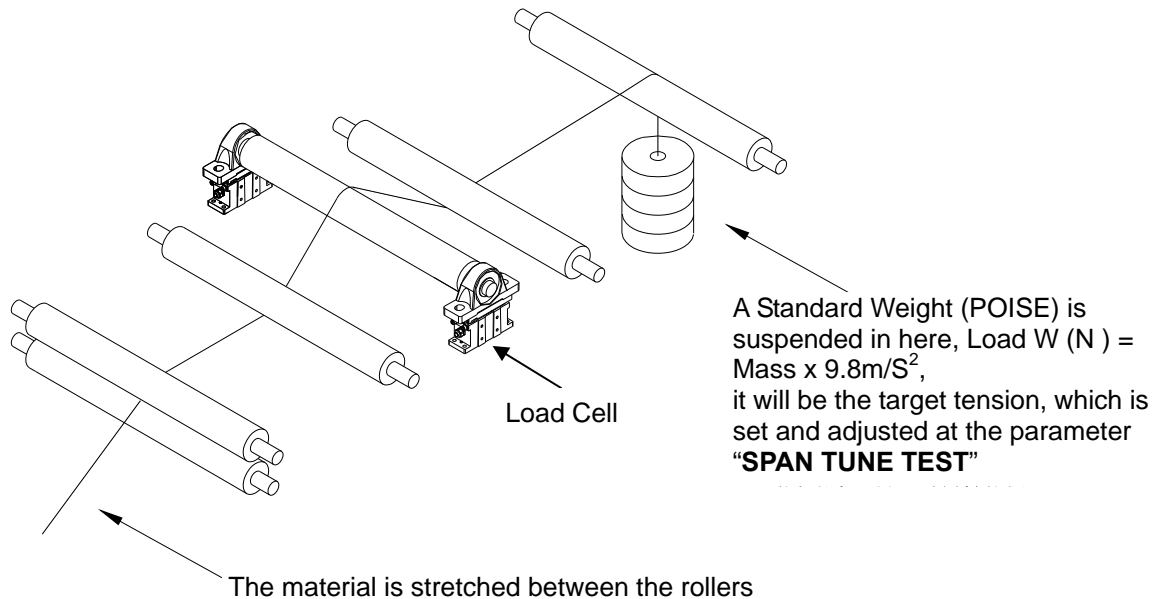
- (1) Going to "FBK PARAMETER" parameter group, setting the corresponding detector's unit and specification of single side, and set the detector's number at the parameter "LOADCELL SELECT".
- (2) Zero reset of tension detector: Proceeding correction for the gross weight load of detecting roller and shaft, the adjustment should be proceeded in the state of installing roller but without any material is passing through it.

ZERO TUNE TEST(Zero Reset Correction)

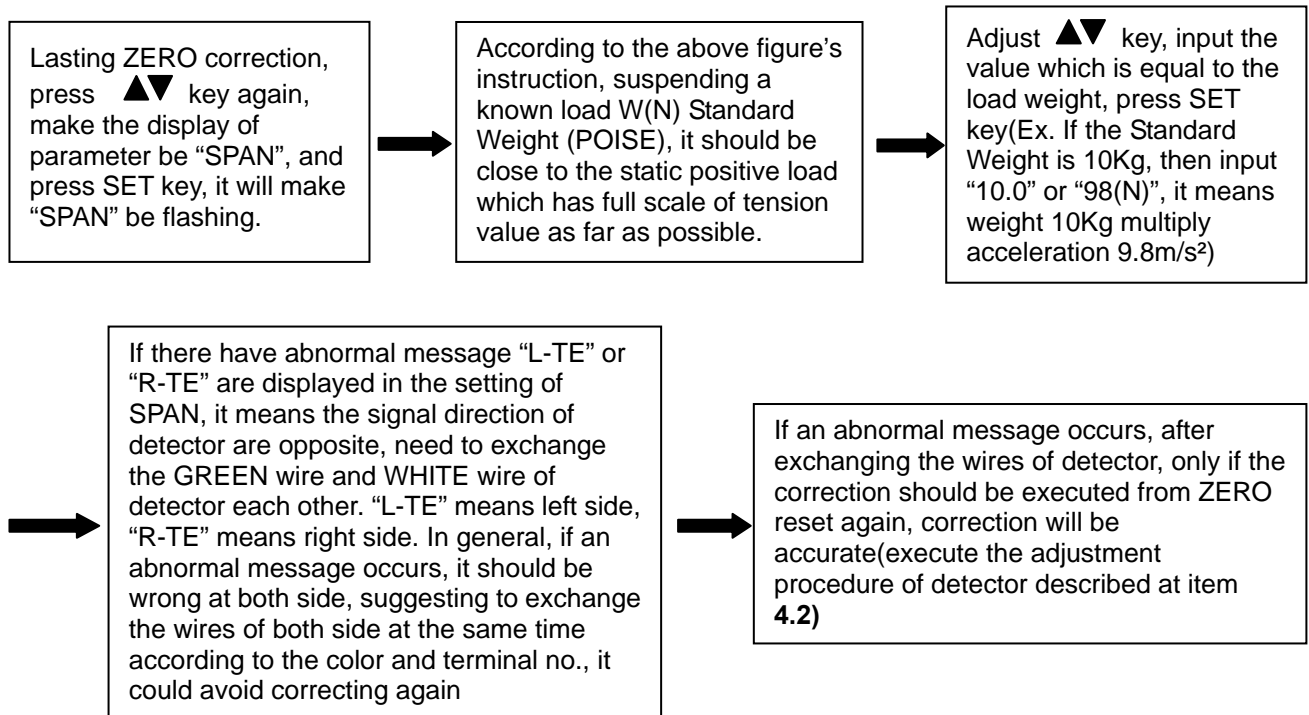


(3) **SPAN TUNE TEST** adjustment of tension detector:

The load from material which put on the tension detector will be different because of the installation angle of detector and passing angle of material. Therefore, it need adjust the span and proceed correction.



Gravity Correction(SPAn)錯誤!



If **“LOADCELL L-ALARM”** appeared on the display, it means the stress direction of detector of left side is opposite; If **“LOADCELL R-ALARM”** appeared on the display, it means the stress direction of detector of right side is opposite. Please exchange GREEN wire and WHITE wire of detector each other, pressing RESET terminal again, and re-execute the correction of ZERO and SPAN(please refer the wiring diagram; there have two kinds of wiring; press-type wiring, stretch-type wiring).

4.4. The Central Winding or Unwinding Control

First correctting whether the signal of line speed reach to termial stage “LINE”, “0V”(or connect terminal “+10V” and terminal “LINE”). Ensuring whether the feedback signal “DC 0 ~ +10V” of winding controller reach to termial stage “WIND”, “0V”.

- ※ When the mode is central winding(motor drives directly), the signal of line speed and motor feedback speed must be connected, so it could extend the functions of tension control and taper tension accurately; When using detector for counting length control, the signal of line speed shouldn't be connected, but the signal of motor feedeback speed should be connected or connecting the terminal “+10V” to terminal “LINE”.
- ※ When the mode is brakedrive of central winding(magnetic powder brake or clutch), please use detector counting length control(diameter calculation), so it could extend the functions of tension control and taper tension accurately; The signal of line speed should be connected or connecting the terminal “+10V” to terminal “LINE”.

The operation of this controller(terminal “RUN”) must start or stop with drive(Ex. Inverter) together.

- ※ When the mode is brake drive of central winding(magnetic powder brake or clutch), connecting terminal “STALL” to terminal “COM” in the zero speed when stop(the “RUN” terminal is not need to ON). Using the setting of retention tension (“STALL SV”), the tension setting is less, and rewinding roller will not loosen materials when the system is stopped.
- ※ When the winding feedback speed isn't connected, please connect “WIND” and “LINE” terminal together, it can avoid that the “SPOUT” output speed will be less (Because the diameter of material roll is considered to be maximum diameter, and the output speed will be less if the diameter is increased progressively).
- ※ If the torque command is opposed to the trend of tension-increase or tension-decrease, reversing the rotary direction of drive or connecting terminal “MC3” to terminal “COM”, the polarity will be reversed, then the setting is completed.

5. Abnormal Message

- (1) **LOADCELL L-ALARM** message: It means the polarity of left side load cell is opposite. (It is only shown in SPAN correction). Please exchange the green wire and white wire of left load cell.
- (2) **LOADCELL R-ALARM** message: It means the polarity of right detector is opposite. (It is only displayed in SPAN correction). Please exchange the green wire and white wire of right load cell.

※ When **LOADCELL L-ALARM** or **LOADCELL R-ALARM** message appear, after it is corrected, you can reset the controller by connecting “RESET” and “COM” terminal or going to parameter setting to set “ZERO” and “SPAN” to clear the abnormal message.

- (3) If the controller is in operation, and the panel's ERROR light is flashing, it means the tension is continuous at the condition, which is not enough or is over (the tolerance of modification will approach to the value of +/- 10V). Please check the coordination condition between parameter and peripherals; for example, the roller is slipped, the front take-up roller is pulled by over-tension, or the drive can't drive...etc.
- (4) The “NEG LOAD CELL” and the negative value display are flashing alternately: It means the position of LOAD CELL is error, and the display is negative Kg. The position offset is because an external force affects the load cell. Please check that the position of LOAD CELL Roller had offset or was jammed; or the fixed screw of Roller bearing is so long as to interfere the internal spring plate. When the above errors or faults were obviated, please install and do the adjustment of LOAD CELL again (refer chapter4, section4.2).

6. Specification

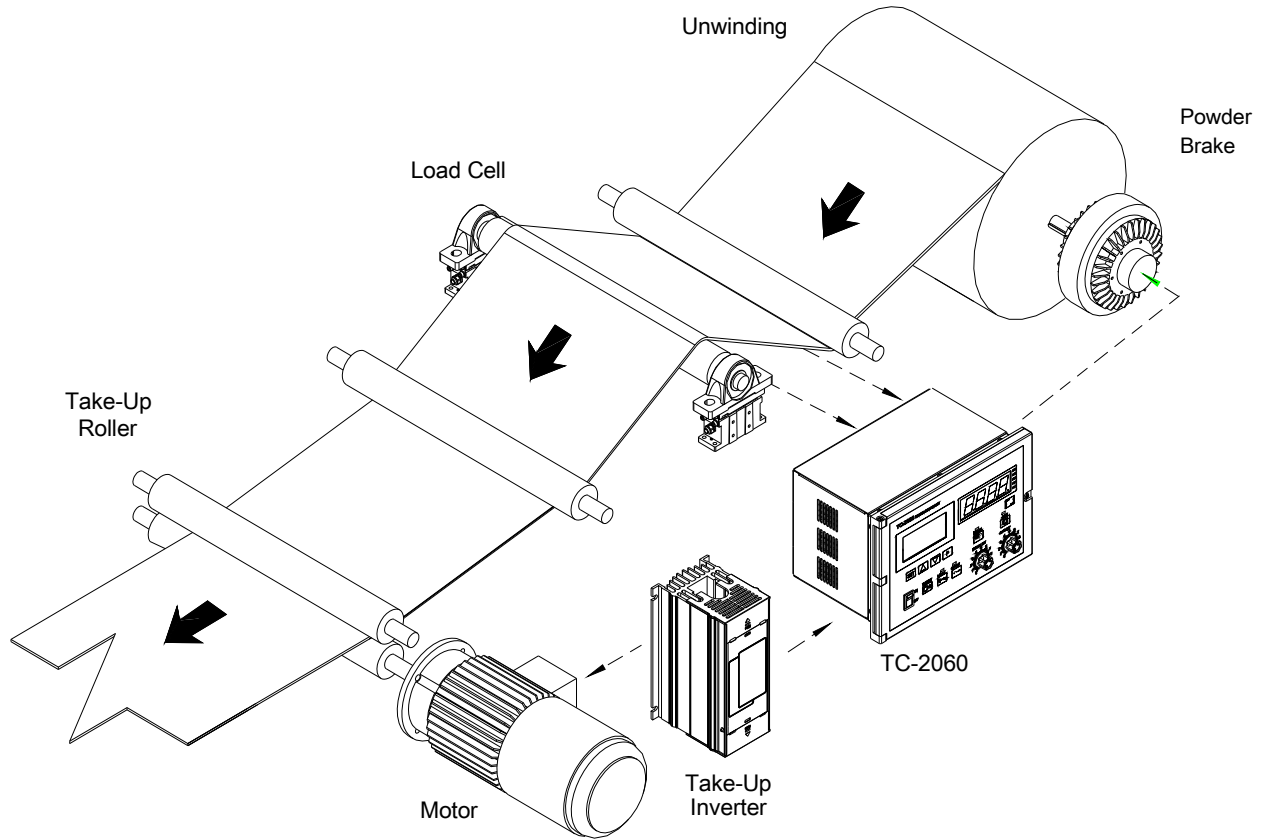
Item		Related Terminal	Specification	
Power	Input	R T FG	AC 180~245V 50/60Hz About 40VA Built-in 2A fuse F.G is earthed based on the third kind of grounding method (The Neutral Line of 3Φ4W Power is connected with the case of device to “Earth”)	
	Output	RED-L RED-R	DC5V OV	Power of tension detector: (+) RED wire is connected to RED-L, RED-R (-) Black wire is connected to BLKL, BLKR
Contact Signal	Input	RUN COM	Run contact Common contact	ON=Auto. RUN OFF=STOP Need to active with drive’s relay together
		CHANGE	Input of changing shaft movement	Normal open is REEL A, Normal close is REEL B
		STALL	A terminal that retention tension is enabled when STOP (“RUN” is flashing)	ON= retention tension setting(the other set is SV setting value) OFF=Tension setting in the operation (SV setting value)
		REST COM	Abnormal Reset Terminal Common contact	Please connect to COM in the abnormal reset
		MC1	Input terminal of multi-function	Function can be programmed by parameter
		MC2	Input terminal of multi-function	Function can be programmed by parameter
		MC3	Output polarity change	Change from the original “0~+10V” to “0~ -10V” (Torque polarity is opposite)
		MC4	Manual Input Terminal	Manual Input Terminal
		+12V SENS 0V	DC12V Diameter counting length input 0V	Max=30MA SENS, can be selected for use / un-use by parameter (Diameter calculation input sensor uses NPN transistor type)
		Contact Signal	Output	ALMA ALMB ALMC
Signal	Output	FBK OUT 0V	Tension value output Signal Common	Connect tension meter externally, 0~+10Vdc, Max 5ma
	Output	NR OUT 0V	Output of new roller’s torque signal	0~+10Vdc, Max 5ma

	Output	4~20ma 0V	Signal output of closed loop control(current source)	Connect EXTENDED RANGE TRANSDUCER(Current to Pressure Converter) externally
	Output	SP OUT 0V	Line speed Output	0~+10VDC, Max 5ma (The Output will be decreased when the material diameter of roller is increased)
	Output	TQ OUT 0V	Signal Output of closed loop control	0~+10VDC, Max 20ma / 4~20ma
	Output	PP, PN	Output of magnetic powder drive	0~ +24VDC, Max 5A
	Output	P12V N12V	Output of new roller magnetic powder drive	New roller 0~ +24VDC, Max 2A
	Input	GR-L GR-R WH-L WH-R	Tension detector input terminal 0~±500mv, Input impedance 20KΩ (LMSseries)	
		LINE 0V	Line Speed Input	0~+10VDC, Input impedance 20KΩ
			Signal Common	
		WIND 0V	Input of winding speed	0~+10VDC, Input impedance 20KΩ
	Signal Common			
	Input	ADIN1 ADIN2	Input terminal of multi-function	0~+10VDC, Input impedance 20KΩ Function can be programmed by parameter.
			Input terminal of multi-function	0~+10VDC, Input impedance 20KΩ, Function can be programmed by parameter.
	Input	TENS 0V	Input terminal of external tension Signal Common	0~+10VDC, Input impedance 20KΩ
Environmental Temp. Environmental Humidity Environment			<ul style="list-style-type: none"> ● 0~+40℃ ● 35~85%RH(Non-Surface Condensation) ● Corroded Gas, Burnable Gas, Conductive DUST are prohibited 	

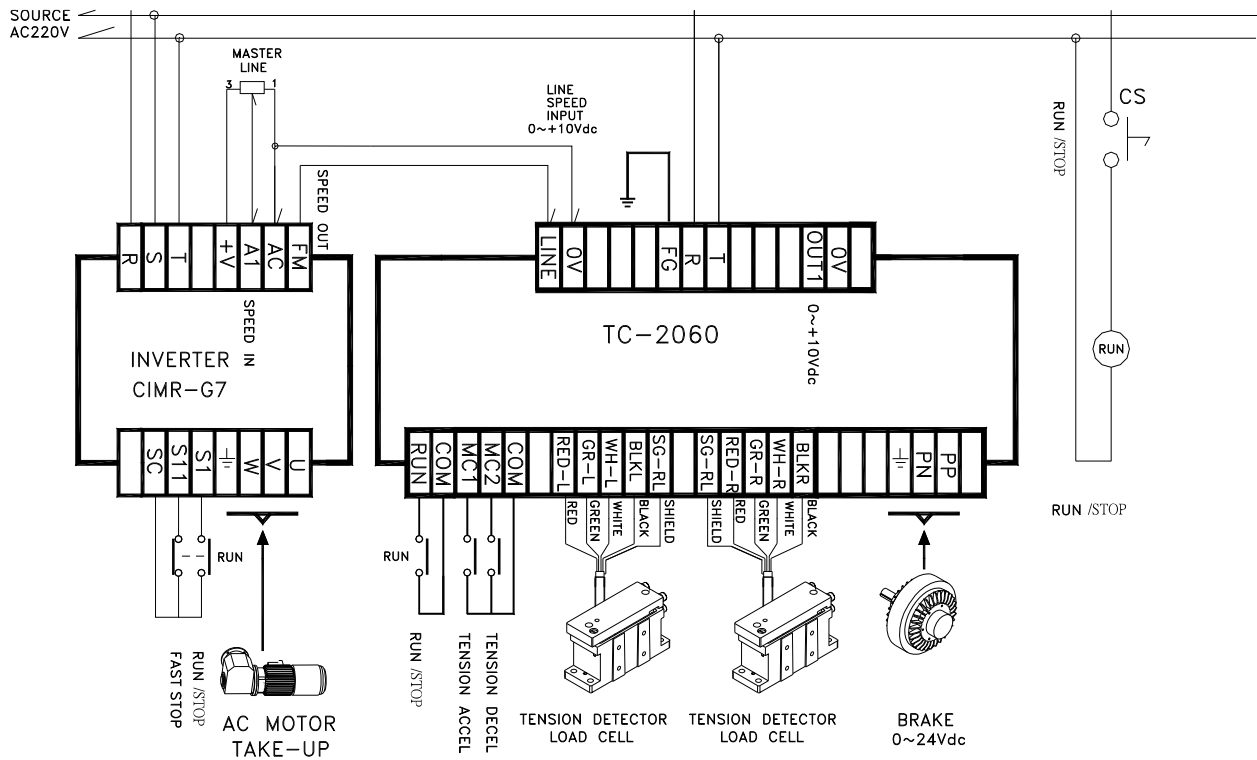
7. Application Examples:

7-1 Central Unwinding Tension Control (cooperating to magnetic powder brake)

Flow Chart: CIMR-G7 + TC-2060 + BRAKE



Wiring Diagram (Main Take-Up Roller's Drive is CIMR-G7 series)



Related Parameter (Central Unwinding Tension Control – Cooperating to magnetic powder brake)

(1) Main guiding roller's inverter (YASKAWA CIMR-G7 series)

A1-00	Language	0 (English)
A1-01	Parameter access class	2 (High class)
A1-02	Control Mode	3 (Vector attached PG, if it doesn't attach PG card, set it to 2)
b1-01	Frequency Instruction Selection	1 (Terminal)
b1-02	Operation Instruction Selection	1 (Terminal)
b1-03	Stop Method Selection	0 (Reducing speed to stop)
C1-01	Acceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-02	Deceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-04	Deceleration Time	2 (Stop time, it is set in accordance with line speed's requirement)
E1-01	Input Voltage Setting	AC220V (According to power voltage)
E1-03	V/F Curve Selection	F (Arbitrary curve)
E1-04	The Highest Output Frequency	60HZ (It is set in accordance with line speed's requirement)
E1-05	The Maximum Voltage	AC220V (According to the rated voltage of motor)
E1-06	Base Frequency	60HZ (According to the rated voltage of motor)
E1-07	Central Output Frequency	3HZ
E1-08	Voltage of Central Output Frequency	11V
E1-09	The Lowest Output Frequency	0.5HZ
E1-10	Voltage of the Lowest Output Frequency	3V
F1-01	PG Parameter	600P/R (According to the specification of PG)
F1-02	PG Disconnection Detection Selection	1 (Free Stop)
F1-03	The corresponding action in over-speed	1 (Free Stop)
F1-04	Speed Offset which detected is too large	3 (Motor keeps on running)
F1-05	PG Rotary Direction	0 (Forward revolution)
H1-09	S11 Terminal's Function	7 (The switch of acceleration and deceleration time)
H2-02	P1 Terminal's Function	1 (Output when the speed is zero)
H3-01	Terminal A1 of Frequency Instruction	0 (0 ~ +10VDC)

The above listing of parameters are only for reference, please refer the Instruction Manual for the other parameters which don't list.

**(2) TC-2060 Tension controller's related parameters and DIP thumb switch position
SW1→0~10VDC Position**

TC-2060 Tension Controller's Related Parameter (Central Unwinding Tension Control – Cooperating to magnetic powder brake)

(3) Parameter Table

3.1:MAIN PARAMETER

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DRIVER SELECT	Drive Selection	POWER (CLUTCH)	0:POWER(CLUTCH) 1:MOTOR(TORQUE) 2:E/P REQUULATOR	0:Magnetic Powder Clutch 1:Motor(torque control) 2:Current to Pressure Converter
FUNCTION SELECT	Winding and Unwinding Selection	UNWIND	0:WINDER, 1:UNWIND	0:Winding 1:Unwinding (Setting can't be changed in the RUN)
DIAMETER SOURCE	The Source of Diameter Detection	DIVIDER	0:DIVIDER 1:SENSOR 2:TB(DIAMETER) 3:DIVIDER(INT)	0: Line speed and winding speed calculation 1: Proximity switch length calculation 2: External diameter signal terminal input 3: parameter of MAXIMUM_DIAHI and MINIMUM_DIALO
LINE RATIO	Ratio of line speed signal input	100.0%	10~500.0%	LINE terminal input
WIND RATIO	Ratio of winding feedback signal	100.0%	0~500.0%	WIND terminal input
TENS RATIO	Ratio of signal	100.0%	0~500.0%	TENS terminal input
ADIN1 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN1 terminal input
ADIN2 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN2 terminal input
AUTO VR MAXIMUM	Ratio of signal	100.0%	0~100.0%	Use range(%) of tension setting for panel's VR (including Terminal "TENS")
MECH COMPANSION	Acceleration Compensation	100.0%	0~999.9%	Compensation amount in acceleration
MECHANISM LOSS A	Static friction compensation of A reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
MECHANISM LOSS B	Static friction compensation of B reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static

INITIAL TENSION	Initial Tension Compensation	30.0%	0~100.0%	Setting of initial tension compensation
INCH ADD/DEC	Setting value of tension increase and decrease	5Kg	0~FULL SCALE Kg	MC1~2 terminal assigned
PRESET SET VALUE	Pre-setting value of new shaft tension	50.0%	0~100.0%	Constant Value(Output from terminal "NROUT", "P12V", "N12V")
CUT ADD/TE VALUE	Increased tension in changing reel and cutting material	100.0%	0~500.0%	T this value are actual cutting material's tension
PRESET SET TIME	Time of changing reel	5.0SEC	0~10.0SEC	Time of changing reel procedure
STOP TIME	STOP time	5.0S	0.0~60.0S	The time of stop when the "RUN" terminal is opened
STOP FUNC SELE	Mode selection in stop	STOP RATIO	0: PID ON 1: STOP RATIO 2:STOP STALL	0: PID continue control within the STOP time 1: Follow "STOP RATIO" to brake 3:Hold voltage in terminal out1
STOP RATIO	Brake value within the STOP time	200.0%	0~500.0%	Brake is multiplied owing to "STOP RATIO" multiply by the diameter value
MAXIMUN DIAMETER	Maximum diameter	1000mm	300~5000mm	
MINIMUN DIAMETER	Minimum diameter	100mm	50~300mm	
THICKNESS	Thickness setting of winding material	120um	10~10000um	When the parameter "DIAMETER SOURCE" is set to "SENSOR", this parameter will be displayed
TB DIAMETER LOGIC	Logic selection of supersonic	0~10VDC	0=0~10VDC 1=10~0VDC	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER ZERO	Zero point adjustment of supersonic	0.0V	-5.00V~+5.00V	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER SPAN	Multiple ratio of supersonic	100.0%	0~500.0%	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
START TORQUE	Start torque compensation	0V	0 ~ +10Vdc	When "RUN" terminal starts, then output torque compensation right away
MANUAL VR SCAL	Auto run MANUAL VR adjustment	0V	0~+10VDC	Parameter MANUAL VR SELECT=AUTO BIAS SET Enable

MAXIMUN _DIAM VOL	Multiple ratio of supersonic	10.00V	0~10.00Vdc	When the parameter “DIAMETER SOURCE” is set to “DIVIDER(INT)”, this parameter will be displayed(taper tension)
MINIMUN _DIAM VOL	Zero point adjustment of supersoni	0.0V	0~10.00Vdc	When the parameter “DIAMETER SOURCE” is set to “DIVIDER(INT)”, this parameter will be displayed(taper tension)
GAIN RATIO	adjustment of Out1 ratio	100%	0~500%	When MC1 ,MC2 terminal Enable the parameter then output torque compensation right away

3.2:TAPER PARAMETER (Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TAPER RATIO	Linear taper tension	100.0%	0~200.0%	Taper ratio is valid only the above TAPER MODE is set to linear(the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%)
TAPER TENS SET1	The #1 turning point's setting value of non-linear taper tension	300mm	0~2000mm	According to diameter value(under the turning point, the tension won't be tapered)
TAPER TENS SET2	The #2 turning point's setting value of non-linear taper tension	500mm	0~2000mm	According to diameter value
TAPER SET RATIO1	Taper Ratio between #1 turning point and #2 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO2	Taper Ratio between #2 turning point and #3 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO3	Taper Ratio above #3 turning point	100.0%	0~200.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER MODES SELE	Mode setting of taper tension curve	LINER	0: LINER 1: NON-LINER	0: Linear 1: Non-Linear (multi sectional, irregular)

3.3:FUNC PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFALUT	SETTING RANGE	EXPLANATION
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TENSION SELECT FUNC	Source selection of tension setting	PLANE TENSION	0:PLANE TENSION 1:PUSH TENSION 2:EXT VR TENSION	0: Operation panel's VR setting 1: Up / Down key setting 2: Input of Terminal "TENS"
MC1 SELECT FUNC	Function selection of MC1 terminal	INCHING ADD	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
MC2 SELECT FUNC	Function selection of MC2 terminal	INCHING DEC	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
AD1 SELECT FUNC	Function selection of AD1 analog input	NO FUNCTION	0:NO FUNCTION 1:NEW REELVALUE 2:TAPER (Linear) 3:TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
AD2 SELECT FUNC	Function selection of AD2 analog input	NO FUNCTION	0:NO FUNCTION 1:NEW REELVALUE 2:TAPER (Linear) 3:TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
RLY SELECT FUNC	Mode selection of relay action	LOW	0:HIGH 1:LOW 2:ALARM	Relay's function output selection 0: in high tension 1: in low tension 2: abnormal
RLY FBK HI/LOW	Active point of tension detection's relay	3.0%	0~100.0%	Following the above assigned mode; when it is set to "HIGH", relay will be active if it is higher than the active point, when it is set to "LOW", relay will be active if it is lower than active point

3.4: P I D PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
AUTO TUNE ON/OFF	"automatic detection"(PID)	OFF	0:OFF 1:ON	On "automatic detection"
TENSION PID FEEL	Dead band of tension	0.1KG	0~Scale (parameter)	Tension will not be corrected within this range
TENSION PID SLP	Section 1 breakpoint of tension error	1.5KG	0~Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP will be regarded as section 1

TENSION PID SLP1	Section 2 breakpoint of tension error	3.0KG	0~Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP1 will be regarded as section 2
TENSION CP GAIN	Tension error ratio of section 1	10.0%	0~500.0%	The section within PID FEEL and PID SLP1 will be corrected by PI
TENS CI+ GAIN	The rising time of section 1 tension error integrator	300S	0~5000S	
TENS CI- GAIN	The falling time of section 1 tension error integrator	300S	0~5000S	
TENSION CP1 GAIN	Tension error ratio of section 2	20.0%	0~500.0%	The section within PID FEEL and PID SLP1 will be corrected by PI
TENS CI1+ GAIN	The rising time of section 2 tension error integrator	150S	0~5000S	
TENS CI1- GAIN	The falling time of section 2 tension error integrator	150S	0~5000S	
TENSION CP2 GAIN	Tension error ratio of section 3	30.0%	0~500.0%	The section which is small than SLP1 will be corrected by PI
TENS CI2+ GAIN	The rising time of section 3 tension error integrator	20S	0~5000S	
TENS CI2- GAIN	The falling time of section 3 tension error integrator	20S	0~5000S	
PID FILTER TIME	The filter time of tension feedback	100ms	0~500ms	The filter time of load cell feedback signal

3.5:FBK PARAMETER (Feedback Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
LOADCELL UNIT	The unit of tension detecting and display	Kgf	0:Kgf 1:N	
LOADCELL SCALE	Specification of load cell	50.0KG	0~1000Kg	Load cell's specification(single side)
LOADCELL SELECT	Load cell's quantity and right-left side Selection	REELS	0:REELS 1:L- REEL 2:R- REEL	0: Two side detection 1: Left single side 2: Right single side
ZERO TUNE TEST	Load cell's tension zero reset correction	0.0KG	SCALE~+SCALE	

SPAN TUNE TEST	Load cell's tension highest point correction	0~500%	0~500%	
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3.6:DISP PARAMETER(Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DISPLAY POINT	The decimal point number of tension setting	1	0~2(the value of tension setting and display are valid)	The number setting of decimal point(the value of tension setting and display)
DISP NO.1 SOURCE	The first row LCD source selection display	SV	0:LINE INPUT 1:WIND INPUT 2:TENSION INPUT 3:ADIN1 4:ADIN2	0: Voltage of "LINE" terminal 1: Voltage of "WIND" terminal 2: Tension setting's value 3: Voltage of "ADIN1" terminal 4: Voltage of "ADIN2" terminal 5: Voltage of torque command 6: Voltage of "NR OUT" terminal
DISP NO.3 SOURCE	The third row LCD source selection display	TQ OUT	5:TQ OUT 6:NR OUT 7:SP OUT 8:FBK OUT 9:SLP 10:PID VOL	7: Voltage of "SP OUT" terminal 8: Voltage of "FBK OUT" terminal 9: Error amount 10: Voltage of error amount compensation
DISP NO.4 SOURCE	The fourth row LCD source selection display	SP OUT	11:DIAMETER 12:COUNT 13:FEEDBACK 14:FBK-L CELL 15:FBK-R CELL 16:SERIAL STATUS 17:FBK(SERIAL) 18:SV(FEEDBACK) 19:SPAN SCALE	11: Diameter amount 12: Counting length amount 13: Total amount of tension 14: Left side load cell's tension 15: Right side load cell's tension 16: Communication status 17: Total amount of tension 18: Filter (Total tension value) 19: Display rate of Load cell SPAN
DISP FILTER TIME	Display time	5.0S	0~20.0S	The filter time of display value

3.7:SERIAL PARAMETER(Communication)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
COMMAND SELECT	Selection of digital input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Digital input & parameter & SV tension setting value are controlled by RS-485 communication 2: Digital input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SINGLE SELECT	Selection of analog input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Analog input & parameter & SV tension setting value are controlled by RS-485 communication

				2: Analog input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SERIAL ADDRESS	Communication address (the number of station)	0	0 , 1~31	☆ When the communication function is set, the following parameter will be displayed 0: Don't send back, all receive 1~31: station address
BAUD RATE	Communication baud rate	9600	(0)=4800 bps (1)=9600 bps (2)=19200 bps	There are three kinds of baud rate can be set
PARITY SET	Parity setting	NO PARITY	0: NO PARITY 1: EVEN PARITY 2: ODD PARITY	
SERIAL TIME	Communication delay interval of time	15 ms	5~65ms	The delay time between command message and response message

3.8:INSI PARAMETER (Cipher Parameter)

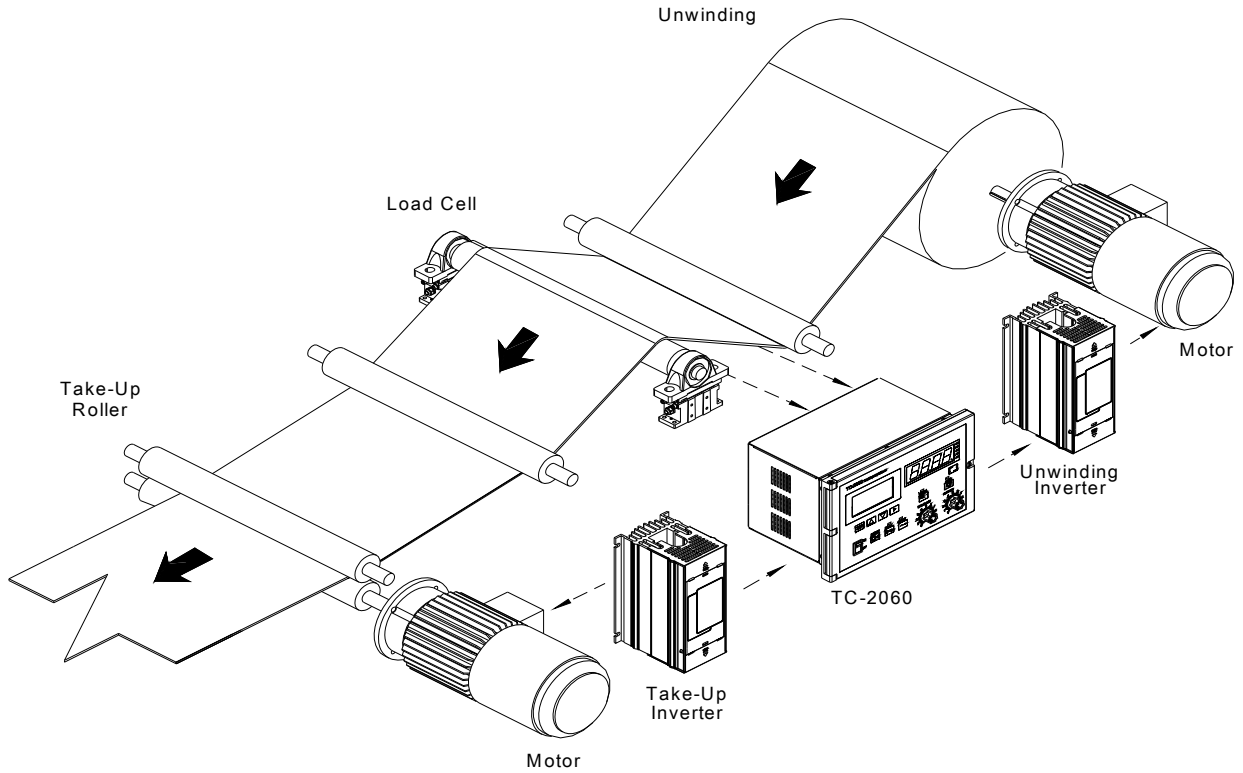
PASS WORD	Cipher parameter	0	0~9999	0: Can change any parameter 1234: Reset to DEFAULT (The power must be off and start again after setting) 1~9999: Can't change parameter value
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Application Example Explanation: (Central Unwinding Tension Control – Cooperating to magnetic powder brake)

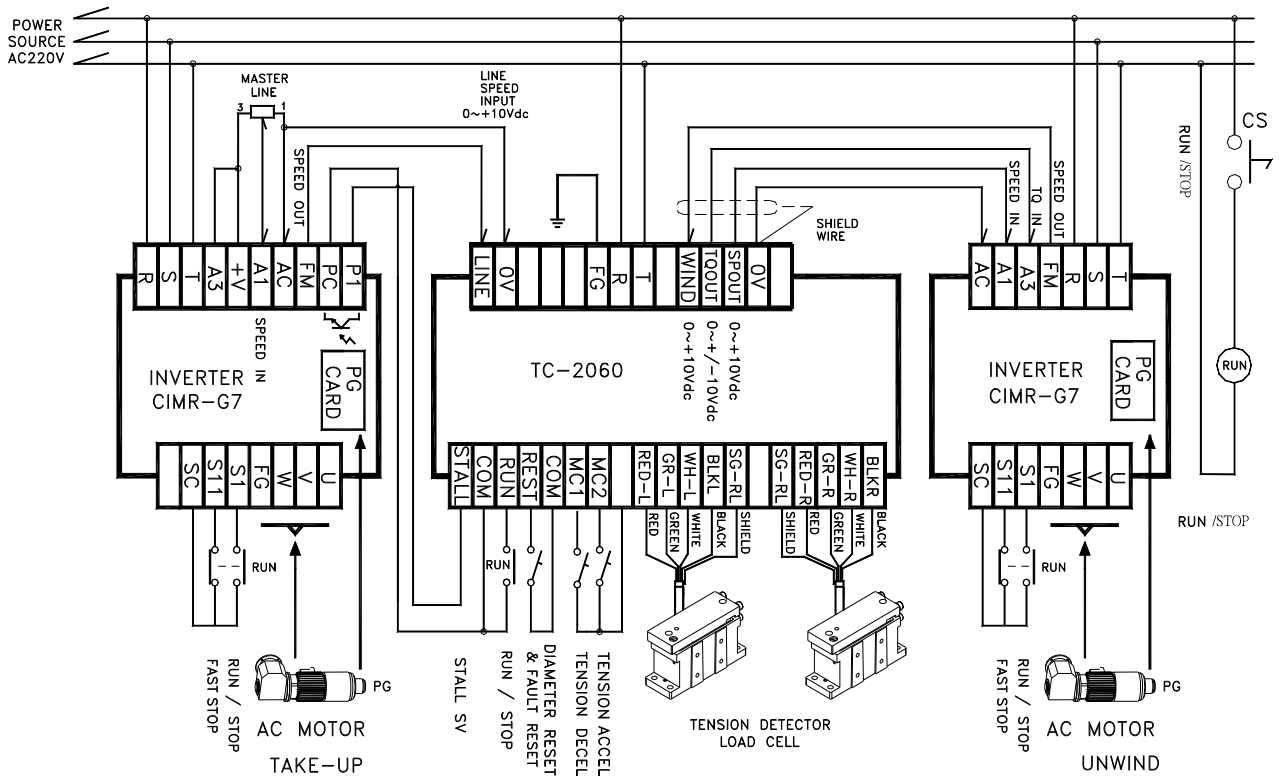
1. After running of take-up roller, according to take-up speed for offering TC-2060 as reference of line speed (if there are no take-up speed, please connect terminal "+10V" to terminal "LINE"), setting feed-in tension at TC-2060 tension controller, controlling brake amount of magnetic powder brake, LOAD CELL is weighted through by material tension, detecting tension and conduct the detection signal back to TC-2060, then it could achieve the objective of unwinding materials with constant tension.
2. When LOAD CELL is corrected, please follow the instruction described at Section 4.3 to proceed correction.
3. When the materials is unwinding, if the variation of unwinding tension is too large in the acceleration and deceleration, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately.
4. When the materials is unwinding, if the variation of tension is too large in the constant speed, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately, or increase CI time (Integral time), and decrease CP amount (Proportional ratio).
5. The other related questions can refer related section description listed at this Instruction Manual.

7-2 Central Unwinding Tension Control (cooperating to motor drive direct torque control – Unwinding materials)

Flow Chart: CIMR-G7 + TC-2060 + CIMR-G7



Wiring Diagram (The drive of main guiding roller and unwinding system are CIMR-G7 series)



Related Parameter (Central Unwinding Tension Control – Cooperating to Motor Drive - Unwinding Materials)

(3) Main guiding roller's inverter (YASKAWA CIMR-G7 Series)

A1-00	Language	0 (English)
A1-01	Parameter access class	2 (High class)
A1-02	Control Mode	3 (Vector attached PG, if it doesn't attach PG card, set it to 2)
b1-01	Frequency Instruction Selection	1 (Terminal)
b1-02	Operation Instruction Selection	1 (Terminal)
b1-03	Stop Method Selection	0 (Reducing speed to stop)
C1-01	Acceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-02	Deceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-04	Deceleration Time	2 (Stop time, it is set in accordance with line speed's requirement)
E1-01	Input Voltage Setting	AC220V (According to power voltage)
E1-03	V/F Curve Selection	F (Arbitrary curve)
E1-04	The Highest Output Frequency	60HZ (It is set in accordance with line speed's requirement)
E1-05	The Maximum Voltage	AC220V (According to the rated voltage of motor)
E1-06	Base Frequency	60HZ (According to the rated voltage of motor)
E1-07	Central Output Frequency	3HZ
E1-08	Voltage of Central Output Frequency	11V
E1-09	The Lowest Output Frequency	0.5HZ
E1-10	Voltage of the Lowest Output Frequency	3V
F1-01	PG Parameter	600P/R (According to the specification of PG)
F1-02	PG Disconnection Detection Selection	1 (Free Stop)
F1-03	The corresponding action in over-speed	1 (Free Stop)
F1-04	Speed Offset which detected is too large	3 (Motor keeps on running)
F1-05	PG Rotary Direction	0 (Forward revolution)
H1-09	S11 Terminal's Function	7 (The switch of acceleration and deceleration time)
H2-02	P1 Terminal's Function	1 (Output when the speed is zero)
H3-01	Terminal A1 of Frequency Instruction	0 (0 ~ +10VDC)

(4) Unwinding drives's inverter (YASKAWA CIMR-G7 Series)

A1-00	Language	0 (English)
A1-01	Parameter access class	2 (High class)
A1-02	Control Mode	3 (Vector attached PG, if it doesn't attach PG card, set it to 2)
b1-01	Frequency Instruction Selection	1 (Terminal)
b1-02	Operation Instruction Selection	1 (Terminal)
b1-03	Stop Method Selection	0 (Reducing speed to stop)
C1-01	Acceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-02	Deceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-04	Deceleration Time	2 (Stop time, it is set in accordance with line speed's requirement)
D5-01	Torque Control Selection	1 (Torque Control)
D5-03	Select Speed Limit	1 (This instruction will according to parameter "b1-01" setting)
E1-01	Input Voltage Setting	AC220V (According to power voltage)
E1-03	V/F Curve Selection	F (Arbitrary curve)
E1-04	The Highest Output Frequency	60HZ (It is set in accordance with line speed's requirement)
E1-05	The Maximum Voltage	AC220V (According to the rated voltage of motor)
E1-06	Base Frequency	60HZ (According to the rated voltage of motor)
E1-07	Central Output Frequency	3HZ
E1-08	Voltage of Central Output Frequency	11V
E1-09	The Lowest Output Frequency	0.5HZ
E1-10	Voltage of the Lowest Output Frequency	3V
F1-01	PG Parameter	600P/R (According to the specification of PG)
F1-02	PG Disconnection Detection Selection	1 (Free Stop)
F1-03	The corresponding action in over-speed	1 (Free Stop)
F1-04	Speed Offset which detected is too large	3 (Motor keeps on running)
F1-05	PG Rotary Direction	0 (Forward revolution)
H1-09	S11 Terminal's Function	7 (The switch of acceleration and deceleration time)
H2-02	P1 Terminal's Function	1 (Output when the speed is zero)
H3-01	Terminal A1 of Frequency Instruction	0 (0 ~ +10VDC)
H3-05	Function Selection of multi function simulated terminal A3	13 (Torque Control)

H3-06	Gain of terminal A3	100%
H3-07	Bias of terminal A3	0.0%
H4-01	FM Selection of multi function simulated output terminal	2 (U1-2 output frequency)

The above listing of parameters are only for reference, please refer the Instruction Manual for the other parameters which don't list.

**(5) TC-2060 Tension controller's related parameters and DIP thumb switch position
SW1→0~10VDC Position**

TC-2060 Tension Controller's Related Parameter (Central Unwinding Tension Control – Cooperating to Motor Drive - Unwinding Materials)

3.1:MAIN PARAMETER

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DRIVER SELECT	Drive Selection	MOTOR (TORQUE)	0:POWER(CLUTCH) 1:MOTOR(TORQUE) 2:E/P REQUULATOR	0: Magic powder clutch 1: Motor(torque control) 2: Current to Pressure Converter
FUNCTION SELECT	Winding and Unwinding Selection	UNWIND	0: WINDER, 1: UNWIND	0: Winding 1: Unwinding (Setting can't be changed in the RUN)
DIAMETER SOURCE	The Source of Diameter Detection	DIVIDER	0: DIVIDER 1: SENSOR 2: TB(DIAMETER) 3:DIVIDER(INT)	0: Computing of line speed and winding speed 1: Proximity switch length calculation 2: External diameter signal terminal input 3: parameter of MAXIMUM_DIAHI and MINIMUM_DIALO
LINE RATIO	Ratio of line speed signal input	100.0%	10~500.0%	LINE terminal input
WIND RATIO	Ratio of winding feedback signal	100.0%	0~500.0%	WIND terminal input
TENS RATIO	Ratio of signal	100.0%	0~500.0%	TENS terminal input
ADIN1 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN1 terminal input
ADIN2 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN2 terminal input
AUTO VR MAXIMUM	Ratio of signal	100.0%	0~100.0%	Use range(%) of tension setting for panel's VR (including Terminal "TENS")
MECH COMPANSION	Acceleration Compensation	100.0%	0~999.9%	Compensation amount in acceleration
MECHANISN LOSS A	Static friction compensation of A reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
MECHANISN LOSS B	Static friction compensation of B reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
INITIAL TENSION	Initial Tension Compensation	30.0%	0~100.0%	Compensation setting for initial tension
INCH ADD/DEC	Setting value of tension increase and decrease	5Kg	0~FULL SCALE Kg	MC1~2 termial assigned

PRESET SET VALUE	Pre-setting value of new shaft tension	50.0%	0~100.0%	Constant Value(Output from terminal "NROUT", "P12V", "N12V")
CUT ADD/TE VALUE	Increased tension in changing reel and cutting material	100.0%	0~500.0%	T this value are actual cutting material's tension
PRESET SET TIME	Time of changing reel	5.0SEC	0~10.0SEC	Time of changing reel procedure
STOP TIME	STOP time	10.0S	0.0~60.0S	The time of stop when the "RUN" terminal is opened
STOP FUNC SELE	Mode selection in stop	PID ON	0: PID ON 1: STOP RATIO 2:STOP STALL	0: PID continue control within the STOP time 1: Follow "STOP RATIO" to brake 3:Hold voltage in terminal out1
STOP RATIO	Brake value within the STOP time	200.0%	0~500.0%	Brake is multiplied owing to "STOP RATIO" multiply by the diameter value
MAXIMUN DIAMETER	Maximum diameter	1000mm	300~5000mm	
MINIMUN DIAMETER	Minimum diameter	100mm	50~300mm	
THICKNESS	Thickness setting of winding material	120um	10~10000um	When the parameter "DIAMETER SOURCE" is set to "SENSOR", this parameter will be displayed
TB DIAMETER LOGIC	Logic selection of supersonic	0~10VDC	0=0~10VDC 1=10~0VDC	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER ZERO	Zero point adjustment of supersonic	0.0V	-5.00V~+5.00V	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER SPAN	Multiple ratio of supersonic	100.0%	0~500.0%	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
START TORQUE	Start torque compensation	0V	0 ~ +10Vdc	When "RUN" terminal starts, then output torque compensation right away
MANUAL VR SCAL	Auto run MANUAL VR adjustment	0V	0~+10VDC	Parameter MANUAL VR SELECT=AUTO BIAS SET Enable

MAXIMUN _DIAM VOL	Multiple ratio of supersonic	10.00V	0~10.00Vdc	When the parameter “DIAMETER SOURCE” is set to “DIVIDER(INT)”, this parameter will be displayed(taper tension)
MINIMUN _DIAM VOL	Zero point adjustment of supersoni	0.0V	0~10.00Vdc	When the parameter “DIAMETER SOURCE” is set to “DIVIDER(INT)”, this parameter will be displayed(taper tension)
GAIN RATIO	adjustment of Out1 ratio	100%	0~500%	When MC1 ,MC2 terminal Enable the parameter then output torque compensation right away

3.2:TAP PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TAPER RATIO	Linear taper tension	100.0%	0~100.0%	Taper ratio is valid only the above TAPER MODE is set to linear(the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%)
TAPER TENS SET1	The #1 turning point's setting value of non-linear taper tension	300mm	0~2000mm	According to diameter value(under the turning point, the tension won't be tapered)
TAPER TENS SET2	The #2 turning point's setting value of non-linear taper tension	500mm	0~2000mm	According to diameter value
TAPER TENS SET3	The #3 turning point's setting value of non-linear taper tension	800mm	0~2000mm	According to diameter value
TAPER SET RATIO1	Taper Ratio between #1 turning point and #2 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%

TAPER SET RATIO2	Taper Ratio between #2 turning point and #3 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO3	Taper Ratio above #3 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER MODES SELE	Mode setting of taper tension curve	LINER	0: LINER 1: NON-LINER	0: Linear 1: Non-Linear (multi sectional, irregular)

3.3:FUNC PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TEN SELECT FUNC	Source selection of tension setting	PLANE TENSION	0: PLANE TENSION 1: PUSH TENSION 2: EXT VR TENSION	0: Operation panel's VR setting 1: Up / Down key setting 2: Input of Terminal "TENS"
MC1 SELECT FUNC	Function selection of MC1 terminal	INCHING ADD	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
MC2 SELECT FUNC	Function selection of MC2 terminal	INCHING DEC	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
AD1 SELECT FUNC	Function selection of AD1 Analog Input	NO FUNCTION	0: NO FUNCTION 1: NEW REELVALUE 2: TAPER (Linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)

AD2 SELECT FUNC	Function selection of AD2 Analog Input	NO FUNCTION	0: NO FUNCTION 1: NEW REELVALUE 2: TAPER (Linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
RLY SELECT FUNC	Mode selection of relay action	LOW	0: HIGH 1: LOW 2: ALARM	Relay's function output selection 0: in high tension 1: in low tension 2: abnormal
RLY FBK HI/LOW	Active point of tension detection's relay	3.0%	0~100.0%	Following the above assigned mode; when it is set to "HIGH", relay will be active if it is higher than the active point, when it is set to "LOW", relay will be active if it is lower than active point

3.4: P I D PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
AUTO TUNE ON/OFF	"automatic detection"(PID)	OFF	0:OFF 1:ON	On "automatic detection"
TENSION PID FEEL	Dead band of tension	0.1KG	0~Scale (Parameter)	Tension will not be corrected within this range
TENSION PID SLP	Section 1 breakpoint of tension error	0.5KG	0~Scale (Parameter)	The setting and actual error are within the range between PID FEEL and PID SLP will be regarded as section 1
TENSION PID SLP1	Section 2 breakpoint of tension error	1.0KG	0~Scale (Parameter)	The setting and actual error are within the range between PID FEEL and PID SLP1 will be regarded as section 2
TENSION CP GAIN	Tension error ratio of section 1	30.0%	0~500.0%	The section within PID FEEL and PID SLP will be corrected by PI
TENS CI+ GAIN	The rising time of section 1 tension error integrator	150S	0~5000S	
TENS CI- GAIN	The falling time of section 1 tension error integrator	150S	0~5000S	
TENSION CP1 GAIN	Tension error ratio of section 2	30.0%	0~500.0%	The section within PID FEEL and PID SLP1 will be corrected by PI
TENSI CI1+ GAIN	The rising time of section 2 tension error integrator	75S	0~5000S	
TENS CI1- GAIN	The falling time of section 2 tension error integrator	75S	0~5000S	

TENSION CP2 GAIN	Tension error ratio of section 3	30.0%	0~500.0%	The section which is small than SLP1 will be corrected by PI
TENSI CI2+ GAIN	The rising time of section 3 tension error integrator	10S	0~5000S	
TENS CI2- GAIN	The falling time of section 3 tension error integrator	10S	0~5000S	
PID FILTER TIME	The filter time of tension feedback	100ms	0~500ms	The filter time of load cell feedback signal

3.5:FBK PARAMETER (Feedback Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
LOADCELL UNIT	The unit of tension detecting and display	Kgf	0: Kgf 1: N	
LOADCELL SCALE	Specification of load cell	50.0KG	0~1000Kg	Load cell's specification(single side)
LOADCELL SELECT	Load cell's quantity and right-left side Selection	REELS	0: REELS 1: L-REEL 2: R-REEL	0: Two side detection 1: Left single side 2: Right single side
ZERO TUNE TEST	Load cell's tension Zero Reset Correction	0.0KG	-SCALE~+SCALE	
SPAN TUNE TEST	Load cell's tension highest point correction	0~500%	0~500%	

3.6:DISP PARAMETER(Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DISPLAY POINT	The decimal point number of tension setting	1	0~2(the value of tension setting and display are valid)	The number setting of decimal point(the value of tension setting and display)
DISP NO.1 SOURCE	The first row LCD source selection display	SV	0: LINE INPUT 1: WIND INPUT 2: TENSION INPUT 3: ADIN1 4: ADIN2 5: TQ OUT 6: NR OUT 7: SP OUT 8:FBK OUT 9:SLP 10:PID VOL 11:DIAMETER	0: Voltage of "LINE" terminal 1: Voltage of "WIND" terminal 2: Tension setting's value 3: Voltage of "ADIN1" terminal 4: Voltage of "ADIN2" terminal 5: Voltage of torque command 6: Voltage of "NR OUT" terminal 7: Voltage of "SP OUT" terminal 8: Voltage of "FBK OUT"
DISP NO.3 SOURCE	The third row LCD source selection display	TQ OUT		

DISP NO.4 SOURCE	The fourth row LCD source selection display	SP OUT	12:COUNT 13:FEEDBACK 14:FBK-L CELL 15:FBK-R CELL 16:SERIAL STATUS 17:FBK(SERIAL) 18:SV(FEEDBACK) 19:SPAN SCALE	terminal 9: Error amount 10: Voltage of error amount compensation 11: Diameter amount 12: Counting length amount 13: Total amount of tension 14: Left side load cell's tension 15: Right side load cell's tension 16: Communication status 17: Total amount of tension 18: Filter (Total tension value) 19: Display rate of Load cell SPAN
DISP FILTER TIME	Display time	5.0S	0~20.0S	The filter time of display value

3.7:SERIAL PARAMETER(Communication)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
COMMAND SELECT	Selection of digital input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Digital input & parameter & SV tension setting value are controlled by RS-485 communication 2: Digital input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication

SINGLE SELECT	Selection of analog input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Analog input & parameter & SV tension setting value are controlled by RS-485 communication 2: Analog input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SERIAL ADDRESS	Communication address (the number of station)	0	0 , 1~31	☆ When the communication function is set, the following parameter will be displayed 0: Don't send back, all receive 1~31: station address
BAUD RATE	Communication baud rate	9600	(0)=4800 bps (1)=9600 bps (2)=19200 bps	There are three kinds of baud rate can be set
PARITY SET	Parity setting	NO PARITY	0: NO PARITY 1: EVEN PARITY 2: ODD PARITY	
SERIAL TIME	Communication delay interval of time	15 ms	5~65ms	The delay time between command message and response message

3.8: INSI PARAMETER (Cipher Parameter)

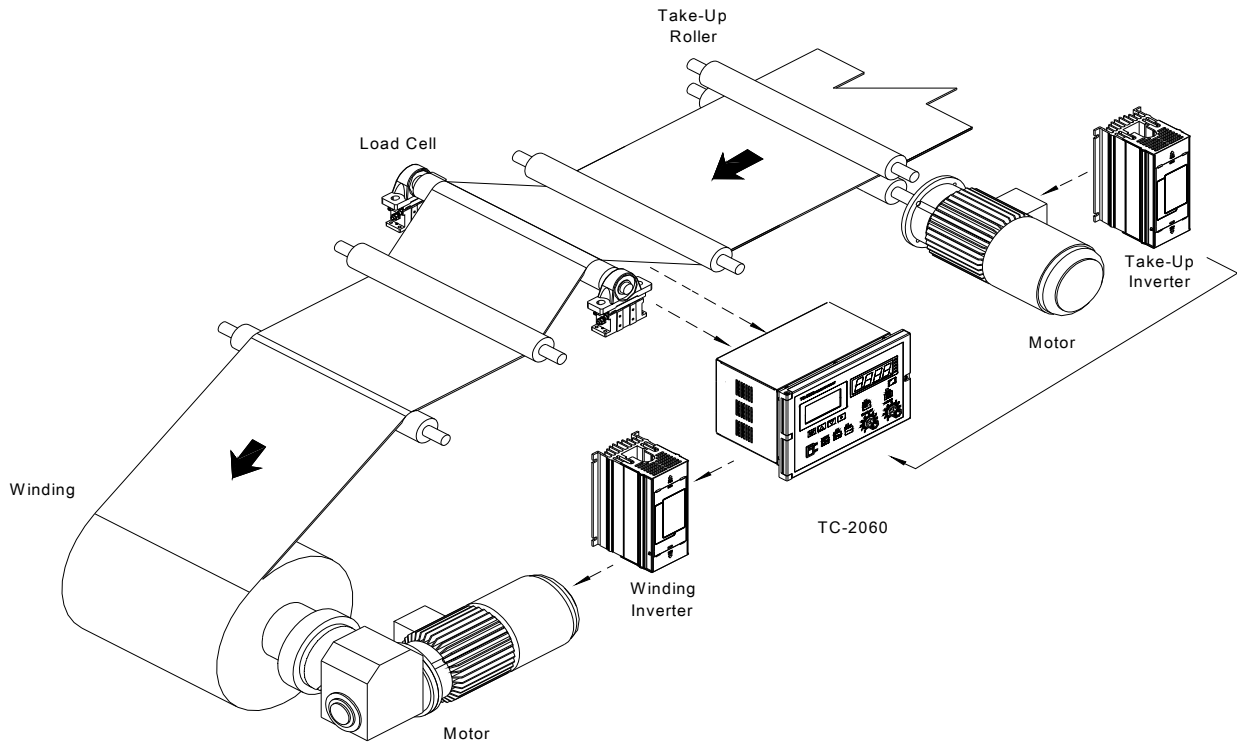
PASSWORD	Cipher parameter	0	0~9999	0: Can change any parameter 1234: Reset to DEFAULT (The power must be off and start again after setting) 1~9999: Can't change parameter value
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Application Example Explanation: (Central Unwinding Tension Control – Cooperating to Motor Drive - Unwinding Materials)

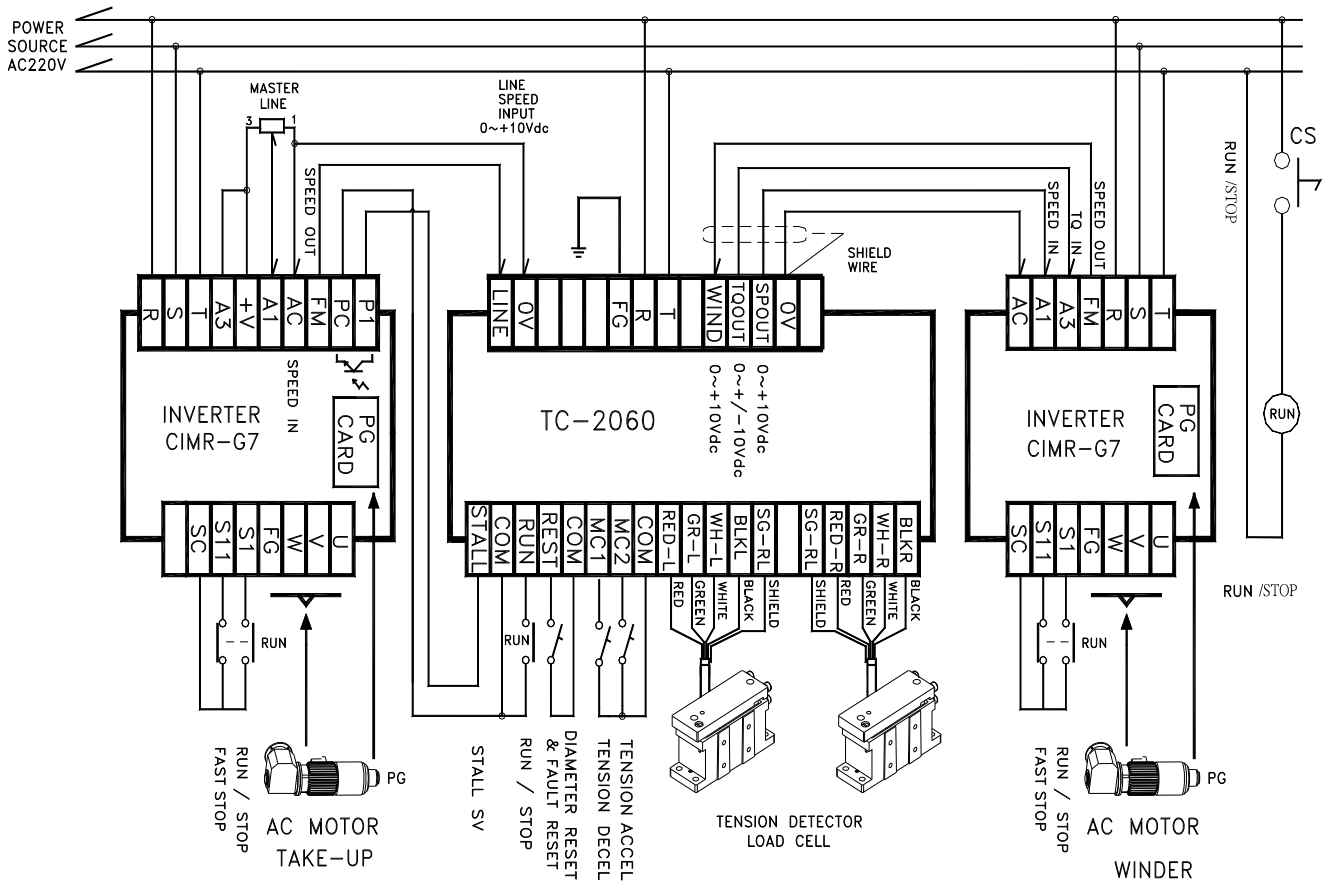
1. After running of take-up roller, according to take-up speed for offering TC-2060 as reference of line speed (if there are no take-up speed, please connect terminal “+10V” to terminal “LINE”), setting feed-in tension at TC-2060 tension controller, controlling brake amount of magnetic powder brake, LOAD CELL is weighted through by material tension, detecting tension and conduct the detection signal back to TC-2060, then it could achieve the objective of unwinding materials with constant tension.
2. When LOAD CELL is corrected, please follow the instruction described at Section 4.3 to proceed correction.
3. When the materials is unwinding, if the variation of unwinding tension is too large in the acceleration and deceleration, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately.
4. When the materials is unwinding, if the variation of tension is too large in the constant speed, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately, or increase CI time (Integral time), and decrease CP amount (Proportional ratio).
5. The other related questions can refer related section description listed at this Instruction Manual.

7-3 Central Winding Tension Control (Cooperating to drive direct torque control for driving)

Flow Chart: CIMR-G7 + TC-2060 + CIMR-G7 (Speed & Torque Control)

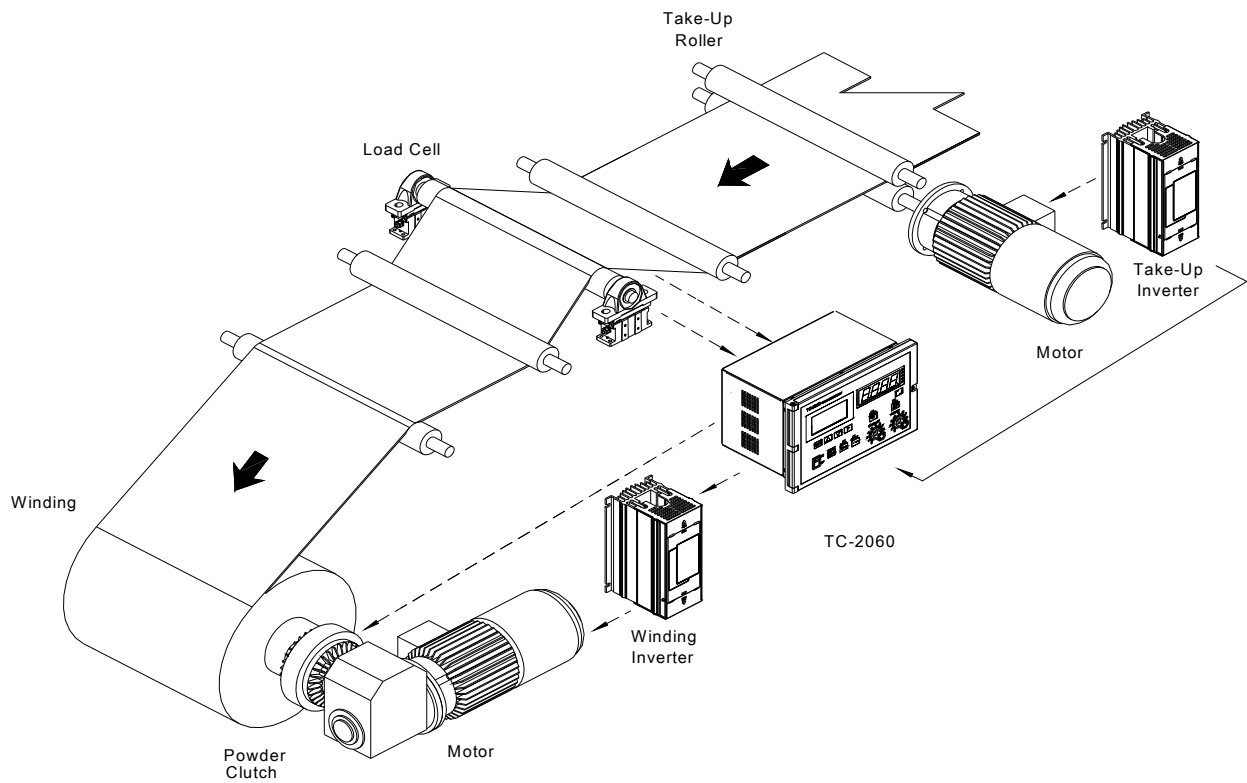


Wiring Diagram (All the drive of main guiding roller and winding roller are YASKAWA IMR-G7 series)

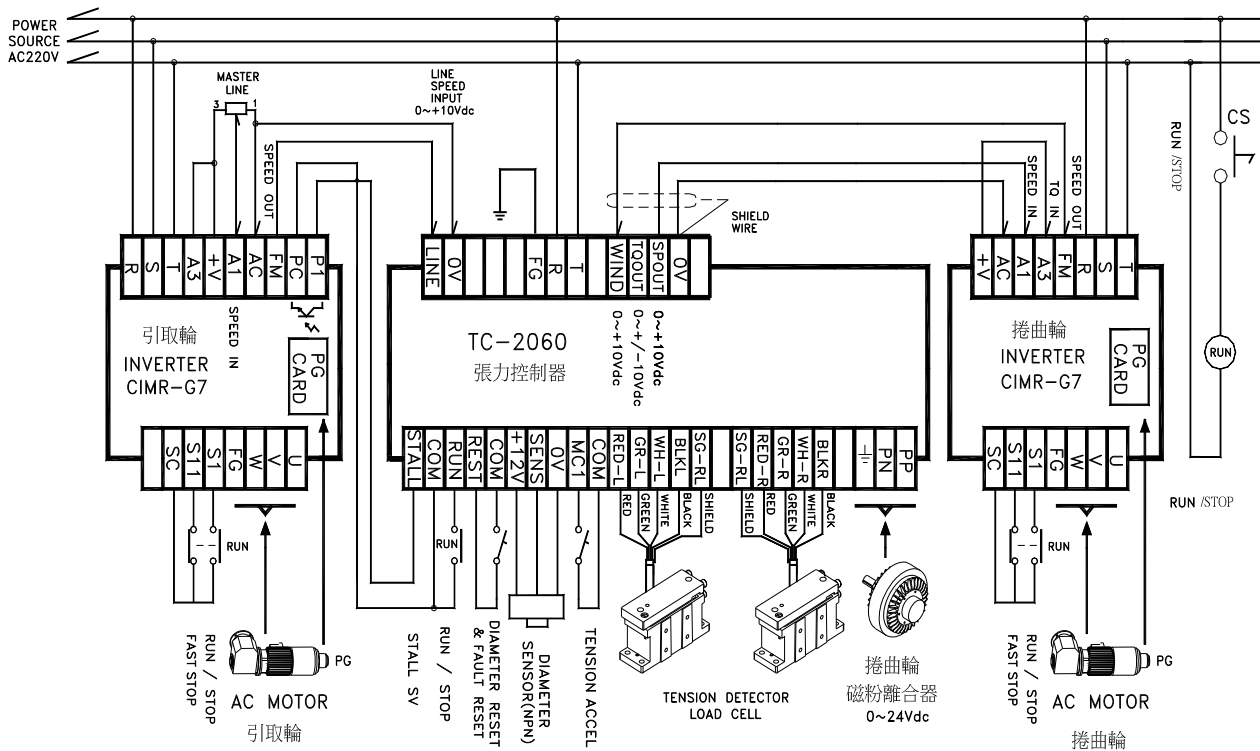


7-4 Central Winding Tension Control (Cooperating to drive's speed control and magnetic powder clutch for driving)

Flow Chart: CIMR-G7 + TC-2060P + CIMR-G7 (Close loop or Open loop) + BRAKE



Wiring Diagram (All the drive of main guiding roller and winding roller are YASKAWA CIMR-G7 series)



Related Parameter (Central Winding Tension Control)

(1) Main Guiding Roller's Inverter & Central Winding's Inverter (YASKAWA CIMR-G7 series)

A1-00	Language	0 (English)
A1-01	Parameter access class	2 (High class)
A1-02	Control Mode	3 (Vector attached PG, if it doesn't attach PG card, set it to 2)
b1-01	Frequency Instruction Selection	1 (Terminal)
b1-02	Operation Instruction Selection	1 (Terminal)
b1-03	Stop Method Selection	0 (Reducing speed to stop)
C1-01	Acceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-01	Acceleration Time	1s Central Winding's Inverter
C1-02	Deceleration Time	10s Main guiding roller's inverter (It is set in accordance with line speed's requirement)
C1-02	Deceleration Time	1s Central Winding's Inverter
C1-04	Deceleration Time	2 (Stop time, it is set in accordance with line speed's requirement)
D5-01	Torque Control Selection	1 (Torque Control)
D5-03	Select Speed Limit	1 (This instruction will according to parameter "b1-01" setting)
E1-01	Input Voltage Setting	AC220V (According to power voltage)
E1-03	V/F Curve Selection	F (Arbitrary curve)
E1-04	The Highest Output Frequency	60HZ (It is set in accordance with line speed's requirement)
E1-05	The Maximum Voltage	AC220V (According to the rated voltage of motor)
E1-06	Base Frequency	60HZ (According to the rated voltage of motor)
E1-07	Central Output Frequency	3HZ
E1-08	Voltage of Central Output Frequency	11V
E1-09	The Lowest Output Frequency	0.5HZ
E1-10	Voltage of the Lowest Output Frequency	3V
F1-01	PG Parameter	600P/R (According to the specification of PG)
F1-02	PG Disconnection Detection Selection	1 (Free Stop)
F1-03	The corresponding action in over-speed	1 (Free Stop)
F1-04	Speed Offset which detected is too large	3 (Motor keeps on running)
F1-05	PG Rotary Direction	0 (Forward revolution)
H1-09	S11 Terminal's Function	7 (The switch of acceleration and deceleration time)

H2-02	P1 Terminal's Function	1 (Output when the speed is zero)
H3-01	Terminal A1 of Frequency Instruction	0 (0 ~ +10VDC)
H3-05	Function Selection of multi function simulated terminal A3	13 (Torque Control)
H3-06	Gain of terminal A3	100%
H3-07	Bias of terminal A3	0.0%
H4-01	FM Selection of multi function simulated output terminal	2 (U1-2 output frequency)

The above listing of parameters are only for reference, please refer the Instruction Manual for the other parameters which don't list.

TC-2060 Tension controller's related parameters and DIP thumb switch position SW1: 0~10VDC Position

TC-2060 Tension Controller Related Parameter (Central Winding Tension Control)

3.1:MAIN PARAMETER

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DRIVER SELECT	Selection of drive	POWER (CLUTCH)	0: POWER(CLUTCH) 1: MOTOR(TORQUE) 2: E/P REGULATOR	0: Magic powder clutch 1: Motor(torque control) 2: Current to Pressure Converter Please take attention to application example of magnetic powder clutch or motor(torque control)
FUNCTION SELECT	Selection of winding and unwinding	WINDER	0: WINDER, 1: UNWIND	0: Winding 1: Unwinding (Setting can't be changed in the RUN)
DIAMETER SOURCE	Source of diameter detection	DIVIDER or SENSOR (POWDER)	0: DIVIDER 1: SENSOR 2: TB(DIAMETER) 3:DIVIDER(INT)	0: Computing of line speed and winding speed 1: Proximity switch length calculation 2: External diameter signal terminal input 3: parameter of MAXIMUM_DIAHI and MINIMUM_DIALO
LINE RATIO	Ratio of line speed signal input	100.0%	10~500.0%	LINE terminal input
WIND RATIO	Ratio of winding feedback signal	100.0%	0~500.0%	WIND terminal input
TENS RATIO	Ratio of signal	100.0%	0~500.0%	TENS terminal input

ADIN1 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN1 terminal input
ADIN2 RATIO	Ratio of signal	100.0%	0~500.0%	ADIN2 terminal input
AUTO VR MAXIMUM	Ratio of signal	100.0%	0~100.0%	Use range(%) of tension setting for panel's VR (including Terminal "TENS")
MECH COMPANSION	Acceleration compensation	100.0%	0~999.9%	Compensation amount in acceleration
MECHANISN LOSS A	Static friction compensation of A reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
MECHANISN LOSS B	Static friction compensation of B reel	0.0V	-5.00V~+5.00V	The setting is enough if the reel's state is between moving and static
INITIAL TENSION	Initial tension compensation	30.0%	0~100.0%	Compensation setting for initial tension
INCH ADD/DEC	Setting value of tension increase and decrease	5Kg	0~FULL SCALE Kg	MC1~2 termial assigned
PRESET SET VALUE	Pre-setting value of new shaft tension	50.0%	0~100.0%	Constant Value(Output from terminal "NROUT", "P12V", "N12V")
CUT ADD/TE VALUE	Increased tension in changing reel and cutting material	100.0%	0~500.0%	T this value are actual cutting material's tension
PRESET SET TIME	Time of changing reel	5.0SEC	0~10.0SEC	Time of changing reel procedure
STOP TIME	STOP time	10.0S	0.0~60.0S	The time of stop when the "RUN" terminal is opened
STOP FUNC SELE	Mode selection in stop	PID ON	0: PID ON 1: STOP RATIO 2:STOP STALL	0: PID continue control within the STOP time 1: Follow "STOP RATIO" to brake 3:Hold voltage in terminal out1
STOP RATIO	Brake value within the STOP time	200.0%	0~500.0%	Brake is multiplied owing to "STOP RATIO" multiply by the diameter value
MAXIMUM DIAMETER	Maximum diameter	1000mm	300~5000mm	
MINIMUM DIAMETER	Minimum diameter	100mm	50~300mm	
THICKNESS	Thickness setting of winding material	120um	10~10000um	When the parameter "DIAMETER SOURCE" is set to "SENSOR", this parameter will be displayed

TB DIAMETER LOGIC	Logic selection of supersonic	0~10VDC	0=0~10VDC 1=10~0VDC	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER ZERO	Zero point adjustment of supersonic	0.0V	-5.00V~+5.00V	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
TB DIAMETER SPAN	Multiple ratio of supersonic	100.0%	0~500.0%	When the parameter "DIAMETER SOURCE" is set to "TB", this parameter will be displayed
START TORQUE	Start torque compensation	0V	0 ~ +10Vdc	When "RUN" terminal starts, then output torque compensation right away
MANUAL VR SCAL	Auto run MANUAL VR adjustment	0V	0~+10VDC	Parameter MANUAL VR SELECT=AUTO BIAS SET Enable
MAXIMUN _DIAM VOL	Multiple ratio of supersonic	10.00V	0~10.00Vdc	When the parameter "DIAMETER SOURCE" is set to "DIVIDER(INT)", this parameter will be displayed(taper tension)
MINIMUN _DIAM VOL	Zero point adjustment of supersoni	0.0V	0~10.00Vdc	When the parameter "DIAMETER SOURCE" is set to "DIVIDER(INT)", this parameter will be displayed(taper tension)
GAIN RATIO	adjustment of Out1 ratio	100%	0~500%	When MC1 ,MC2 terminal Enable the parameter then output torque compensation right away

3.2:TAPE PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TAPER RATIO	Linear taper tension	100.0%	0~100.0%	Taper ratio is valid only the above TAPER MODE is set to linear(the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%)
TAPER TENS SET1	The #1 turning point's setting value of non-linear taper tension	300mm	0~2000mm	According to diameter value(under the turning point, the tension won't be tapered)
TAPER TENS SET2	The #2 turning point's setting value of non-linear taper tension	500mm	0~2000mm	According to diameter value
TAPER TENS SET3	The #3 turning point's setting value of non-linear taper tension	800mm	0~2000mm	According to diameter value
TAPER SET RATIO1	Taper Ratio between #1 turning point and #2 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO2	Taper Ratio between #2 turning point and #3 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER SET RATIO3	Taper Ratio above #3 turning point	100.0%	0~100.0%	the value of taper ratio is the multiplier, setting 100% means the tension won't be tapered; setting 90% means the tension is attenuated 10%
TAPER MODE SELE	Mode setting of taper tension curve	LINER	0:LINER 1:NON-LINER	0: Linear 1: Non-Linear (multi sectional, irregular)

3.3:FUNC PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TENSION SELECT FUNC	Source selection of tension setting	PLANE TENSION	0: PLANE TENSION 1: PUSH TENSION 2: EXT VR TENSION	0: Operation panel's VR setting 1: Up / Down key setting 2: Input of Terminal "TENS"
MC1 SELECT FUNC	Function selection of MC1 terminal	INCHING ADD	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
MC2 SELECT FUNC	Function selection of MC2 terminal	INCHING DEC	0: INCHING ADD 1: INCHING DEC 2: OUT REMOTE 3:OUTPUT GAIN	0: Jog increase for tension setting 1: Jog decrease for tension setting 2: Output signal is controlled by external remote control 3:parameter of Gain ratio enable
AD1 SELECT FUNC	Function selection of AD1 Analog Input	NO FUNCTION	0: NO FUNCTION 1: NEW REELVALUE 2: TAPER (Linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
AD2 SELECT FUNC	Function selection of AD2 Analog Input	NO FUNCTION	0:NO FUNCTION 1: NEW REELVALUE 2: TAPER (Linear) 3: TENSION(FBK)	0: NO 1: New reel's tension setting 2: Taper tension setting 3: Tension detecting input(power input is 0~+/-10V without load cell)
RLY SELECT FUNC	Mode selection of relay action	LOW	0: HIGH 1: LOW 2: ALARM	Relay's function output selection 0: in high tension 1: in low tension 2: abnormal
RLY FBK HI/LOW	Active point of tension detection's relay	3.0%	0~100.0%	Following the above assigned mode; when it is set to "HIGH", relay will be active if it is higher than the active point, when it is set to "LOW", relay will be active if it is lower than active point

3.4: P I D PARAMETER(Parameter Setting)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
TUNE	“automatic detection”(PID)	OFF	0:OFF 1:ON	On “automatic detection”
TENSION PID FEEL	Dead band of tension	0.1KG	0~Scale (parameter)	Tension will not be corrected within this range
TENSION PID SLP	Section 1 breakpoint of tension error	0.5KG	0~Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP will be regarded as section 1
TENSION PID SLP1	Section 2 breakpoint of tension error	1.0KG	0~Scale (parameter)	The setting and actual error are within the range between PID FEEL and PID SLP1 will be regarded as section 2
TENSION CP GAIN	Tension error ratio of section 1	30.0%	0~500.0%	The section within PID FEEL and PID SLP will be corrected by PI
TENS CI+ GAIN	The rising time of section 1 tension error integrator	150S	0~5000S	
TENS CI- GAIN	The falling time of section 1 tension error integrator	150S	0~5000S	
TENSION CP1 GAIN	Tension error ratio of section 2	30.0%	0~500.0%	The section within PID FEEL and PID SLP1 will be corrected by PI
TENS CI1+ GAIN	The rising time of section 2 tension error integrator	75S	0~5000S	
TENS CI1- GAIN	The falling time of section 2 tension error integrator	75S	0~5000S	
TENSION CP2 GAIN	Tension error ratio of section 3	30.0%	0~500.0%	The section which is small than SLP1 will be corrected by PI
TENS CI2+ GAIN	The rising time of section 3 tension error integrator	10S	0~5000S	
TENS CI2- GAIN	The falling time of section 3 tension error integrator	10S	0~5000S	
PID FILTER TIME	The filter time of tension feedback	100ms	0~500ms	The filter time of load cell feedback signal

3.5:FBK PARAMETER (Feedback Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
LOADCELL UNIT	The unit of tension detecting and display	Kgf	0:Kgf 1:N	

LOADCELL SCALE	Specification of load cell	50.0KG	0~1000Kg	Load cell's specification(single side)
LOADCELL SELECT	Load cell's quantity and right-left side Selection	REELS	0:REELS 1:L- REEL 2:R- REEL	0: Two side detection 1: Left single side 2: Right single side
ZERO TUNE TEST	Load cell's tension Zero Reset Correction	0.0KG	-SCALE~+SCALE	
SPAN TUNE TEST	Load cell's tension highest point correction	0~500%	0~500%	

3.6:DISP PARAMETER(Parameter)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
DISPLAY POINT	The decimal point number of tension setting	1	0~2(the value of tension setting and display are valid)	The number setting of decimal point(the value of tension setting and display)
DISP NO.1 SOURCE	The first row LCD source selection display	SV	0: LINE INPUT 1: WIND INPUT 2: TENSION INPUT 3: ADIN1 4: ADIN2 5: TQ OUT 6: NR OUT 7: SP OUT 8:FBK OUT 9:SLP 10:PID VOL 11:DIAMETER 12:COUNT 13:FEEDBACK 14:FBK-L CELL 15:FBK-R CELL 16:SERIAL STATUS 17:FBK(SERIAL) 18:SV(FEEDBACK) 19:SPAN SCALE	0: Voltage of "LINE" terminal 1: Voltage of "WIND" terminal 2: Tension setting's value 3: Voltage of "ADIN1" terminal 4: Voltage of "ADIN2" terminal 5: Voltage of torque command 6: Voltage of "NR OUT" terminal 7: Voltage of "SP OUT" terminal 8: Voltage of "FBK OUT" terminal 9: Error amount 10: Voltage of error amount compensation 11: Diameter amount 12: Counting length amount 13: Total amount of tension 14: Left side load cell's tension 15: Right side load cell's tension 16: Communication status 17: Total amount of tension 18: Filter (Total tension value) 19: Display rate of Load cell SPAN
DISP NO.3 SOURCE	The third row LCD source selection display	TQ OUT		
DISP NO.4 SOURCE	The fourth row LCD source selection display	SP OUT		
DISP FILTER TIME	Display time	5.0S		

3.7:SERIAL PARAMETER(Communication)

SYMBOL	SYMBOL DESCRIPTION	DEFAULT	SETTING RANGE	EXPLANATION
COMMAND SELECT	Selection of digital input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Digital input & parameter & SV tension setting value are controlled by RS-485 communication 2: Digital input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SINGLE SELECT	Selection of analog input command	OUTSIDE TB	0: OUTSIDE TB 1: SERIAL 2: TB (SV=RS485)	0: External terminal control (RS-485 Read function is available) 1: Analog input & parameter & SV tension setting value are controlled by RS-485 communication 2: Analog input is controlled by terminal. Parameter & SV tension setting value are controlled by RS-485 communication
SERIAL ADDRESS	Communication address (the number of station)	0	0, 1~31	☆ When the communication function is set, the following parameter will be displayed 0: Don't send back, all receive 1~31: station address
BAUD RATE	Communication baud rate	9600	(0)=4800 bps (1)=9600 bps (2)=19200 bps	There are three kinds of baud rate can be set
PARITY SET	Parity setting	NO PARITY	0:NO PARITY 1:EVEN PARITY 2:ODD PARITY	
SERIAL TIME	Communication delay interval of time	15 ms	5~65ms	The delay time between command message and response message

3.8:INSI PARAMETER (Cipher Parameter)

PASSWORD	Cipher Parameter	0	0~9999	0: Can change any parameter 1234: Reset to DEFAULT (The power must be off and start again after setting) 1~9999: Can't change parameter value
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Application Example Explanation:

1. After running of take-up roller, according to take-up speed for offering TC-2060 as reference of line speed (if there are no take-up speed, please connect terminal "+10V" to terminal "LINE"), setting winding tension at TC-2060 tension controller, and transmit speed and torque command to winding inverter (In the drive of magnetic powder clutch, torque command doesn't need to transmit to winding inverter, PP. PN drive magnetic powder clutch directly). The rotational speed and torque are controlled by motor (In the drive of magnetic powder clutch, motor is used for rotational speed control, and magnetic powder clutch is used for tension control). LOAD CELL is weighted through by material tension, detecting tension and conduct the detection signal back to TC-2060, then it could achieve the objective of winding with constant surface tension.
2. When LOAD CELL is corrected, please follow the instruction described at Section 4.3 to proceed correction.
3. When the materials is winding, if the variation of winding tension is too large in the acceleration and deceleration, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately.
4. When the materials is winding, if the variation of tension is too large in the constant speed, can refer the description of Parameter Explanation PID Parameter Group, adjusting related parameter appropriately, or increase CI time (Integral time), and decrease CP amount (Proportional ratio).
5. In this application example, when motor is used for driving directly, diameter calculation uses line speed and winding speed for calculation, it is also can use proximity switch counting length for calculating diameter. When magnetic powder clutch is used for driving, only can select proximity switch counting length for calculating diameter.
6. In this application example, when the main guiding roller is stopped, and the speed is zero, the drive's **P1** will be active (Vs **PC**), let "**STALL**" terminal of TC-2060 be enabled ("**STALL SET**": **Retention Setting**). Tension setting is changed to retention setting, only set retention setting to be a tiny tension, then the winding shaft won't loosen materials by stop (RUN doesn't need to ON).
7. Using proximity switch counting length for calculating diameter, diameter reset must be connected (**REST ,COM**).
8. The other related questions can refer the related section description listed at this Instruction Manual.
9. If it need to do taper tension, only press "**P**" key for 3 seconds, the "**TAPE**" will be displayed, changing the value (In general, suggest to set "**75%**"), press "**S**" key, then the setting is completed.
- 10 If the torque command is opposed to the trend of tension-increase or tension-decrease, reversing the rotary direction of drive or connecting terminal "**MC3**" to terminal "**COM**", the polarity will be reversed, then the setting is completed.

8. Communication

TC-2060 Controller's operation description for MODBUS communication

8.1 Introduction:

TC-2060 Controllers use RS-485 serial communication and Modbus communication protocol to connect several TC-2060 Controllers and PLC ,or PC,HMI---etc, in order to get control and monitoring simultaneously.

8.2 Communication specification:

- (1) Hardware is RS-485 serial port.
- (2) Communication protocol is RTU communication protocol of Modbus.
- (3) Communication format is set by parameter group.
 - (3.1) Set the source of RUN command to see if it is coming from RS-485:
COMMAND SELECT = 0:OUTSIDE TB ----- Coming from external terminal control. (RS-485 Read function is available)
COMMAND SELECT = 1:SERIAL ----- Digital input & Parameter & SV tension setting value are controlled by RS-485.
COMMAND SELECT = 2:RS-485 PARAMETER ----- Digital input is controlled by terminal. Parameter & SV tension setting value is controlled by RS-485.
 - (3.2) Set the source of analog signal to see if it is come from RS-485:
SINGLE SELECT = 0: OUTSIDE TB ----- Analog signal is controlled by external terminal (RS-485 Read function is available).
SINGLE SELECT = 1: SERIAL ----- Analog signal input & Parameter & SV tension setting value are controlled by RS-485.
SINGLE SELECT = 2:RS485 PARAMETER ----- Analog signal input is controlledby terminal. Parameter & SV tension setting value are controlled by RS-485.
 - (3.3) SERIAL ADDRESS = 0 ~ 31 ----- Communication Address(Default = 0).
Each communication unit should have a unique and unrepeated communication address in the communication format.
 - (3.4) BAUD RATE = 0 ~ 2 ----- Transmission Speed(Default = 1)
BAUD RATE = 0 ----- 4800 Bps
BAUD RATE = 1 ----- 9600 Bps
BAUD RATE = 2 ----- 19200 Bps
 - (3.5) PARITY SET = 0 ~ 2 ----- Parity Setting(Default = 0)
PARITY SET = 0 ----- No Parity
PARITY SET = 1 ----- Even Parity
PARITY SET = 2 ----- Odd Parity
Note: The stop bit is 1BIT.
 - (3.6) Setting dealy time of communication reception
SERIAL TIME = 5ms ~ 65ms ----- Dealy time of communication reception,

When the response time is over 5 seconds, the error message will be shown on digital controller. After it is corrected, the error message will be disappeared automatically.

- (3.7) The corresponding state of TC-2060 Controller after the abnormal communication happened (Including abnormal communication format and overtime for the interruption of communication).

SERIAL ALARM SET= RUNNING

0: Drive stops running.

1: When the communication format is not corrected, TC-2060 Controller stops running. When the communication format is corrected, but the communication is interrupted, TC-2060 Controller keeps running.

2: Drive continues to run.

- (3.8) RS-485 serial port has RXD and TXD contact points, which can be used as semi-duplex communication. For serial communication of RS-485 ports, just connected all RXD and all TXD in serial (Refer the following figure).

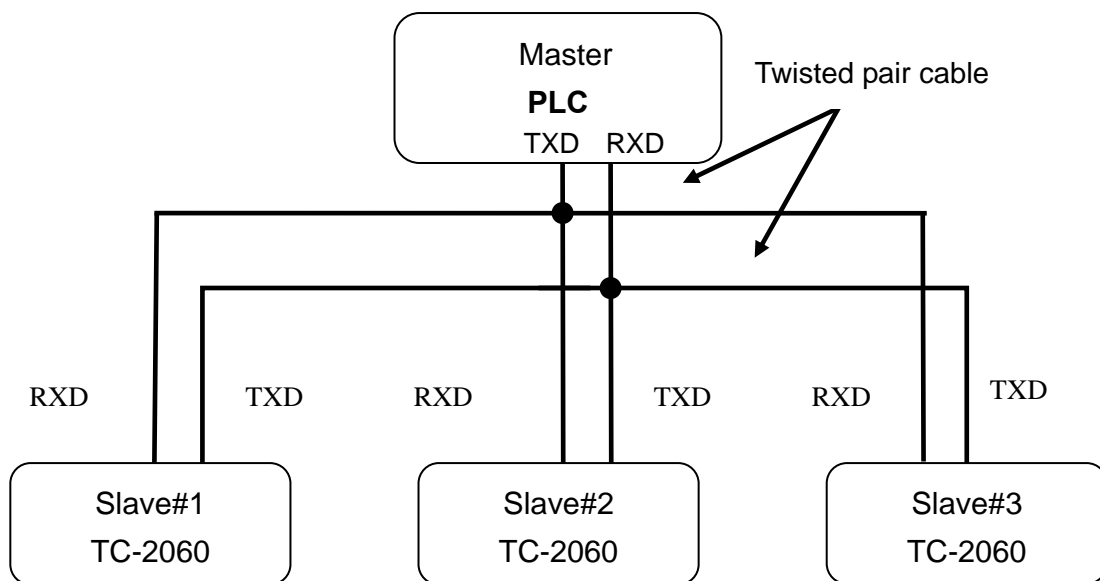


圖 1 : RS-485 Connection

8.3 Communication procedure

- (1) TC-2060 Controller power on first, setting up communication parameters of RS485, connecting RS-485 port of TC-2060 Controller, then the controller can start the communication.
- (2) In the function code of 03H, 08H, command code can connect to the line, monitor directly. It won't be limited from the sections 8.2 – (3.1), (3.2.).
- (3) In the communication, if the running of TC-2060 Controller is controlled by RS-485 (COMMAND SELECT=RS-485) or speed command (SINGLE SELECT=RS-485) is coming from RS-485, while TC-2060 Controller stops for 5 seconds without receiving any data, a warning message, "SERIAL ERROR ALM", will be displayed at the panel, it means

the communication is standby, if TC-2060 Controller receives the data, this message will not be displayed again.

8.4 Explanation for RTU communication protocol of Modbus :

(1) Definition of Character:

In RTU mode of Modbus, every Character is composed of 11bits, including 1 start bit, 8 Data bits, 1 Parity bit and 1 stop bit. If the parameter = “0” and no parity, the parity bit should be set as “1”. It will be transmitted from start bit in series. The format of Character is shown as follows:

Parity check format:

LSB									MSB	
1	2	3	4	5	6	7	8	9	10	11
Start bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Parity bit	Stop bit
	0	1	2	3	4	5	6	7		

No-parity check format:

LSB									MSB
1	2	3	4	5	6	7	8	9	10
Start bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Data bit	Stop bit
	0	1	2	3	4	5	6	7	

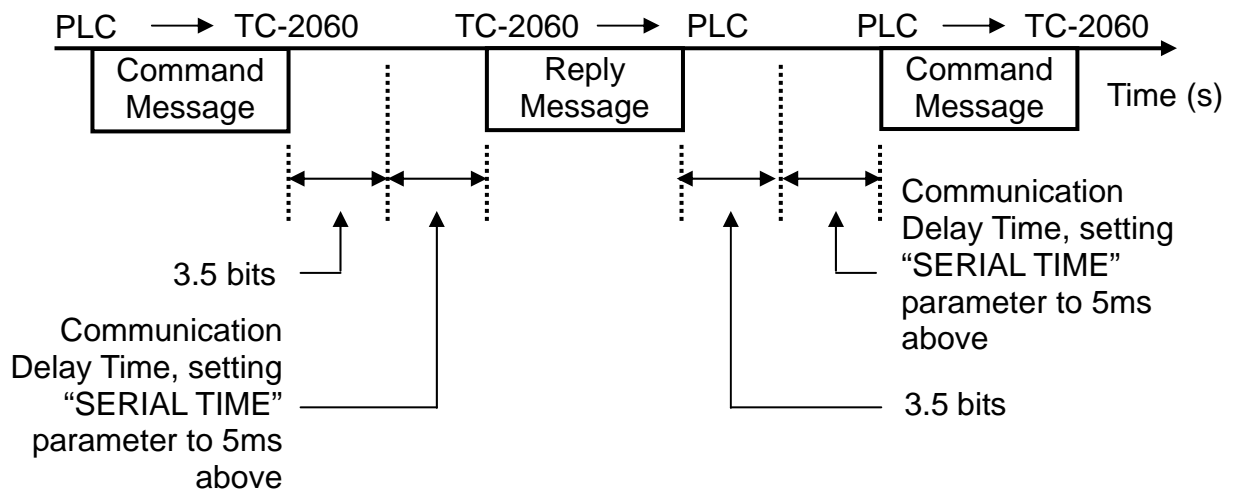
(2) Definition of Message

In the RTU mode protocol of Modbus, every Message is composed of 4bits, including Slave Address, Function Code, Data and Check Code(CRC-16). The start and stop of every Message are all separated by a time which is over 3.5 bits, and plus “SERIAL TIME” (parameter).

The format of Message is shown as follows:

A time is over 3.5 bits, and plus “SERIAL TIME”	Slave Address	Function Code	Data	CRC-16		A time is over 3.5 bits, and plus “SERIAL TIME”
	1 bit	1 bit	n bit	CRC_L	CRC_H	

Septum between Messages:



(i) Slave Address

1 bit is used to represent Slave Address of driver in RTU mode. The parameter can be used to set Slave Address of TC-2050 Controller. The range is 1~31.

All the connected Slaves can receive the Message from Master, but only the Slave with the same address can execute this Message, and reply the Message to Master. When the address is set at 0, the Message can be received and executed by connected Slave, but Slave can only receive the Message, and can't reply any Message to Master.

(ii) Function Code

1 bit is used to represent Function Code of driver in RTU mode. Slaves execute it according to the command. The Function Code of TC-2050 Controller is listed in the following table, and the function will be discussed in "Message Mode" in detail.

Function Code	Function
03H	Read data of Register
06H	Write a single data into Register
08H	Loop test
10H	Write data into Register

(iii) Data

In Message format, the bits of data are not constant because the data of every function are not the same, which will be discussed in "Message Mode" in detail.

(iv) Check Code(CRC-16)

In Message format, CRC-16 has 2 bits. It is used to check if the data are wrong. CRC-16 is binary code of 16 bits, when CRC-16 is transmitted, low byte Check Code is transmitted first, and high byte Check Code is transmitted. The calculation steps of CRC-16 are described as follows:

- (1) Set CRC_16 for "FFFFH".
- (2) Doing an XOR calculation between the low byte of CRC_16 and the first byte of

Message, and send back the result to the low byte.

- (3) If LSB of CRC_16 is "0", shifting right a bit of CRC_16, and writing "0" to MSB of CRC_16; if LSB of CRC_16 is "1", shifting right a bit of CRC_16, and writing "0" to MSB of CRC_16, doing an XOR calculation with A001H.
- (4) Repeat step of (3) until 8 bits have been shifted right.
- (5) As for the next byte of Message, repeating above steps from (2) to (4) until all bytes is accessed completely. After that CRC-16 value is the Check Code.

Example: Use Basic Language to calculate CRC-16.

Function CRC_16(message \$) as long

Crc16& = 65535

FOR CHAR% = 1 to LEN(message \$)

 Crc16& = crc16& XOR ASC (MID \$ (message \$, C% , 1))

FOR BIT% = 1 to 8

 IF crc16& MOD 2 THEN

 Crc16& = (crc16& \ 2) XDR 40961

 ELSE

 Crc16& = crc16& \ 2

 END IF

 NEXT BIT%

 NEXT CHAR%

Crc_hi% = crc16& \ 256

Crc_lo% = crc16& MOD 256

Message\$ = message\$ + CHR\$(Crc_lo%) + CHR\$(Crc_hi%)

Crc_16 = crc16&

END FUNCTION CRC_16

(V) Message mode:

The Message can be divided into Command Message and Reply Message. The Message sent from Master to Slave is called Command Message. The Message sent from Slave to Master is called Reply Message. In general, after receiving Command Message, if the delaying time is over the length of 3.5bits including the communication delay time, the slave with designated address will be responsible for reply. Under the following condition, Slave will not send "Reply Message".

1. The Slave address in the Command Message is different to all connected addresses.
2. The Slave detected communication error (Parity, Framing, Overrun, or CRC_16 error) from the receiving Message.Slave.

8.5 Message Format:

This TC-2060 Controller only receive 4 kinds of Command Message, including Read (03H), Loop Test (08H) and Write (06H and 10H), and listed below:

Command	Function code	Function	Command Message		Response Message	
			Byte (Min.)	Byte (Max.)	Byte (Min.)	Byte (Max.)
Read	03H	Read Register data	8	8	7	37
Write	06H	Write a single data into Register	8	8	8	8
Loop test	08H	Loop test	8	8	8	8
Write	10H	Write data into Register (Multiple data)	11	41	8	8

The Format of Command Message and Response Message accepted by TC-2060 Controller is shown as follows:

(1) Read Command (03H):

As for the data of Holding Register, maximum 16 data can be read at a time.

Master Command Message

Slave address		01H	Example
Function code		03H	
The first address	High byte	02H	
	Low byte	04H	
Number of Register	High byte	00H	
	Low byte	01H	
CRC-16	High byte	C4H	
	Low byte	73H	

Master wants to read the data with Slave address = 01H started from Holding Register address = 0204H, the data length is one word.

Slave Reply Message (Normal)

Slave address		01H
Function code		03H
Number of data bits		02H
The first Register	High byte	00H
	Low byte	20H
CRC-16	Low byte	B9H
	High byte	9CH

Slave Reply Message (Error)

Slave address		01H
80H+ Function code		83H
Error code		02H
CRC-16	Low byte	01H
	High byte	31H

(2) Write Command (06H):

Write data to the Holding Register. When slave address is 0, all slaves will receive and execute this Message. Now, all slaves will not respond. If the input command is used to change the parameters, they will not be saved in EEPROM at log off. If they want to be saved, they have to be written into 0200H address. The content is 01H, and they can be saved in EEPROM.

Master Command Message

Slave address		01H	Example Master wants to write 0020H data into Slave address = 01H of Register 0204H
Function code		06H	
Register address	High byte	02H	
	Low byte	04H	
Data byte	High byte	00H	
	Low byte	20H	
CRC-16	Low byte	C8H	
	High byte	6BH	

Slave Response Message (Normal)

Slave address		01H
Function code		06H
Register address	High byte	02H
	Low byte	04H
Data byte	High byte	00H
	Low byte	20H
CRC-16	Low byte	C8H
	High byte	6BH

Slave Response Message (Error)

Slave address		01H
80H+ Function code		86H
Error code		03H
CRC-16	Low byte	02H
	High byte	61H

(3) Loop Test Command(08H)

Test whether the communication loop is normal or not.

Master Command Message

Slave address		01H
Function code		08H
Test function code	High byte	00H
	Low byte	00H
Test data	High byte	12H
	Low byte	34H
CRC-16	Low byte	EDH
	High byte	7CH

Slave Response Message (Normal)

Slave address		01H
Function code		08H
Test function code	High byte	00H
	Low byte	00H
Test data	High byte	12H
	Low byte	34H
CRC-16	Low byte	EDH
	High byte	7CH

Slave Response Message (Error)

Slave address		01H
80H+ Function code		88H
Error code		03H
CRC-16	Low byte	06H
	High byte	01H

(4) Write Command(10H) :

Write multiple data into the Register, and the maximum 16 Registers can be written at a time. When Slave address is "0" in the Write Command, all Slaves will receive and will not reply. If using the Write Command to change the parameters, they will not be saved in EEPROM at power off. If they want to be saved, they have to be written into the address of 0200H. The content is 01H, then they can be saved in EEPROM.

Master Command Message

Slave address		01H	Example
Function code		10H	
The first Register address	High byte	02H	
	Low byte	04H	
No. of Register	High byte	00H	
	Low byte	01H	
Number of data byte*		02H	
The first data byte	High byte	00H	
	Low byte	20H	
CRC-16	Low byte	85H	
	High byte	CCH	

Master wants to write 2 bytes of data (0020H) to Slave address = 01H, and the start position of Register is 0204H.

Slave Reply Message (Normal)

Slave address		01H
Function code		10H
The first Register address	High byte	02H
	Low byte	04H
No. of Register	High byte	00H
	Low byte	01H
CRC-16	Low byte	41H
	High byte	B0H

Slave Reply Message (Error)

Slave address		01H
80H+Function code		90H
Error code		03H
CRC-16	Low byte	0CH
	High byte	01H

The number of data byte is 2 times to the number of Register.

8.6 Holding Register Explanation:

The Register is divided into control, monitor and drive types:

Category	Property	Address
Control data	Read/Write	0200H - 0206H, 0300H - 030CH
Monitor data	Read only	0310H - 032CH
Drive parameter data	Read/Write	020AH - 028EH

8.6.1 Control Data Register (Read/Write): Used to control the operation of TC-2060 Controller.

Name	Description	Address	Content
EEPROM WRITE ENABLE		0200H	When BIT = 1, all the parameters are stored at EEPROM
MAIN AUTO SV ADDRESS	Automatic tension setting value	0202H	0~ * 2 Full Scale Kg
MAIN MANUAL SV ADDRESS	Manual tension setting value	0204H	0~100.0% : 0~4095 COUNT
MAIN STALL SV ADDRESS	Retention tension setting value	0206H	0~ * 2 Full Scale Kg
TB	Terminal input	0300H	BIT0:RUN 0 = OFF 1 = ON
			BIT1: A, B change 0 = A shaft 1 = B shaft
			BIT2: STALL 0 = OFF 1 = ON
			BIT3: RESET 0 = OFF 1 = ON
			BIT4: MC1 0 = OFF 1 = ON
			BIT5: MC2 0 = OFF 1 = ON
			BIT6: MC3 0 = OFF 1 = ON

A/D input terminal LINE		0304H	0 ~ +10Vdc : 0~4095 COUNT
A/D input terminal ADIN1		030AH	0 ~ +10Vdc : 0~4095 COUNT
A/D input terminal ADIN2		030CH	0 ~ +10Vdc : 0~4095 COUNT

8.6.2 Monitor Data Register(read only): It is used for reading the status of TC-2060 controller's operation.

Name	Description	Address	Content
TB	Terminal Input Status	0310H	BIT0: RUN 0 = OFF 1 = ON
			BIT1: A, B change 0 = A shaft 1 = B shaft
			BIT2: STALL 0 = OFF 1 = ON
			BIT3: RESET 0 = OFF 1 = ON
			BIT4: MC1 0 = OFF 1 = ON
			BIT5: MC2 0 = OFF 1 = ON
			BIT6: MC3 0 = OFF 1 = ON
Digital Output		0311H	BIT0: RELAY 0 = OFF 1 = ON
Abnormal Status Indication		0312H	BIT0: CRC16 CODE ERROR
			BIT1: SERIAL BRK OE PE FE ERROR
			BIT2:
ERROR		0312H	BIT3: SERIAL READ/WRITE ADDRESS
			BIT4: SERIAL FUNCTION ERROR
			BIT5: SERIAL TIME ERROR TIME>5S
			BIT6:
A/D input terminal LINE Status		0314H	0~+10Vdc : 0~4095 COUNT
			0316H
A/D input terminal WIND Status			

A/D input terminal TENS Status		0318H	0~+10Vdc : 0~4095 COUNT
A/D input terminal ADIN1 Status		031AH	0~+10Vdc : 0~4095 COUNT
A/D input terminal ADIN2 Status		031CH	0~+10Vdc : 0~4095 COUNT
LOADCELL TOTAL Kg Status		031EH	0~+10Vdc : 0~4095 COUNT
LOADCELL LIGHT Status		0320H	0~+10Vdc : Full Scale Kg
LOADCELL RIGHT Staus		0322H	0~+10Vdc : Full Scale Kg
D/A output terminal TQOUT Status		0324H	-10vdc~+10Vdc : 0~4095 COUNT 0324H.15=0(+)
D/A output terminal NROUT Status		0326H	0~+10Vdc : 0~4095 COUNT
D/A output terminal SPOUT Status		0328H	0~+10Vdc : 0~4095 COUNT
LOADCELL TOTAL Kg (by filter) Status		032AH	0~+10Vdc : 0~ * 2 Full Scale Kg
DIAMETER Output Status		032CH	0~+10Vdc : 0~4095 COUNT

8.6.3 Parameter Data Register(read/write): It is used for controlling TC-2060 controller's action

Register(020AH~028EH)

MAIN PARAMETER

Name	Address	Content
DRIVER SELECT	020AH	00H:POWER(CLUTCH) 01H:MOTOR(TORQUE) 02H:E/P REGULATO
FUNCTION SELECT	020CH	00H:WINDER 01H:UNWIND
DIAMETER SOURCE	020EH	00H:DIVIDER 01H:SENSOR 02H:TB(DIAMETER) 03H:DIVIDER(INT)
LINE RATIO	0210H	0~500.0%

WIND RATIO	0212H	0~500.0%
TENS RATIO	0214H	0~500.0%
ADIN1 RATIO	0216H	0~500.0%
ADIN2 RATIO	0218H	0~500.0%
AUTO VR MAXIMUM	021AH	0~100.0%
MECH COMPANSION	021CH	0~999.9%
MECHANISN LOSS A	021EH	-5.00V~+5.00V
MECHANISN LOSS B	0220H	-5.00V~+5.00V
INITIAL TENSION	0222H	0~100.0%
INCH ADD/DEC	0224H	0~SCALE Kg
PRESET SET VALUE	0226H	0~100.0%
CUT ADD/TE VALUE	0228H	0~2 * SCALE Kg
PRESET SET TIME	022AH	0~10.0S
STOP TIME	022CH	0~60.0S
STOP FUNC SELE	022EH	00H:SELE PID 01H:STOP RATIO 02H:STOP STALL
STOP RATIO	0230H	0~500.0%
MAXIMUM DIAMETER	0232H	300~2000mm
MINIMUM DIAMETER	0234H	300~2000mm
THICKNESS	0236H	10~10000um
TB DIAMETER LOGIC	0238H	0~1(00H=0~10V, 01H=10V~0V)
TB DIAMETER ZERO	023AH	-5.00V~+5.00V
TB DIAMETER SPAN	023CH	0~500.0%
START TOURE	023EH	0~10.00V
MANUAL VR SCAL	0240H	0~10.00V
MAXIMUM_DIAM VOL	0242H	0~10.00V DIVDER(INT)
MAXIMUM_DIAM VOL	0244H	0~10.00V DIVDER(INT)

GAIN RATIO	0246H	0~500.0%
TAPER MODE SELE	0250H	00H:LINER 01H:NON_LINER
TAPER RATIO	0252H	0~100.0%
TAPER TENS SET1	0254H	0~SCALE *2
TAPER TENS SET2	0256H	0~SCALE *2
TAPER TENS SET3	0258H	0~SCALE *2
TAPER SET RATIO1	025AH	0~100.0%
TAPER SET RATIO2	025CH	0~100.0%
TAPER SET RATIO3	025EH	0~100.0%
TE SELECT FUNC	0260H	00H:PLANE TENSION 01H:PUSH TENSION 02H:EXT VR TENSION
MC1 SELECT FUNC	0262H	00H:INCHING ADD 01H:INCHING DEC 02H:OUT REMOTE 03H:OUTPUT GAIN
MC2 SELECT FUNC	0264H	00H:INCHING ADD 01H:INCHING DEC 02H:OUT REMOTE 03H:OUTPUT GAIN
AD1 SELECT FUNC	0266H	00H:FUNCTION 01H:NEW REEL VALUE 02H:TAPER 03H:TENSION(FBK)
AD2 SELECT FUNC	0268H	00H:FUNCTION 01H:NEW REEL VALUE 02H:TAPER 03H:TENSION(FBK)
RLY SELECT FUNC	026AH	00H:ALARM 01H:FBHI 02H:FBLO
RLY FBK HI/LOW	026CH	0~100.0%
AUTO_TUNE	0270H	0:OFF 1:ON
TENSION PID FEEL	0272H	0~SCALE
TENSION PID SLP	0274H	0~SCALE
TENSION PID SLP1	0276H	0~SCALE

TENSION CP GAIN	0278H	0~500.0%	
TENSI CI+ GAIN	027AH	0~500.0S	
TENSI CI- GAIN	027CH	0~500.0S	
TENSION CP1 GAIN	027EH	0~500.0%	
TENSI CI1+ GAIN	0280H	0~500.0S	
TENSI CI1- GAIN	0282H	0~500.0S	
TENSION CP2 GAIN	0284H	0~500.0%	
TENSI CI2+ GAIN	0286H	0~500.0S	
TENSI CI2- GAIN	0288H	0~500.0S	
PID FIELTER TIME	028AH	0~500.0mS	
LOADCELL UNIT	028CH	00H:Kgf 01H:N	
LOADCELL SCALE	028EH	0~1000.0Kg	
LOADCELL SELECT	0290H	00H: REELS 01H:L-REEL 02H:R-REEL	
ZERO TUNE TEST	0292H	-50.0 ~ +50.0Kg	
SPAN TUNE TEST	0294H	0~500.0%	
DISPLAY POINT	0296H	0~2	
DISP NO.1 SOURCE	0298H	0~16	00H:LINE INPUT 01H:WIND INPUT 02H:TENSION INPUT 03H:ADIN1 04H:ADIN2 05H:TORQUE OUT 06H:NR OUT 07H:SP OUT 08H:FBK OUT 09H:SLP 0AH:PID VOL
DISP NO.3 SOURCE	029AH	0~16	

DISP NO.4 SOURCE	029CH	0~16	0BH:DIAMETER 0CH:COUNT 0DH:FEEDBACK 0EH:FBK-L CELL 0FH:FBK-R CELL 20H:SERIAL STATUS 21:FBK(SERIAL) 22:SV(FEEDBACK) 23:SPAN SCALE
DISP FILTER TIME	029EH		0~20.0S

* All the parameter with (*) can't be changed by communication in running.

Communication Error Display::

1. "SERIAL TIM ALARM" No reply in communication interruption, and outran "Setting Time" over 3s.
2. "SERIAL FUN ALARM" Communication function code error(Not 03H,06H,08H,10H).
3. "CPU SERIAL ALARM " Communication interruption is abnormal(Format isn't correct).
4. "SERIAL R/W ALARM" Read/write address error (The address must be a multiple of 2)
5. "SERIAL WR EEPROM" Write data into EEPROM over 30 times in communication.
6. " SERIAL CRC ALARM" Check code error.
7. " SERIAL ERROR ALM" Communication wait time is over the setting time 5 seconds.
8. No Reply Communication data format is error, the receiving data format isn't correct.
9. No Reply UART error, Checking Parity in transmission
10. OVERRUN,FRAME error

V 0.09 English Version April 08 , 2014