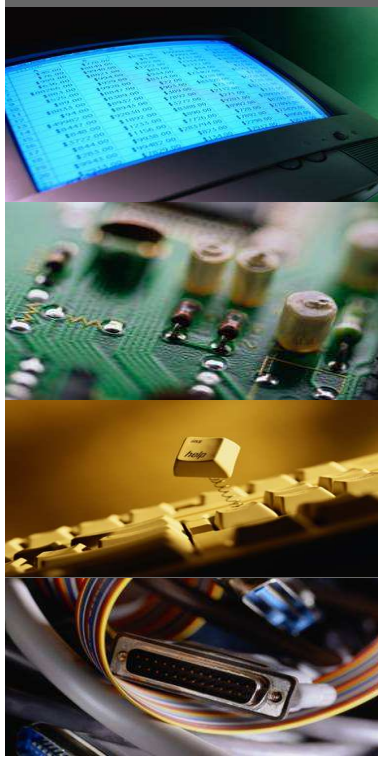
Guide Book for L7S Series Torque Mode



21.Feb, 2014

SI team/Wonkee Son

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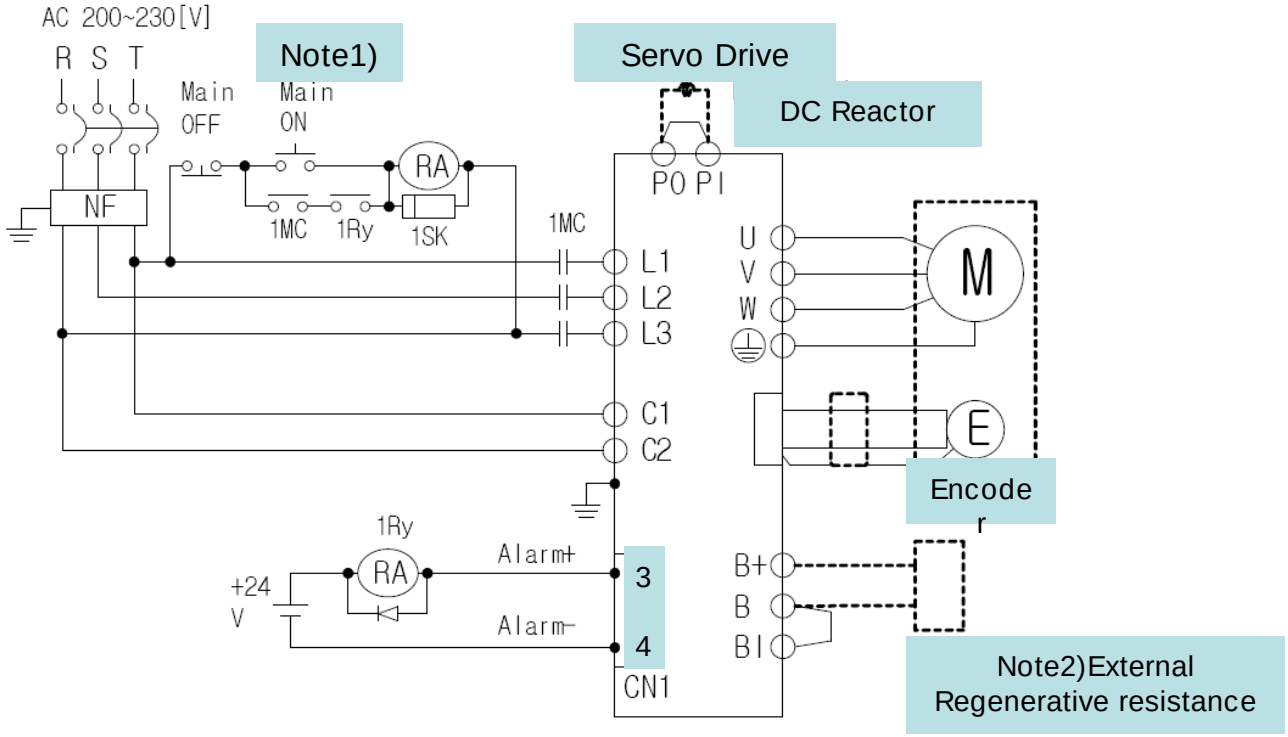
Contains

1. Wiring diagram
2. Outline
3. Parameter settings
4. Torque command
5. Gain Tuning

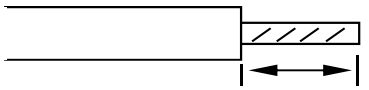


Note1) It takes approximately one to two seconds to output an alarm signal after turning on the main power(3Phase AC220V). Accordingly, press and hold the main power ON switch for at least two seconds.

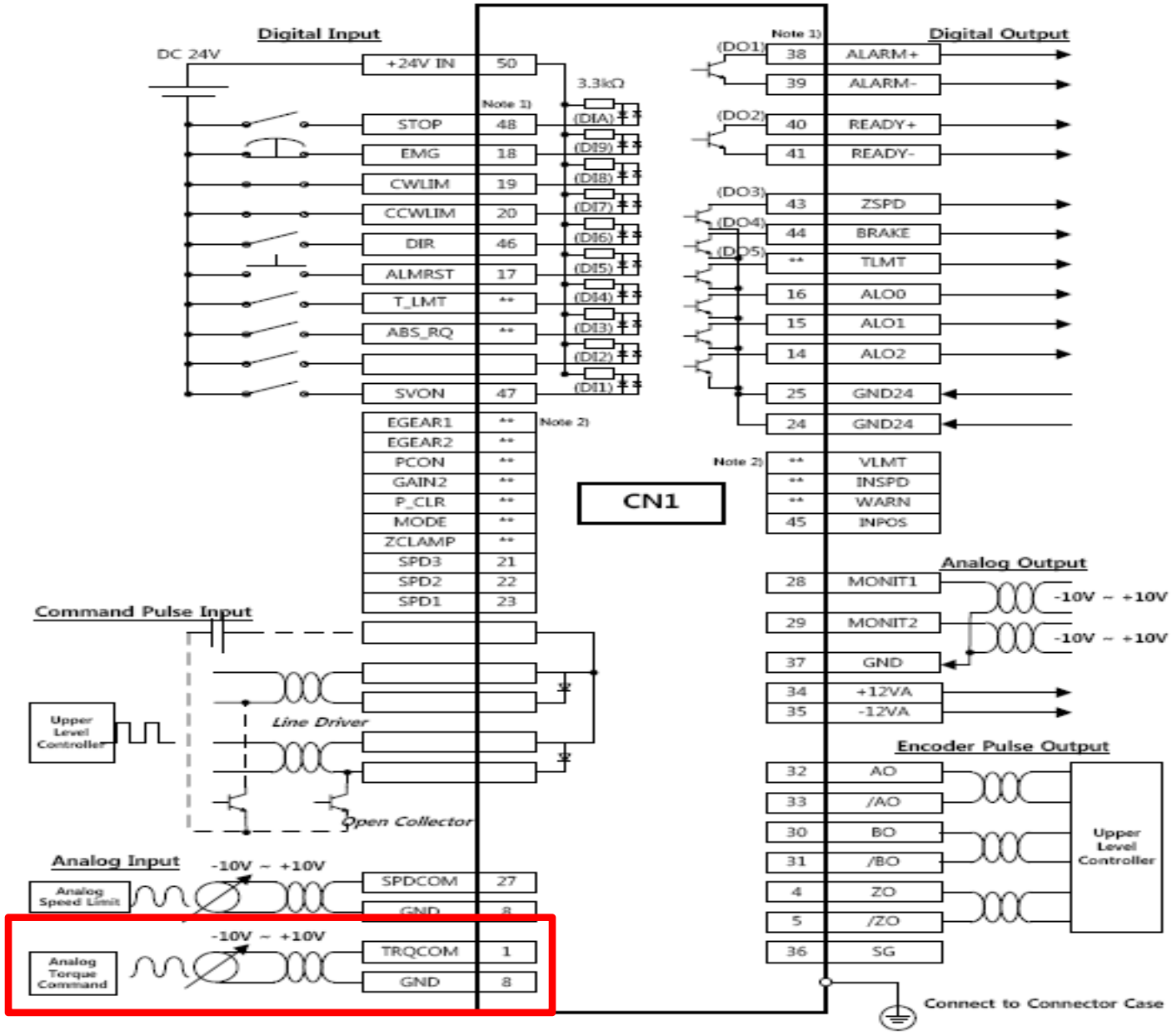
Note2) Check the B and BI short-circuit terminals and the L7NA001B-L7NA004B (50 W, 100 Ω), L7NA008B ~ L7NA010B (100 W, 40 Ω), and L7NA020B ~ L7NA035B (150 W, 13 Ω) regenerative resistors before use. If the regenerative capacity is high because of frequent acceleration and deceleration, open the short-circuit pins (B , BI) and connect an external regenerative resistor to B and B+

주3) Remove approximately 7-10 ㎜ of the sheathing from the cables for the main circuit power and attach crimp terminals. (Maker : SEOIL)

100[W]~400[W] : UA-F1510, 800[W] ~400[W]: UA-F2010, 2[kW] ~3.5[kW]: UA-F4010



Wiring Diagram



Outline for torque mode

▶Outline: Torque mode is to use for controlling tension and pressure of machine.

Input the voltage required from upper controller

▶ Set as below ordering

1. Wiring on CN1
   - Analog Torque command : No.1(TRQCOM), No.8(GND)
2. Basic parameters setting
   - Motor ID->Encoder type->Encoder pulse numbers->Operation mode
3. Motor operation test as increase gradually Analogue Torque command voltage
4. Check analog torque command scale and current command torque[St-08]
5. When ordering 0V, if motor is rotated, adjust not to rotate motor as using torque offset
6. Torque limit setting
7. Use Zero clamp function to reduce offset of command from upper controller
8. Adjust Drive according to load condition

(Notice)

▶ In the case of wrong parameter set, Motor will rotate in high speed or vibrate. And, it causes burning of Motor

Motor ID [P0-00]

1. then motor constant can be automatically set
2. ID is displayed on Motor Label

Encoder Type [P0-01]

No.	Types	Signal Mode	Signal types	Remark
0	Incremental Parallel	A Phase Lead 15Lines	A,B,Z,U,V,W	
1	SingleTurn Absolute Serial	Biss Serial	Serial Type	
3	MultiTurn Absolute Serial	Biss Serial	Serial Type	

Encoder Pulse [P0-02]

1. Set Encoder Pulse Number
2. Encoder Pulse Number is displayed on Motor Label

(Notice) Serial type : Set the number of bits per turn from Encoder
Incremental type : Set the number of Encoder pulse

(Note) Set Pulse Logic Parameter in Servo-off

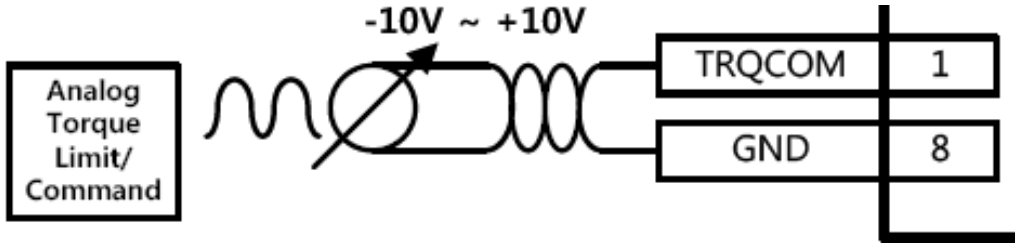
Operation Mode [P0-03]	"0" (Torque Mode) Set

Operation mode	Operation mode
0	Torque control operation
1	Speed control operation
2	Position control operation
3	MODE contacts ON : Speed control operation MODE contacts OFF : Position control operation
4	MODE contacts ON : Speed control operation MODE contacts OFF : Torque control operation
5	MODE contacts ON : Position control operation MODE contacts OFF : Torque control operation

(Note) Set Pulse Logic Parameter in Servo-off

Torque command

Analogue Torque command input signal : I/O pin no.1, no8

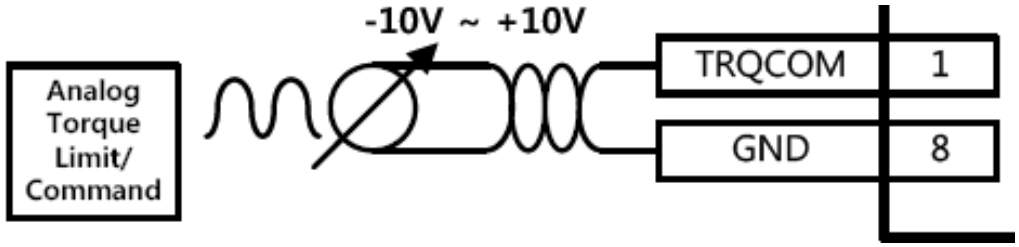


*Current operation torque (St-07) : Displays the current load factor against the rated load factor (Displays the load currently output by the servo motor as a percentage against the rated output)

*Current command torque (St-08) : Displays the command load factor against the rated load factor (Displays the load currently output by the servo motor as a percentage against the rated output)

Torque command

Analogue speed command input signal : I/O pin no.27, no8

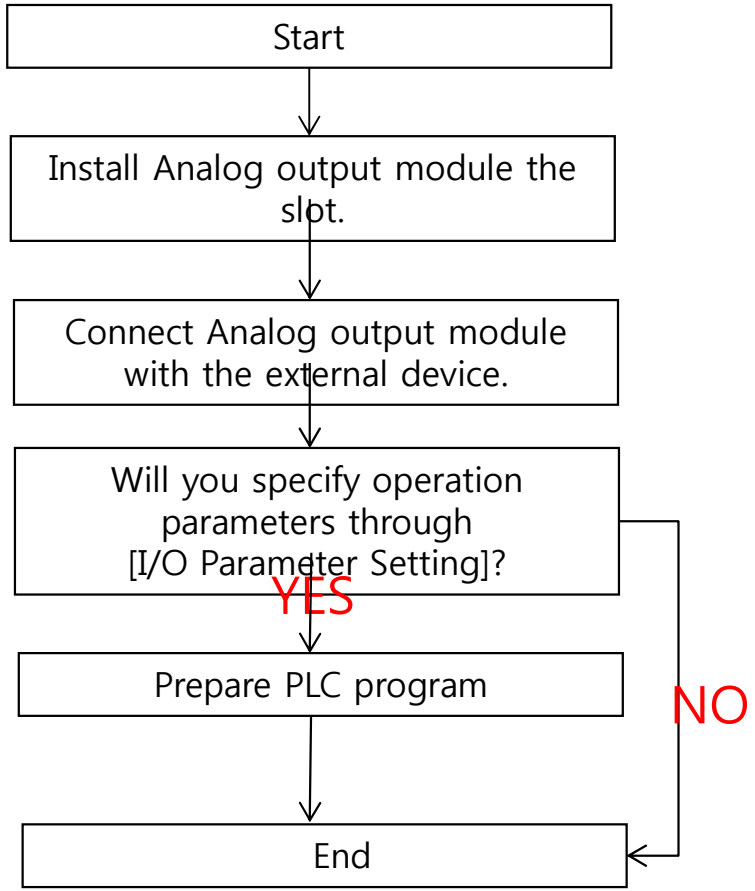


Analog speed scale setting [P2-17] : Sets speed scale when the analog speed command is 10 [V].
The maximum value is the maximum motor speed

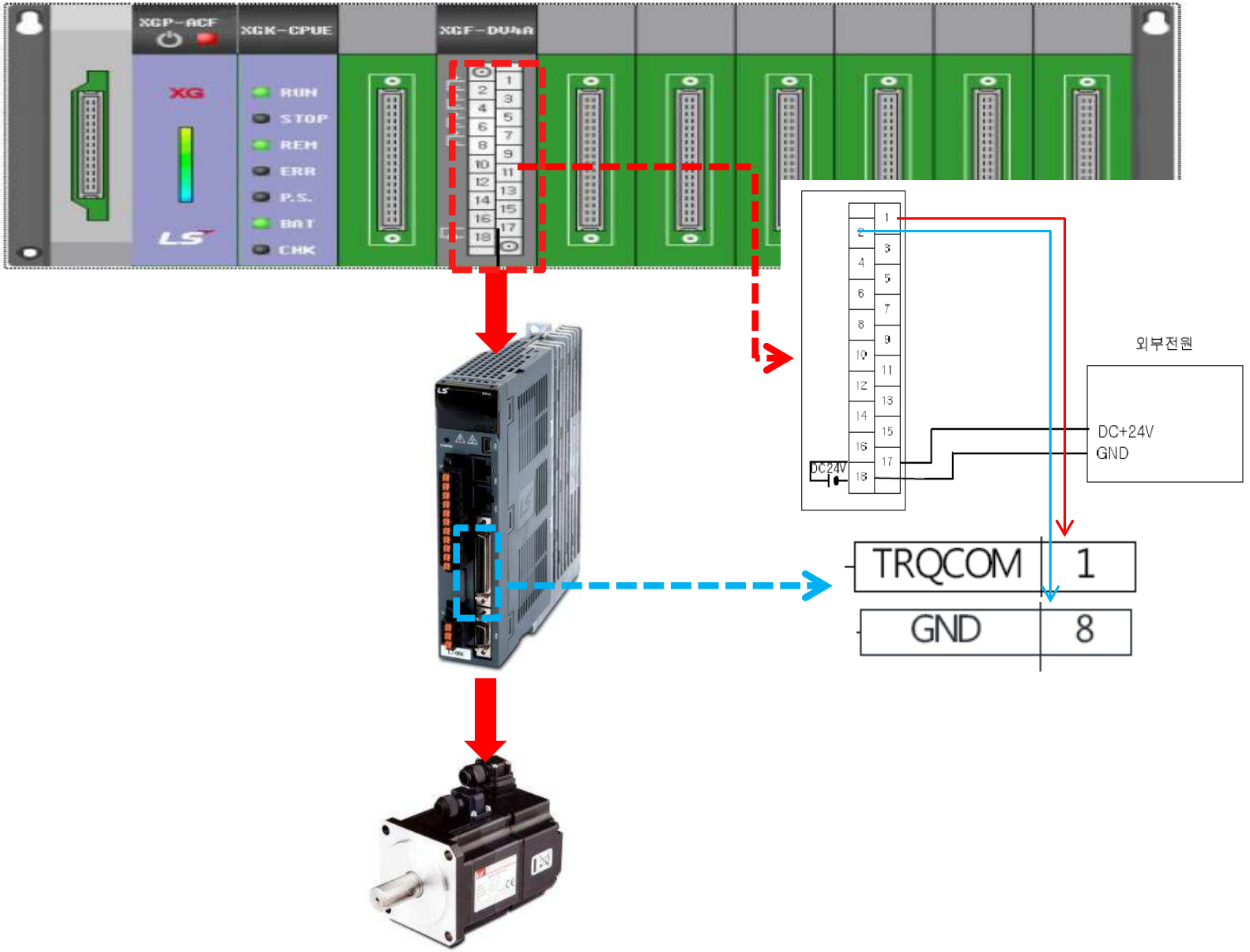
If input value is 2000, when 10V, motor is rotated at 2000rpm

Torque command

Procedures for the operation with Analog output module (XGF-DV4A/DV8A)



Connection diagram for XGF-DV4A with L7S Dirve



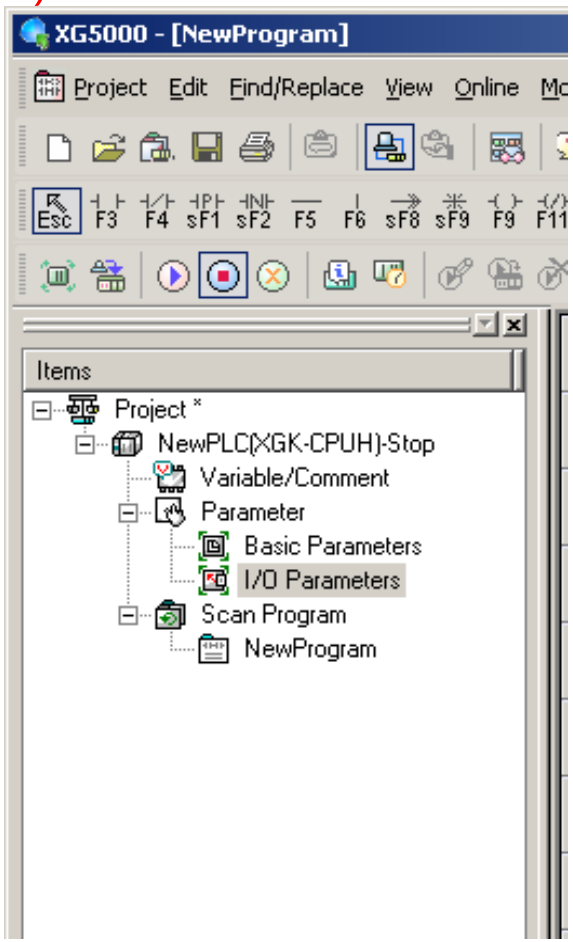
Setting screen of parameters

To set I/O parameters

1) After selecting I/O parameters in the left menu of XG-5000, Double click the I/O parameters

2) Click the arrow button on the screen above to display the screen where an applicable module can be selected. Search for the applicable module to select.

1)



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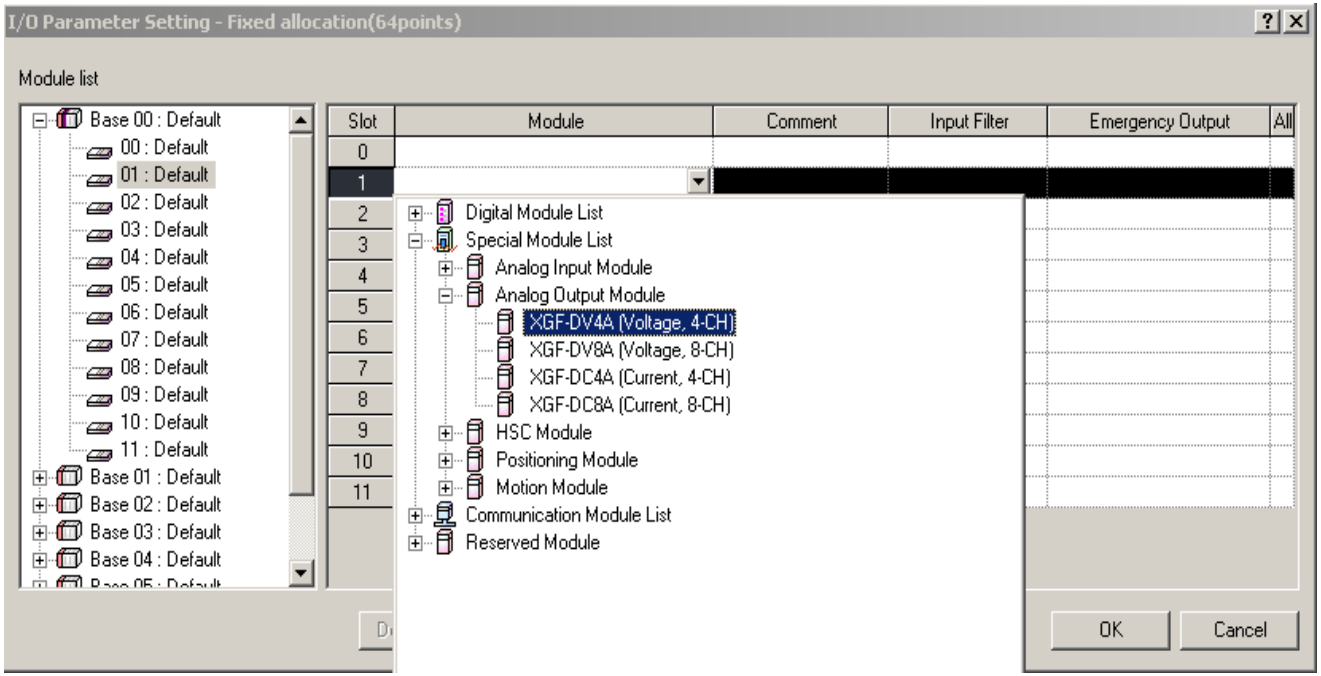
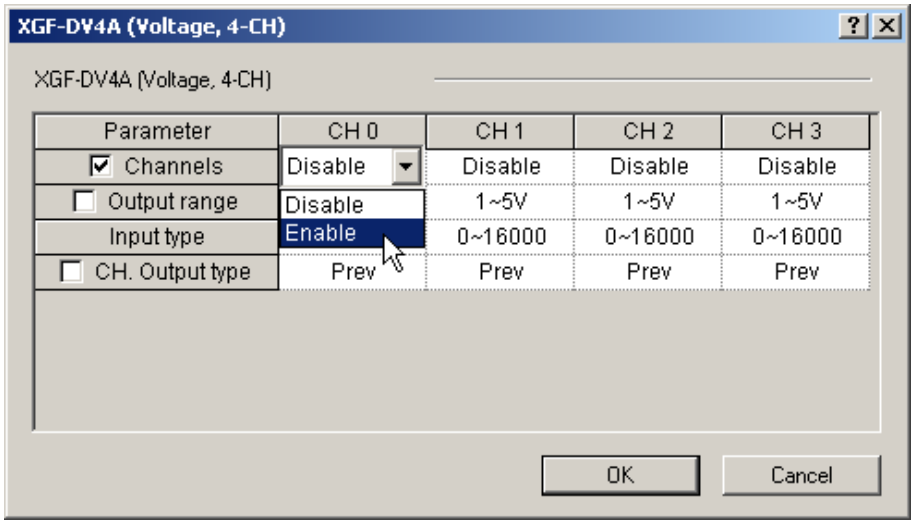


I/O Parameters settings

Set Channels, Output range, input type, Channel. Output type like 3)~6) as below

3)



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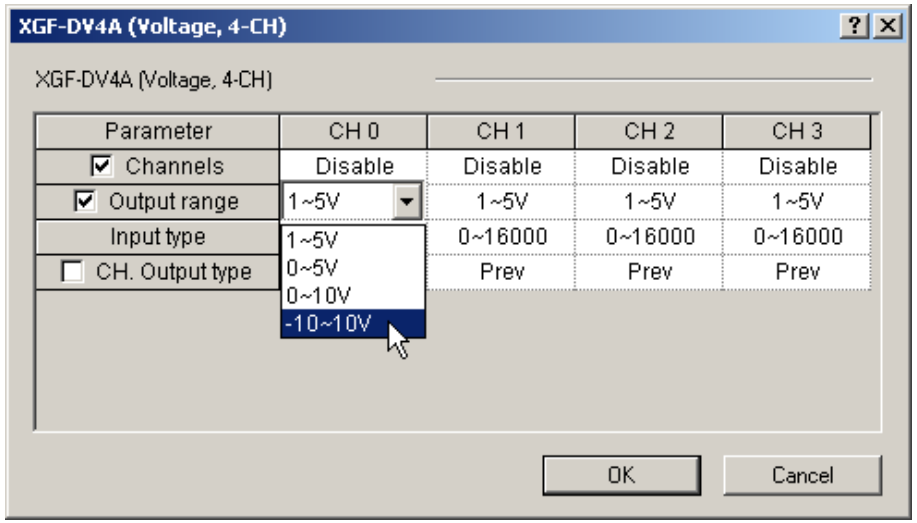

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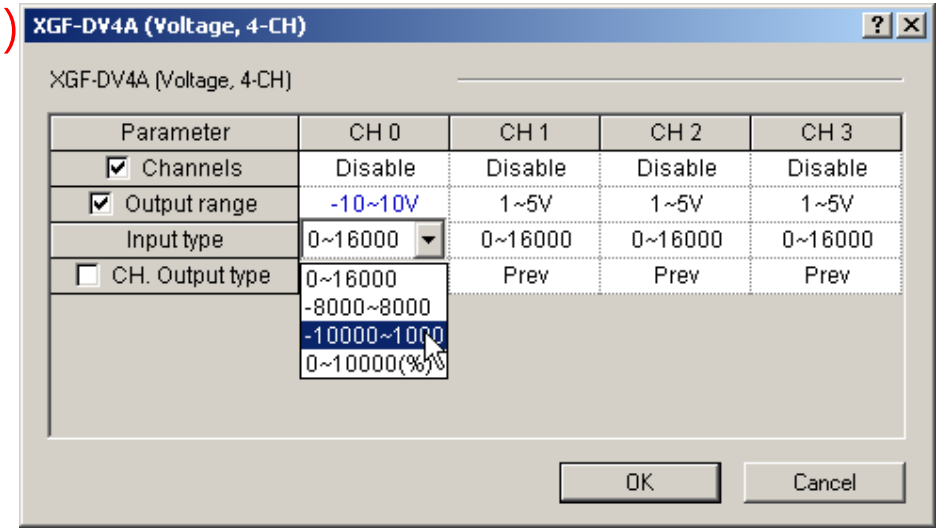
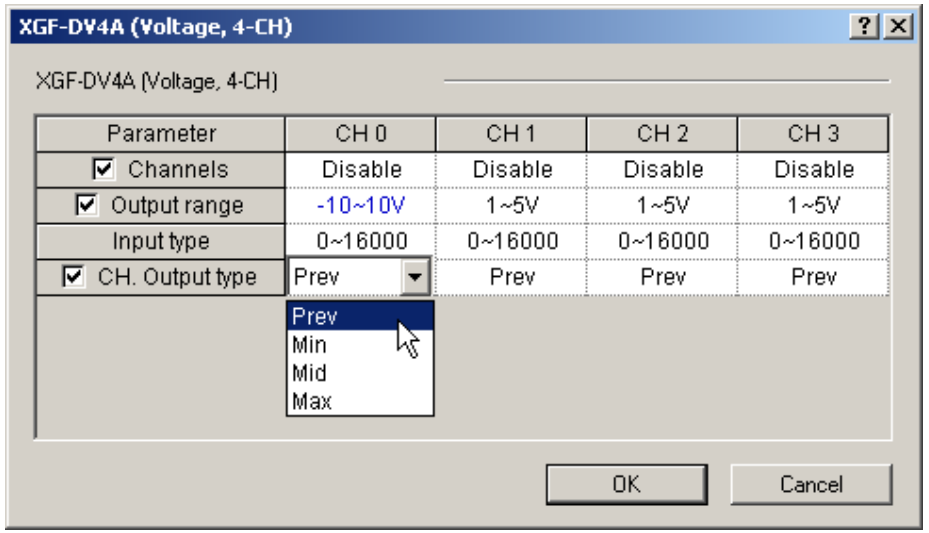
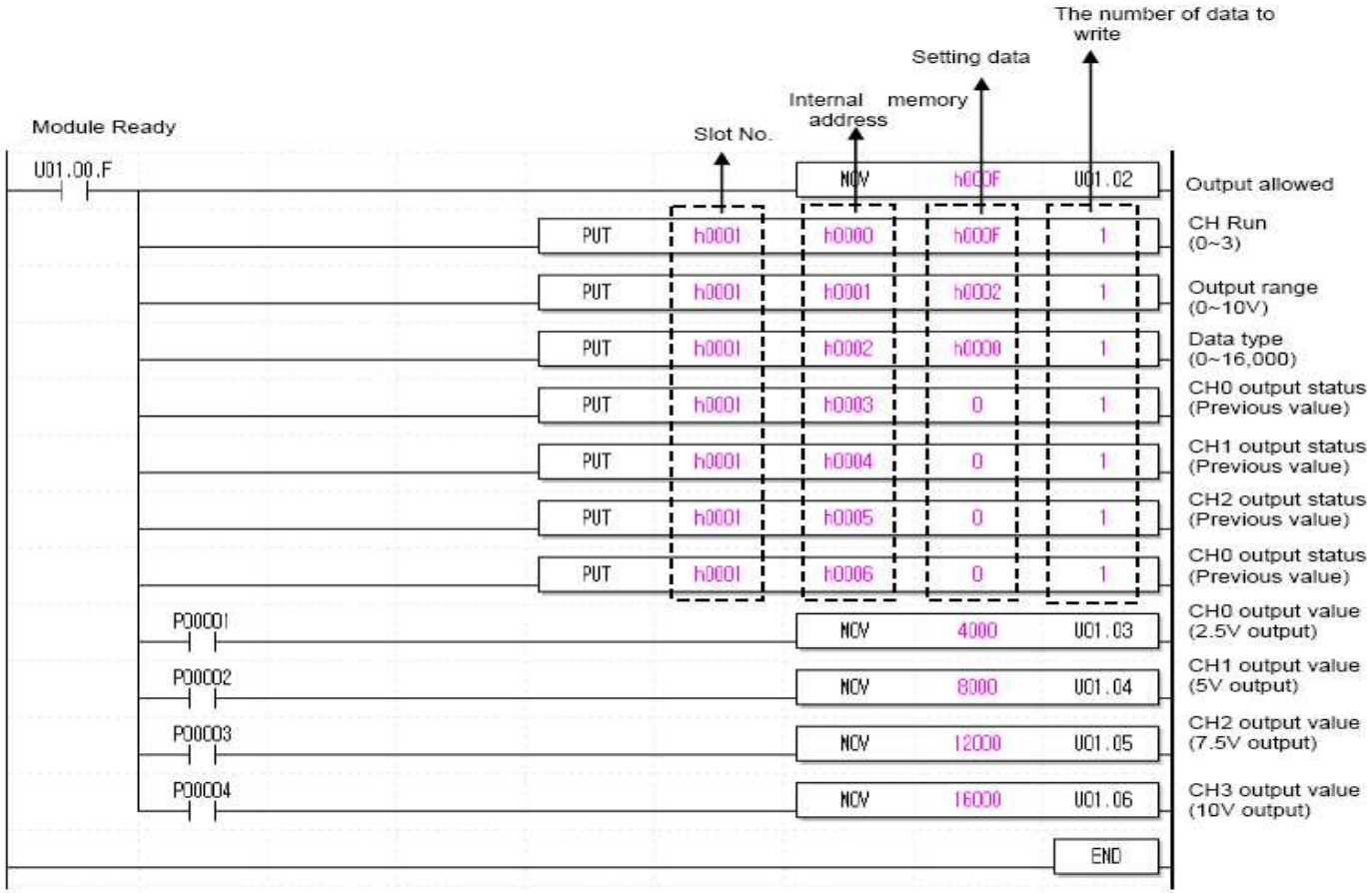


6)



▶ Example of PLC program(XGK)

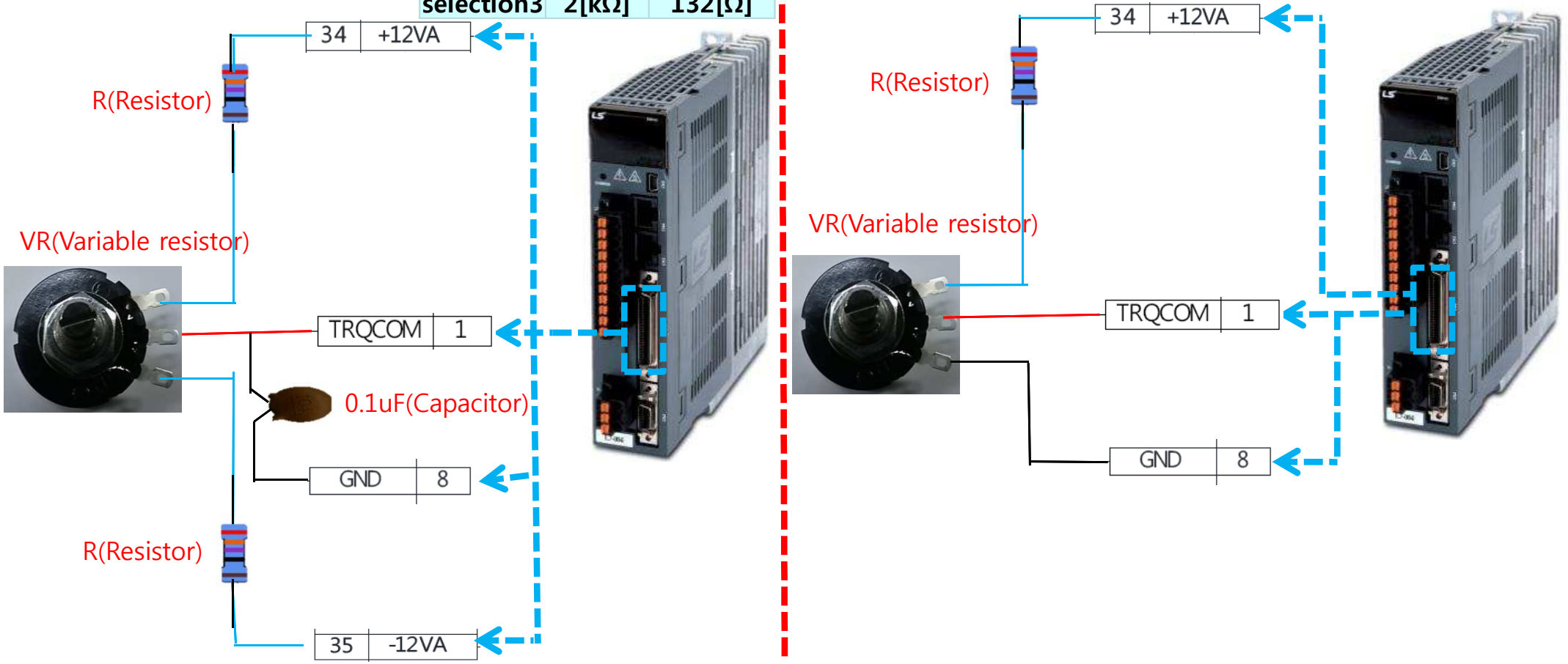
1. CH Run, Output range, Data type and output status are saved in internal address.
2. If P0001 is On, 2.5V will be output, If P0002 is On, 5.0V will be output. If P0003 is On, 7.5V will be output
   If P0004 is On, 10.0V will be output



Analog Torque command by using variable resistor

▶ **Analog input adjustment by using variable resistor with using power supplied by the drive**

Division	VR	R
selection1	10[kΩ]	660[Ω]
selection2	5[kΩ]	330[Ω]
selection3	2[kΩ]	132[Ω]



(Notice)

- ▶ **As using 'R' resistor, possible to reduce the voltage within 10V.**
- ▶ **In the case of one side polarity only like right picture, Motor is rotated one direction only**

▶ Analog Torque Scale Setting[P2-20] :

Set the analog torque command of 10 [V] as a percentage of the rated torque. The setting should be within the torque limit [P1-13] and [P-14] of system parameter setting.

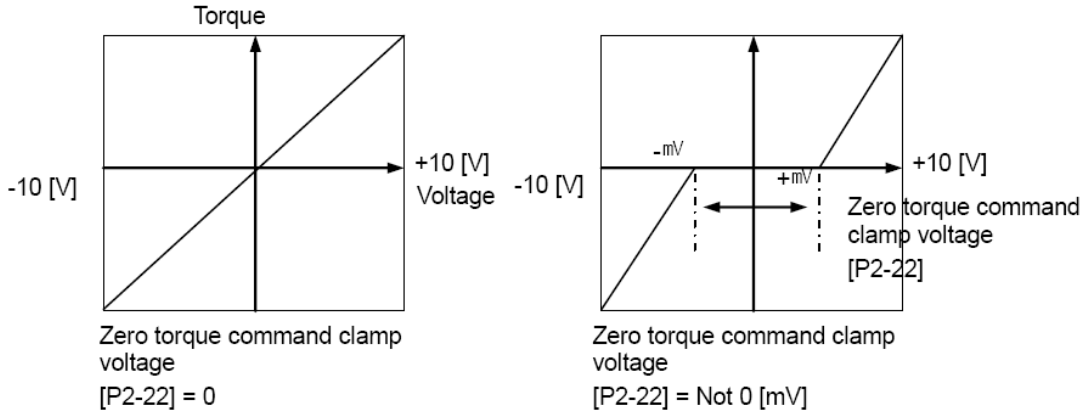
▶ Torque command offset[P2-21]:

There are cases in which a certain level of voltage remains on the analog circuit, even at the 0 torque command, because of problems with the circuit. You can compensate this by setting the voltage as offset. The unit is [mV].

▶ Zero Torque clamp voltage[P2-22]:

The voltage command under the zero speed clamp level[P2-22] is ignored

When speed command over the level inputs, motor is rotated by command value



▶ **Velocity limit in torque mode :** This function is to limit velocity for protection machine. In Torque mode, Servo motor is controlled by command torque but velocity is not controlled. Therefore, When over torque command is set, the velocity of motor is over machine torque and over speed occurs. For that case, possible to use velocity limit

▶ **Velocity limit switch :** Sets speed limit mode during torque control

* 0: Limit to [P1-23]. 1: Maximum motor speed 2: Analog speed command
  3: Limited to the smaller value between the value of [P1-23] and the analog speed command.

* Sets speed limit when speed limit mode [P1-22] is 0 during torque control

▶ **STOP input :**

After Servo-On, If speed command voltage is input after Servo-On, Motor is rotated

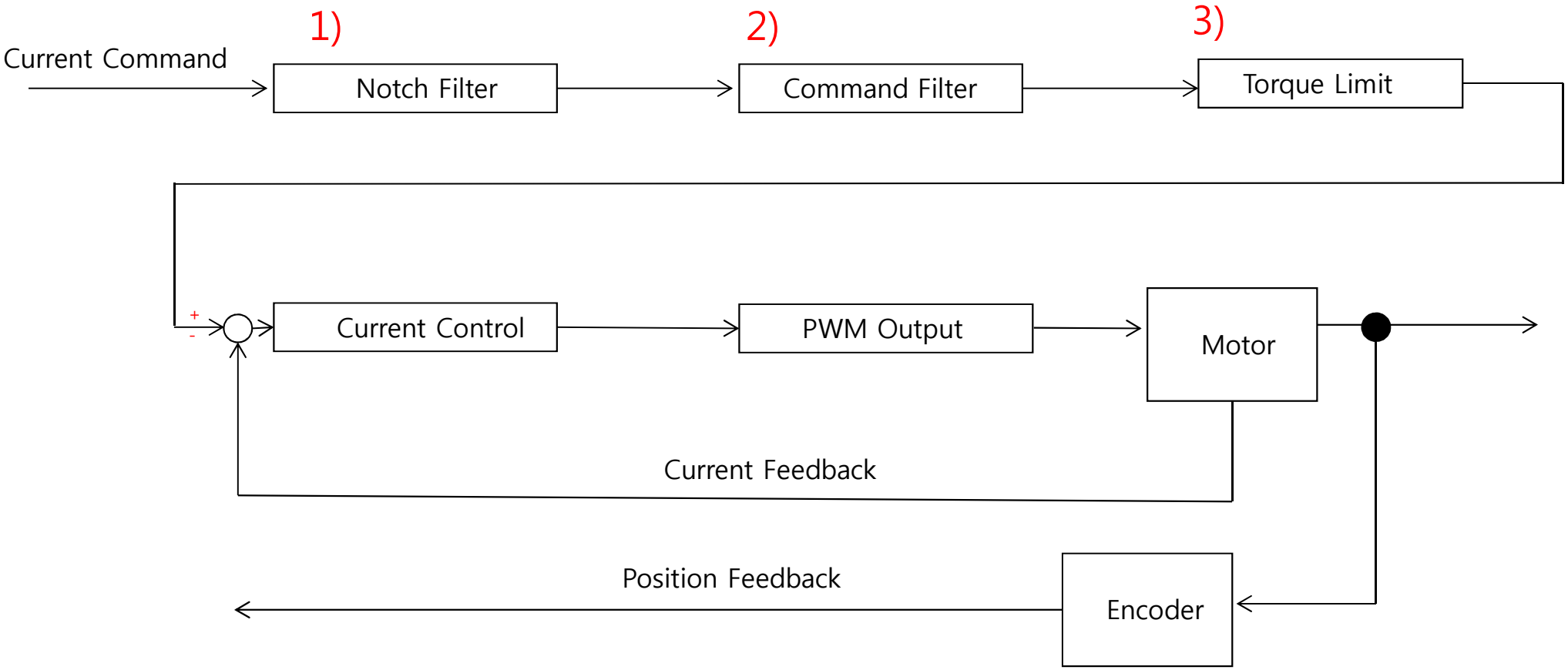
Input contact STOP(No.48) is on, Motor will be stopped.

(Notice)

▶ **The setting of Acceleration/Deceleration Time and S-curve operation is available for Speed mode, only. It is not available for Torque mode**

Gain tuning for torque command (1/2)

▶ The gains related Torque command



1) Notch Filter [P1-17, P1-18, P1-19]

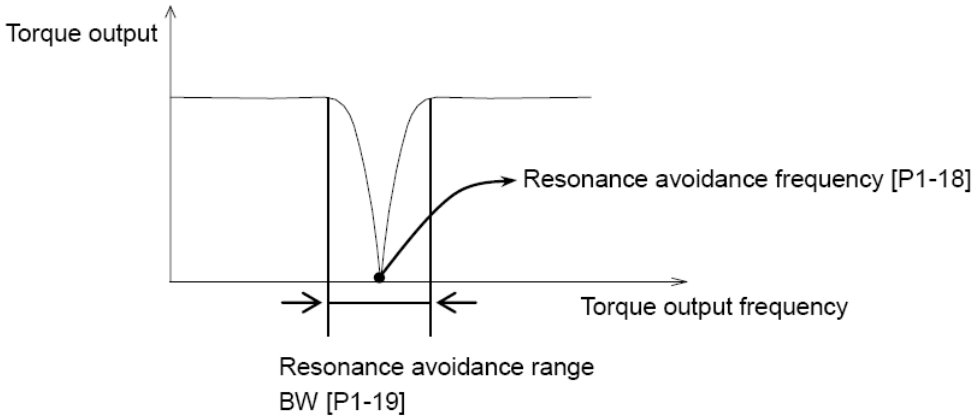
2) Torque command filter time constant [P1-12]

3) Torque limit [P1-13, P1-14]

Gain tuning for torque command (2/2)

▶ Notch Filter [P1-17, P1-18, P1-19]

If vibration occurs at certain frequencies in certain systems because of mechanical resonance, you can control the vibration by controlling torque output for the specific frequency.



*Notch filter use[P1-17]

0: Use

1: Not use

▶ Torque command filter time constant [P1-12]

You can improve the stability of command signals by setting a digital filter for analog torque command voltage.

If you set too great a value, responsiveness for torque commands will be reduced.

It is important to set an appropriate value for your system.

▶ Torque limit [P1-13, P1-14]

You can set maximum torque limits for forward rotation [P1-13] and for reverse rotation [P1-14] separately.

The setting is displayed as a percentage of the rated torque and the standard is 300 [%].

Revision History

Number	Date issued	Revised content	Version Number	Notes