GTAKE
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User Manual

GK800T Dedicated AC Motor Drives For Tension Control

1. Instruction

GK800T dedicated drives mainly provide winding and unwinding requirements and tension control functions of winding diameter calculation. This additional manual should be used along with the manual of GK800 Series High Performance AC Motor Drives.

2. Hardware Difference

N/A

3. Dedicated Parameters

Parameter	Designation	Range	Default	Attr.
F6-00	Tension control model selection	0: Invalid 1: Torque control mode 2: Speed control mode 3:Torque closed-loop control mode (reserved) 4: Constant linear speed control mode (reserved)	1	×
F6-01	Winding and rewinding selection	0: Winding 1: Rewinding	0	△
F6-02	Register ratio	0.01~100.00	1.00	△
F6-03	Linear speed input selection	0: Invalid 1: AI1 input 2: AI2 input 3: AI3 input 4: X7/DI pulse input	2	△

Parameter	Designation	Range	Default	Attr.
		5: communication input		
F6-04	Maximum linear speed	0.1m/min~6000.0m/min	1000.0m/min	Δ
F6-05	Minimum linear speed	0.1m/min~6000.0m/min	200.0m/min	Δ
F6-06	Current linear speed displayed value	0.1m/min~6000.0m/min	0.0m/min	Δ
F6-07	Winding calculation mode	0: Calculated by linear speed 1:Calculatedby thickness added up 2: AI1 input winding diameter 3: AI2 input winding diameter 4: AI3 input winding diameter 5: X7/DI pulse input winding diameter 6: Automatic calculation	0	Δ
F6-08	Maximum winding diameter	0.1mm~5000.0mm	500.0mm	Δ
F6-09	Minimum winding diameter	0.1mm~5000.0mm	100.0mm	Δ
F6-10	Initial winding diameter 1	0.1mm~5000.0mm	100.0mm	Δ
F6-11	Initial winding diameter 2	0.1mm~5000.0mm	100.0mm	Δ
F6-12	Initial winding diameter 3	0.1mm~5000.0mm	100.0mm	Δ
F6-13	Winding diameter calculation selection	Units place: winding diameter reset selection during running 0: Cannot reset when running 1: Can reset when running Tens place: winding diameter reset selection when stop 0: Remain current winding diameter when stop 1: Restore to initial winding diameter when stop Hundreds place: winding diameter reset selection when power failure 0: Remain current winding diameter when power failure 1: Restore to initial winding diameter when power failure Thousands place: winding diameter calculation direction selection 0: Reverse allowable 1: Reverse forbidden	1000	×
F6-14	Winding diameter calculation filter time	0.000s~60.000s	7.000s	Δ
F6-15	Amplitude limit of winding diameter change rate	0.0mm/s ~20.0mm/s 0.0mm/s is unlimited	0.0mm/s	Δ
F6-16	Number of pulses per lap (when the winding diameter	0~65535	1	×

Parameter	Designation	Range	Default	Attr.
	is calculated by thickness)			
F6-17	Laps per layer (when the winding diameter is calculated by thickness)	0~10000	1	×
F6-18	Material thickness 0	0.01mm ~100.00mm	0.01mm	Δ
F6-19	Material thickness 1	0.01mm ~100.00mm	0.01mm	Δ
F6-20	Material thickness 2	0.01mm ~100.00mm	0.01mm	Δ
F6-21	Material thickness 3	0.01mm ~100.00mm	0.01mm	Δ
F6-22	Current winding diameter	0.1mm ~5000.0mm	0.0mm	Δ
F6-23	Tension setting mode	0: F6-25 digital setting 1: AI1 input winding diameter 2: AI2 input winding diameter 3: AI3 input winding diameter 4: X7/DI pulse input winding diameter 5: communication setting	0	×
F6-24	Maximum tension	0.0N~6553.5N	0.0N	Δ
F6-25	Tension digital setting value	0.0N~6553.5N	0.0N	Δ
F6-26	Tension taper setting mode	0: F6-27 digital setting 1: AI1 input 2: AI2 input 3: AI3 input 4: X7/DI pulse input 5: communication setting	0	Δ
F6-27	Tension taper digital setting value	0.0%~100.0%	0.0%	Δ
F6-28	Tension taper compensation correction	0mm ~65535mm	0mm	Δ
F6-29	Zero-speed tension boost	0.0%~200.0%	0.0%	Δ
F6-30	Zero-speed threshold value	0.0%~100.0%	0.0%	Δ
F6-31	Sliding friction compensation torque	0.0%~100.0%	0.0%	Δ
F6-32	High speed sliding friction compensation correction	-50.0%~50.0%	0.0%	Δ
F6-33	Basis of high speed sliding friction compensation correction	0: frequency 0: linear speed	0	×
F6-34	Material density	0kg/m^3~65535 kg/m^3	0	Δ
F6-35	Material width	0mm ~65535mm	0	Δ
F6-36	Mechanical inertia compensation factor	0~1000	0	Δ
F6-37	Pre-drive winding diameter calculation delay time	0.0s~10.0s	2.0s	×

Parameter	Designation	Range	Default	Attr.
F6-38	Pre-drive frequency gain	0%~200.0%	100.0	▵
F6-39	Pre-drive torque limit mode	0: Calculate torque limit value by tension setting and current winding diameter 1: torque limit by d2-12, d2-13 2: torque limit by F6-41	0	▵
F6-40	Pre-drive torque limit gain	0.0~200.0%	100.0%	▵
F6-41	Pre-drive torque limit digital setting	0.0~200.0%	100.0%	▵
F6-42	Tension boost value	0.0~200.0%	50.0%	▵
F0-14	PID parameter switch	0: No switch, determined by parameters Kp1, Ti1 and Td1. 1: Auto switch on the basis of input offset 2: Switched by terminal 3: Switched by winding diameter 4: Switched by linear speed 5: Switched by frequency	3	×
L1-01	LED display parameter setting 2 on running status	0: Display disabled; display enabled Units place: BIT0: running linear speed (m/min) BIT1: Setting linear speed (m/min) BIT2: Input terminal state BIT3: Output terminal state Tens place: BIT0: Closed-loop setting (%) BIT1: Closed-loop feedback (%) BIT2: Setting length (m) BIT3: Actual length (m) Hundreds place: BIT0: Setting torque (%) BIT1: Current winding diameter (0.1mm) BIT2: Reserved BIT3: Reserved Thousands place: Reserved	000F	▵
L1-02	LED display parameter setting on stop status	0: Display disabled; display enabled Unit's place: BIT0: Setting frequency (Hz) BIT1: Busbar voltage (V) BIT2: Input terminal state BIT3: Output terminal state Tens place: BIT0: AI1 (V) BIT1: AI2 (V) BIT2: AI3 (V)	000F	▵

Parameter	Designation	Range	Default	Attr.
		BIT3: Reserved Hundreds place: BIT0: Closed-loop setting (%) BIT1: Closed-loop feedback (%) BIT2: Setting length (m) BIT3: Actual length (m) Thousands place: BIT0: Setting linear speed (m/min) BIT1: Current winding diameter (0.1mm) BIT2: External count value BIT3: DI		

4. Dedicated Parameter Specifications

F6-00	Tension control model selection	Range: 0～4	Default: 1

Select tension control mode.

0: Invalid

Tension control invalid. Drives are the same as GK800 high performance AC motor drives.

1: Torque control mode

Tension detection device and tension feedback signals are unnecessary. The drive automatically calculates current torque setting value basing on externally setting tension and current winding diameter, and performs torque control, so as to control the tension of materials.

The control mode requires the drive to run in the vector control mode, and in high-demanding tension control applications, the motor speed feedback encoder needs to be installed to perform closed-loop vector control. Motor parameters (for details, see d0 group, or d3 group), vector control parameters (for details, see d2 group, or d4 group), and encoder parameters (for details, please see d6 group) are required to be set correctly.

After F6-00 is set to 1, there is no need to set 1 in d2-00 or d5-00 (speed/torque control selection). The drive automatically runs according to the torque control mode.

2: Speed control mode

Tension or position detection device are required (tension oscillating bar or floating roll).

The tension or position feedback signals can be sent to the drive to perform PID regulation, to stabilize the feedback position in PID setting value, so as to ensure constant tension of the material. However, the tension force is not always regulated by changing PID setting value, but by changing the balance weight of tension bar or floating roll to regulate.

When running under tension control of this mode, there is no need to set frequency setting mode in b0 group, but to correctly set linear speed input channel, so as to obtain correct linear speed signal. PID regulation parameters can be set in F0 group.

When running under tension control of this mode the drive can work under V/F control, sensor-less vector control, and closed-loop vector control

3: Torque closed-loop control mode (reserved)

4: Constant linear speed control mode (reserved)

F6-01	Winding and rewinding selection	Range: 0～1	Default: 0

Select winding running or rewinding running by this parameter.
Meanwhile, winding running and rewinding running can be switched over by digital input terminal “Winding and rewinding selection”.

F6-01	Winding and rewinding selection terminal	Winding and rewinding status
0	OFF	winding
0	ON	rewinding
1	OFF	rewinding
1	ON	winding

Whether winding or rewinding, the moving direction when material is pulled tightly is considered as the forward direction of the motor. Tension direction is the same as the motor forward direction. Namely, when winding normally, and the tension direction is forward, then the winding motor runs forward. When rewinding normally, and the tension direction is forward then the rewinding motor runs in a reverse direction.

F6-02	Register ratio	Range: 0.01~100.00	Default: 1.00

Register ratio must be set correctly during tension control. Register ratio=motor revolving speed/reel revolving speed.
The following F6-03～F6-06 are function descriptions of linear speed calculation.

F6-03	Linear speed input selection	Range: 0～5	Default: 2

When 2 is selected in F6-00 (speed control mode), or winding calculation mode F6-07 is set as 0 (calculated by linear speed), correct linear speed must be obtained.
0: Invalid
1: AI1 input
2: AI2 input
3: AI3 input
4: X7/DI pulse input

5: communication input
Generally, traction motor revolving speed and linear speed is in linear relation. Therefore, the most common method is to output the output frequency of the drive by AO. This analog quantity, as linear speed, is inputted to winding and rewinding drive. Moreover, input the linear speed, which corresponds to the maximum output frequency (corresponds to 10V or 20mA), to F6-04 so as to finish corresponding relationship of analog input

and linear speed.

When performing tension control (F6-00 selected as 2) under speed control mode, there is no need to set frequency setting mode in b0 group. After setting this parameter correctly, the drive will calculate setting frequency, according to the input linear speed and calculated winding diameter, and it will overlap PID calculation output as the final frequency setting value of winding and rewinding drive. PID regulation parameters are set in F0 group.

F6-04	Maximum linear speed	Range: 0.1m/min~6000.0m/min	Default: 1000.0m/min

When 1~4 is selected in F6-03, the linear speed corresponding to analog input maximum value (10V or 20mA) or pulse input maximum value (50kHz) needs to be set. This linear speed is the maximum linear speed.

F6-05	Minimum linear speed	Range: 0.1m/min~6000.0m/min	Default: 200.0m/min

When the linear speed detected is smaller than this setting value, winding diameter calculation is not performed, in case of causing major calculation error.

F6-06	Current linear speed displayed value	Range: 0.1m/min~6000.0m/min	Default: 0.0m/min

Display current running linear speed.

The following F6-07~F6-22 are function descriptions of winding diameter calculation.

F6-07	Winding calculation mode	Range: 0 ~6	Default: 0

Regardless torque control mode or speed control mode, when performing tension control of winding and rewinding, current winding diameter needs to be correctly calculated. Winding diameter can be calculated via the following modes.

0: Calculated by linear speed

The most common is winding calculation mode. Winding diameter is calculated by inputting linear speed and running frequency of the winding and rewinding drive. At this moment, parameter F6-08～F6-15 needs to be set correctly. The winding diameter calculation is shown in F6-22.

1: Calculated by thickness added up

Calculate winding diameter by material thickness added up, and need to input lap counting signal. At this moment, parameter F6-16～F6-21 need to be set correctly. Winding diameter calculation result is shown in F6-22.

2: AI1 input winding diameter

3: AI2 input winding diameter

4: AI3 input winding diameter

5: X7/DI pulse input winding diameter

When detecting winding diameter by winding diameter detection sensor, select input channel of the winding diameter detection signal.

6: Automatic calculation

This is realized by internal automatic calculation and used to applications where winding diameter precision and tension control precision are not so high.

F6-08	Maximum winding diameter	Range: 0.1mm ~5000.0mm	Default: 500.0mm

When 2 to 5 is selected in F6-07, the corresponding winding diameter of maximum value (10V or 20mA) of analog input or pulse input of maximum value (50KHZ), is the maximum winding diameter.

Maximum winding diameter is also used for maximum amplitude during winding diameter calculation.

When not selecting “Initial winding diameter selection” terminal function, if reset winding diameter of the rewinding drive, then the initial winding diameter will be F6-08 setting value after reset.

F6-09	Minimum winding diameter	Range: 0.1mm ~5000.0mm	Default: 100.0mm

Minimum winding diameter is also used for minimum amplitude during winding diameter calculation.

When not selecting “Initial winding diameter selection” terminal function, if reset winding diameter of the winding drive, then the initial winding diameter will be F6-09 setting value after reset.

F6-10	Initial winding diameter 1	Range: 0.1mm ~5000.0mm	Default: 100.0mm
F6-11	Initial winding diameter 2	Range: 0.1mm ~5000.0mm	Default: 100.0mm
F6-12	Initial winding diameter 3	Range: 0.1mm ~5000.0mm	Default: 100.0mm

Set the initial winding diameter of winding and rewinding, by using digital input “Initial winding diameter selection 1” and terminal “Initial winding diameter selection 2” terminal, as shown in the following table. When digital input “Winding diameter reset” terminal is enabled, the winding diameter resets according to the initial winding diameter as shown in the following table.

Initial winding diameter selection 2	Initial winding diameter selection 1	Initial winding diameter
OFF	OFF	F6-08 (when rewinding) F6-09 (when winding)
OFF	ON	F6-10
ON	OFF	F6-11
ON	ON	F6-12

F6-13	Winding diameter calculation selection	Range: 0000～1111	Default: 1000

Units place: Winding diameter reset selection when running

0: Cannot reset when running

1: Can reset when running

Tens place: winding diameter reset selection when stopping

0: Remain current winding diameter when stopping

1: Restore to initial winding diameter when stopping

Hundreds place: Winding diameter reset selection when power failure

0: Remain current winding diameter when power failure

1: Remain initial winding diameter when power failure

Thousands place: winding diameter calculation direction selection

0: Reverse allowable

1: Reverse forbidden

F6-14	Winding diameter calculation filter time	Range: 0.000s~60.000s	Default: 7.000s

Set filter time of winding diameter calculation.

F6-15	Amplitude limit of winding diameter change rate	Range: 0.0mm/s ~20.0mm/s 0.0mm/s is no limit	Default: 0.0mm/s

Limit the change rate of calculated winding diameter. Defined as: the winding diameter change at every second is no more than this setting value. If set as 0.0, it means that rate amplitude limit does not perform.

When 1 is selected in F6-07 (calculate winding diameter by thickness), F6-16～F6-21 needs to be set.

F6-16	Number of pulses per lap (When calculating winding diameter by thickness)	Range: 0~65535	Default: 1

It refers to the number of pulse generated by digital input “Lap counting signal” when the reel revolves a lap.

F6-17	Laps per layer (When calculating winding diameter by thickness)	Range: 0~10000	Default: 1

This is generally used for wire material. Defined as: the material reels one full layer, when the reel revolves the set laps as set in F6-17.

F6-18	Material thickness 0	Range: 0.01mm~100.00mm	Default: 0.01mm
F6-19	Material thickness 1	Range: 0.01mm~100.00mm	Default: 0.01mm
F6-20	Material thickness 2	Range: 0.01mm~100.00mm	Default: 0.01mm
F6-21	Material thickness 3	Range: 0.01mm~100.00mm	Default: 0.01mm

Select the thickness of material. The winding diameter adds once according to the material thickness when the material rolls one full lap.

Material thickness selection 2	Material thickness selection 1	Material thickness
OFF	OFF	F6-18
OFF	ON	F6-19
ON	OFF	F6-20
ON	ON	F6-21

F6-22	Current winding diameter	Range: 0.01mm~100.00mm	—

No matter what kind of winding calculation mode is, the final calculated winding diameter displays on this parameter, which can be changed online manually.

The following F6-23～F6-36 are function descriptions of tension setting and compensation under torque control mode (F6-00 is set as 1).

F6-23	Tension setting mode	Range: 0~5	Default: 0

0: F6-25 digital setting
Set tension setting by F6-25.
1: AI1 input winding diameter
2: AI2 input winding diameter
3: AI3 input winding diameter
Set tension setting by analog input. The corresponding winding diameter for maximum value (10V or 20mA) of analog input is F6-24.
4: X7/DI pulse input winding diameter
Set tension setting by pulse input. The corresponding winding diameter for maximum value (50kHz) of pulse input is F6-24.
5: communication setting

F6-24	Maximum tension	Range: 0.0N~6553.5N	Default: 0.0N

When 1~4 is set in F6-23, maximum tension must be set. Defined as: maximum value (10V or 20mA) of analog input, or corresponding diameter for maximum value (50kHz) of pulse input.

F6-25	Digital setting value for tension	Range: 0.0N~6553.5N	Default: 0.0N

When the F6-23 is set to 0, the digital setting value for tension can be set through F6-25.

F6-26	Tension taper setting mode	Range: 0~5	Default: 0

F6-23~F6-25: the taper compensation parameters, which are applicable to winding control only. In some winding applications, the winding tension is required to be gradually decreased along with the increase of the winding diameter for purpose of good curling of the material.
Formula:
Tension value after compensation = set tension*{1-K*[1-(minimum winding diameter + F6-28)/(the current winding diameter+F6-28)]}

K: tension taper, which can be set via the below:
0: digital setting (F6-27)
1: AI1 input
2: AI2 input
3: AI3 input
4: X7/DI pulse input
5: communication setting

F6-27	Digital setting value of tension taper	Range: 0.0%~100.0%	Default: 0.0%

When the tension taper setting mode F6-26 is set to 0, this parameter value will be the value of tension taper.

F6-28	Tension taper compensation correction	Range: 0mm~65535mm	Default: 0mm

Refer to the formula of taper compensation as abovementioned in F6-26.

The higher the compensation correction value, the lower the tension droop rate while the winding diameter increases.

F6-29	Zero-speed tension boost	Range: 0.0%~200.0%	Default: 0.0%
F6-30	Zero-speed threshold	Range: 0.0%~100.0%	Default: 0.0%

F6-29: in order to overcome the static friction force during booting up, a proper tension boost value shall be set. It indicates the percentage that the tension value makes up of the maximum tension value. Increase the F6-29 setting value properly, in case the tension is set in a low value that may result in difficulty during booting up.

F6-30: the inverter is running under zero-speed condition, when the running speed of the inverter is lower than zero-speed threshold as set in F6-30. The zero-speed value (F6-30) indicates the percentage that the frequency makes up of the maximum frequency value.

F6-31	Sliding friction compensation torque	Range: 0.0%~100.0%	Default: 0.0%
F6-32	High speed sliding friction compensation correction	Range: -50.0%~50.0%	Default: 0.0%
F6-33	Basis of high speed sliding friction compensation correction	Range: 0~1	Default: 0

F6-31: due to the sliding friction the actual tension is less than the setting value, especially when the winding diameter is small or the tension is set to a small value. A proper setting of sliding friction compensation torque is an effective solution.

F6-32: when the F6-32 is set at 0.0%, the sliding friction compensation is based on the setting value of F6-31 regardless of the speed. However, sliding friction may vary for some systems when speed changes.

A proper correction value set via F6-32 assists to enable the material tension to stay constant. When the F6-32 setting value is: <0%, the high speed sliding friction is less than the low speed sliding friction value. Conversely, when the F6-32 setting value is: >0%, the high speed sliding friction is greater than the low speed friction sliding value

For F6-31 and F6-32, the setting value indicates the percentage that the compensation makes up of the rated torque.

F6-33 indicates the identifying basis of the high/low speed.

0: identify via the running frequency of the winding and rewinding inverter.

1: identify via the linear speed.

F6-34	Material density	Range: 0kg/m3~65535kg/m3	Default: 0kg/m3

F6-35	Material width	Range: 0mm~65535mm	Default: 0mm
F6-36	Mechanical inertia compensation factor	Range: 0~1000	Default: 0

F6-34~F6-36: inertia compensation. Inertia is mainly comprised of two types: material inertial and mechanical inertial.

Material inertial: is much in line with the density, width, winding diameter, min. winding diameter (winding diameter of empty winding) of the material. Basing on these the inverter is able to figure out the required inertial compensation torque. The density and width of the material need to be set properly.

Mechanical inertia: includes inertia of winding and rewinding motor rotor, drive system inertia, and reel inertia. Mechanical inertia is irrelevant with the material, thus when empty winding, the F6-36 setting value can be modified as below:

During winding:

When it speeds up, properly increase the F6-36 setting value if the tension decreases. Whereas, decrease the F6-36 setting value.

When it slows down, properly increase the F6-36 setting value if the tension increases. Whereas, decrease the F6-36 setting value.

During rewinding:

When it speeds up, properly increase the F6-36 setting value if the tension increases. Whereas, decrease the F6-36 setting value.

When it slows down, properly increase the F6-36 setting value if the tension decreases. Whereas, decrease the F6-36 setting value.

F6-37～F6-41: Pre-drive function during automatic roll alternation

In the case of reel alternation during the running, it is necessary to rotate the winding and rewinding reel in advance, and the linear speed of rotating shall be consistent with the linear speed of material. The pre-drive status of the inverter starts, after it receives the “Run Command” and the digital input “pre-drive terminal” is enabled.

F6-37	Pre-drive winding diameter calculation delay time	Range: 0.0s~10.0s	Default: 2.0s

After the pre-drive is ended, there is a delay time which is defined by F6-37 before the winding diameter calculation starts up. This helps to avoid the winding diameter calculation fluctuation at the instant of the pre-drive ending.

F6-38	Pre-drive frequency gain	Range: 0%~200.0%	Default: 100.0%

The inverter automatically calculate the Running Frequency in terms of linear speed and winding diameter during pre-drive, so as to keep the linear speed of pre-drive reel in consistency with the material linear speed.

The automatically calculated Running Frequency can be properly corrected through pre-setting the pre-drive frequency.

Formula:

Revised frequency= automatically calculated Running Frequency * F6-38 set value

When the pre-drive frequency gain (F6-38) is: ＞100.0%, the linear speed of the pre-drive reel is greater than the material speed during running. Conversely, when the pre-drive frequency gain (F6-38) is: ＜100.0%, the linear speed of the pre-drive reel is less than the material speed during running.

In general, in the case of winding the pre-drive frequency gain (F6-38) can be slightly greater than 100.0% .Whereas the frequency gain can be slightly less than the 100.0% in the case of re-winding.
For instance, if the automatically calculated frequency is 5.00Hz and the F6-38 is set at 110.0%, then the inverter is running at 5.50Hz in a pre-drive state

F6-39	Pre-drive torque limit mode	Range: 0~2	Default: 0

The output torque is required to be limited since the inverter is running in a speed control state during pre-drive state. Pre-drive torque limit mode can be set via F6-39.
0: Figure out the limit value of the torque, through the tension setting and the current value of winding diameter.
This is the commonly used mode. Calculate out the limit value of the torque through the tension setting and the current value of winding diameter. Modify the limit value further via F6-40.
1: Complete torque limit through d2-12 and d2-13.
2: Complete torque limit through F6-41.

F6-40	Pre-drive torque limit gain	Range: 0.0~200.0%	Default: 100.0%

When the F6-39 is set to: 0, the torque limit value figured out already can be corrected by setting this torque limit gain.
The corrected torque limit value = torque limit value calculated based on the tension setting and the current value of winding diameter * F6-40
For instance:
If F6-39 is set to: 0 , with the torque limit value calculated to be 10%, and if the F6-40 is set to 120.0%, the pre-drive torque limit value will be 12% accordingly.

F6-41	Digital setting for pre-drive torque limit	Range: 0.0%~200.0%	Default: 100.0%

When the F6-39 is set to: 2, the pre-drive torque limit value can be set by F6-41.

Auxiliary function description

F6-42	Tension boost value	Range: 0.0%~200.0%	Default: 10.0%

When the digital input terminal of “Tension boost” is enabled, the tension boost is based on the F6-42 setting value.
Modified and supplementary functions of other parameter group:

F0-14	PID parameters switch	Range: 0~5	Default: 3

When F6-00 is set to 2, (Speed control mode), this parameter is valid.
0: No switch. Use parameters of Kp1, Ti1 and Td1
1: Auto switch on the basis of input offset
2: Switch by terminal
Quite the same with the standard products if choose 0~2.
3: Switch by winding diameter

When minimum winding diameter: use parameters of Kp1, Ti1 and Td1. When maximum winding diameter: use parameters of Kp2, Ti2 and Td2. When between minimum and maximum winding diameter, the PID parameter changes continuously.

4: Switch by linear speed

When the linear speed is 0: use parameters Kp1, Ti1 and Td1. When maximum linear speed: use parameters of Kp2, Ti2 and Td2. When the linear speed is between 0 and maximum linear speed, the PID parameter changes continuously.

5: Switch by frequency

When the frequency is 0: use parameters of Kp1, Ti1 and Td1. When maximum frequency: use parameters of Kp2, Ti2 and Td2. When the frequency is between 0 and maximum frequency, the PID parameter changes continuously.

Supplementary terminal functions:

C0-01	Function of terminal X1	70: Tension control prohibited 71: Winding and rewinding selection 72: Winding diameter reset 73: Initial winding diameter selection 1 74: Initial winding diameter selection 2 75: Winding diameter calculation pause 76: Material thickness selection 1 77: Material thickness selection 2 78: Lap counting signal 79: Pre-drive enabled 80: Tension boost	Default: 0
C0-02	Function of terminal X2		Default: 0
C0-03	Function of terminal X3		Default: 0
C0-04	Function of terminal X4		Default: 0
C0-05	Function of terminal X5		Default: 0
C0-06	Function of terminal X6		Default: 0
C0-07	Function of terminal X7/D1		Default: 0
C0-08	Function of terminal AI1 (digital enabled)		Default: 0
C0-09	Function of terminal AI2 (digital enabled)		Default: 0
C0-10	Function of terminal AI2 (digital enabled)		Default: 0

70: Tension control prohibited

When this terminal is enabled, the tension control is prohibited. Which is equivalent to that the F6-00 is set to 0.

71: Winding and rewinding selection

Refer to F6-01 functions description, which enables a switch between winding and rewinding.

72: Winding diameter reset

The winding diameters need to be reset at the initial value in case of reel alternation.

73: Initial winding diameter selection 1

74: Initial winding diameter selection 2

Basing on the above terminal functions (73~74) different initial winding diameters can be choose /set, for which please kindly refer to F6-10~F6-12.

75: Winding diameter calculation pause

The winding diameter calculation is paused when this terminal is enabled.

76: Material thickness selection 1
77: Material thickness selection 2
Material thickness can be set basing on the aforementioned terminal functions (76~77)

78: Lap counting signal
When the winding diameter is calculated by thickness added up, calculate the laps of the reel by this input signal.

79: Pre-drive enabled
When this terminal is enabled, the pre-drive running mode is activated.
When this terminal is disabled, the inverter is running in tension control mode.

80: Tension boost
When this terminal is enabled, the tension boost can be started basing on the F6-42 setting value.

C3-00	AO1 output function selection	18: Winding diameter output	2
C3-01	AO2 output function selection		1
C3-02	Y2/DO output function selection (When used as DO)		2

18: Output winding diameter
Output winding diameter calculation. The maximum winding diameter is corresponding to the maximum analog value (10V or 20mA), or the maximum pulse frequency (50kHz).

L1-01	LED display parameter setting 2 on running status	Range: 0000～37FF	Default: 000F

0: Display disabled; display enabled
Units place:
BIT0: running linear speed (m/min)
BIT1: Setting linear speed (m/min)
BIT2: Input terminal state
BIT3: Output terminal state
Tens place:
BIT0: Closed-loop setting (%)
BIT1: Closed-loop feedback (%)
BIT2: Setting length (m)
BIT3: Actual length (m)
Hundreds place:
BIT0: Setting torque (%)

BIT1: Current winding diameter (0.1mm)
BIT2: Reserved
BIT3: Reserved
Thousands place:
BIT0: Reserved
BIT1: Reserved
BIT2: Reserved
BIT3: Reserved

L1-02	LED display parameter setting on stop status	Range: 0000～FF7F	Default: 000F

LED display parameters can be set, when inverter is in stopped state. Press the  button on the keyboard for multiple parameters selection or display.

0: Display disabled; display enabled
Unit's place:
BIT0: Setting frequency (Hz)
BIT1: Busbar voltage (V)
BIT2: Input terminal state
BIT3: Output terminal state
Tens place:
BIT0: AI1 (V)
BIT1: AI2 (V)
BIT2: AI3 (V)
BIT3: Reserved
Hundreds place:
BIT0: Closed-loop setting (%)
BIT1: Closed-loop feedback (%)
BIT2: Setting length (m)
BIT3: Actual length (m)
Thousands place:
BIT0: Setting linear speed (m/min)
BIT1: Current winding diameter (0.1mm)
BIT2: External count value
BIT3: DI