

HIGH SPEED COUNTER USER MANUAL

XBF-HO02A

XBF-HD02A



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Programmable Logic Control

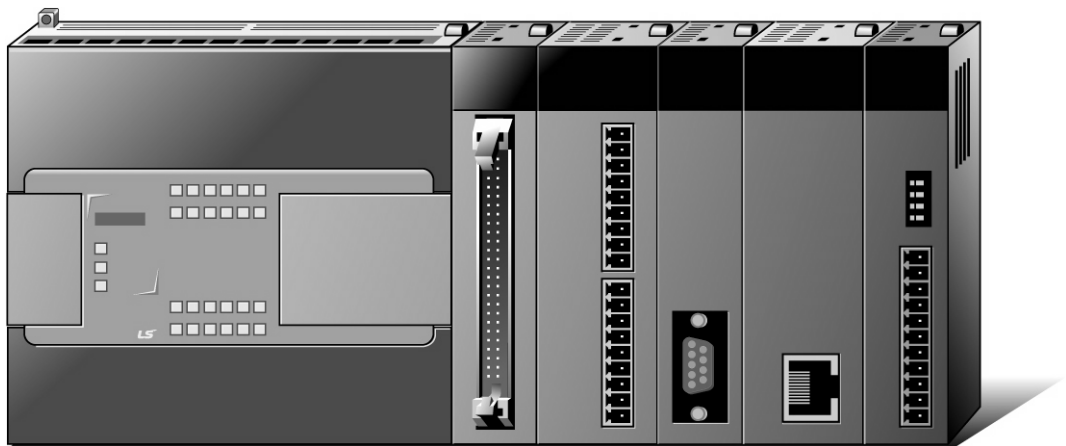
High Speed Counter Module

XGB Series

User Manual

XBF-HO02A

XBF-HD02A



Safety Instructions


- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.


LSELECTRIC

Before using the product ...

For your safety and effective operation, please read the safety instructions thoroughly before using the product.

- ▶ Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product.
- ▶ Instructions are divided into “Warning” and “Caution”, and the meaning of the terms is as follows.

 **Warning** This symbol indicates the possibility of serious injury or death if some applicable instruction is violated

 **Caution** This symbol indicates the possibility of severe or slight injury, and property damages if some applicable instruction is violated

Moreover, even classified events under its caution category may develop into serious accidents relying on situations. Therefore we strongly advise users to observe all precautions properly just like warnings.

- ▶ The marks displayed on the product and in the user’s manual have the following meanings.

 Be careful! Danger may be expected.

 Be careful! Electric shock may occur.

- ▶ The user’s manual even after read shall be kept available and accessible to any user of the product.

Safety Instructions for design process

Warning

- ▶ **Please install a protection circuit on the exterior of PLC so that the whole system may operate safely regardless of failures from external power or PLC.** Any abnormal output or operation from PLC may cause serious problems to safety in whole system.
 - Install protection units on the exterior of PLC like an interlock circuit that deals with opposite operations such as emergency stop, protection circuit, and forward/reverse rotation or install an interlock circuit that deals with high/low limit under its position controls.
 - If any system error (watch-dog timer error, module installation error, etc.) is detected during CPU operation in PLC, all output signals are designed to be turned off and stopped for safety. However, there are cases when output signals remain active due to device failures in Relay and TR which can't be detected. Thus, you are recommended to install an addition circuit to monitor the output status for those critical outputs which may cause significant problems.
- ▶ **Never overload more than rated current of output module nor allow to have a short circuit.** Over current for a long period time may cause a fire .
- ▶ **Never let the external power of the output circuit to be on earlier than PLC power**, which may cause accidents from abnormal output operation.
- ▶ **Please install interlock circuits in the sequence program for safe operations in the system when exchange data with PLC or modify operation modes using a computer or other external equipments** Read specific instructions thoroughly when conducting control operations with PLC.

Safety Instructions for design process

Caution

- ▶ **I/O signal or communication line shall be wired at least 100mm away from a high-voltage cable or power line.** Fail to follow this

Safety Instructions on installation process

Caution

- ▶ **Use PLC only in the environment specified in PLC manual or general standard of data sheet.** If not, electric shock, fire, abnormal operation of the product may be caused.
- ▶ **Before install or remove the module, be sure PLC power is off.** If not, electric shock or damage on the product may be caused.
- ▶ **Be sure that every module is securely attached after adding a module or an extension connector.** If the product is installed loosely or incorrectly, abnormal operation, error or dropping may be caused. In addition, contact failures under poor cable installation will be causing malfunctions as well.
- ▶ **Be sure that screws get tighten securely under vibrating environments.** Fail to do so will put the product under direct vibrations which will cause electric shock, fire and abnormal operation.
- ▶ **Do not come in contact with conducting parts in each module,** which may cause electric shock, malfunctions or abnormal operation.

Safety Instructions for wiring process

Warning

- ▶ **Prior to wiring works, make sure that every power is turned off.** If not, electric shock or damage on the product may be caused.
- ▶ **After wiring process is done, make sure that terminal covers are installed properly before its use.** Fail to install the cover may cause electric shocks.

Caution

- ▶ **Check rated voltages and terminal arrangements in each product prior to its wiring process.** Applying incorrect voltages other than rated voltages and misarrangement among terminals may cause fire or malfunctions.
- ▶ **Secure terminal screws tightly applying with specified torque.** If the screws get loose, short circuit, fire or abnormal operation may be caused. Securing screws too tightly will cause damages to the module or malfunctions, short circuit, and dropping.
- ▶ **Be sure to earth to the ground using Class 3 wires for FG terminals which is exclusively used for PLC.** If the terminals not grounded correctly, abnormal operation or electric shock may be caused.
- ▶ **Don't let any foreign materials such as wiring waste inside the module while wiring,** which may cause fire, damage on the product or abnormal operation.
- ▶ **Make sure that pressed terminals get tighten following the specified torque. External connector type shall be pressed or soldered using proper equipments.**

Safety Instructions for test-operation and maintenance

Warning

- ▶ **Don't touch the terminal when powered.** Electric shock or abnormal operation may occur.
- ▶ **Prior to cleaning or tightening the terminal screws, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- ▶ **Don't let the battery recharged, disassembled, heated, short or soldered.** Heat, explosion or ignition may cause injuries or fire.

Caution

- ▶ **Do not make modifications or disassemble each module.** Fire, electric shock or abnormal operation may occur.
- ▶ **Prior to installing or disassembling the module, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- ▶ **Keep any wireless equipment such as walkie-talkie or cell phones at least 30cm away from PLC.** If not, abnormal operation may be caused.
- ▶ **When making a modification on programs or using run to modify functions under PLC operations, read and comprehend all contents in the manual fully.** Mismanagement will cause damages to products and accidents.
- ▶ **Avoid any physical impact to the battery and prevent it from dropping as well.** Damages to battery may cause leakage from its fluid. When battery was dropped or exposed under strong impact, never reuse the battery again. Moreover skilled workers are needed when exchanging batteries.

Safety Instructions for waste disposal



Caution

- ▶ **Product or battery waste shall be processed as industrial waste.** The waste may discharge toxic materials or explode itself.

Revision History

| Version | Date | Remark | Page |
|---------|---------|--|---------------|
| V 1.0 | 2012.05 | First Edition | - |
| V 1.1 | 2015.07 | 1. Domain name changed 2. CI changed 3. General specifications changed by reason of changed IEC Specifications | - - 2-1 |
| V 1.2 | 2016.03 | 1. Smart Link Connection Diagram added and changed | 2-8~12 |
| V1.3 | 2020.06 | 1. Changed company name to LS ELECTRIC | - |
| V1.4 | 2022.09 | 1. Changed domain to ls-electric.com | - |

※ The number of User's manual is indicated right part of the back cover.

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About User's Manual

Congratulations on purchasing PLC of LS ELECTRIC Co.,Ltd.

Before use, make sure to carefully read and understand the User's Manual about the functions, performances, installation and programming of the product you purchased in order for correct use and importantly, let the end user and maintenance administrator to be provided with the User's Manual.

The User's Manual describes the product. If necessary, you may refer to the following description and order accordingly. In addition, you may connect our website (<http://www.ls-electric.com/>) and download the information as a PDF file.

Relevant User's Manuals

| Title | Description | No. of User's Manual |
|---|--|-----------------------------|
| XG5000 User's Manual (for XGK, XBC,XBM) | XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGB(MK language) CPU | 10310000511 |
| XG5000 User's Manual (for XGI, XGR, XEC) | XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGB(IEC language) CPU | 10310000746 |
| XGK/XGB Instructions & Programming User's Manual | User's manual for programming to explain how to use instructions that are used PLC system with XGK, XGB CPU. | 10310000509 |
| XGI/XGR/XEC Instructions & Programming User's Manual | User's manual for programming to explain how to use instructions that are used PLC system with XGI, XGR, XEC CPU. | 10310000739 |
| Ultimate Performance XGB Unit(MK/IEC) | It describes how to use XGB main unit, system configuration,mechanism,program function ,input/output function, Built-in High-speed Counter, Datalog, PID Control, Built-in Communication function, Built-in Position, Built-in Analog input/output.. | 10310000893, 10310001406 |
| XGB hardware | It describes power, IO, extension specification and system configuration, built-in high speed counter of XGB main unit. | 10310000893, 10310000981 |
| XBC Standard / Economic Type Main Unit(MK/IEC) | It describes power, IO, extension specification and system configuration, built-in high speed counter of XGB standard / economic type main unit. | 10310001090, 10310001273 |

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Warranty and Environmental Policy

Chapter 1. Overview

XGB High Speed counter modules are designed for XGB(XBM/XBC/XEC) series and used with XGT PLC CPU. And XBF-HO02A(Open Collector type) , XBF-HD02A(Line Drive type) modules are available.

1.1 Characteristic

High Speed Counter modules can count the high speed pulses which can not be processed by CPU module's counter instructions (CTU, CTD, CTUD etc.), up to binary value of 32 bits (-2,147,483,648 ~ 2,147,483,647).

High Speed counter modules have the following functions.

- (1) XGB PLC is available.
- (2) Three kinds of pulse inputs function
 - (a) 1-phase input: Increasing/Decreasing function Program or by means of the B-phase input (1-multiplier, 2-multiplier)
 - (b) 2-phase is input: Increasing/Decreasing function by means of the difference in phase.(1-multiplier, 2-multiplier, 4-multiplier)
 - (c) CW/CCW is input: Increasing/Decreasing function by means of A-phase or B-phase.(1-multiplier)
- (3) Preset and Gate function by means of the applicable program or external input signal
- (4) 6 additional functions are available such as Count Clear, Count Latch, Sampling Count, Input frequency Measure, Revolution Measure per unit time and Count Disable.
- (5) 7 kinds of compared signals can be outputted at output contact of the built-in transistor through compared based value (Min compared value, Max compared value) and current count value.
- (6) Provided Low Active and High Active mode.
(Preset and Gate input is only available a high active mode.)
- (7) Currently user manual of HSC module is written based on the following version.

| XGB Main Unit | | Version |
|---------------|------------|----------------|
| XBM | XBM-D□□□S | V3.20 or above |
| XBC | XBC-D□□□H | V2.10 or above |
| | XBC-D□□□S | V1.20 or above |
| | XBC-D□□□SU | V1.20 or above |
| | XBC-D□□□E | Unavailable |
| XEC | XEC-D□□□H | V1.40 or above |
| | XEC-D□□□S | V1.00 or above |
| PADT | XG5000 | V3.64 or above |

Chapter 2 Specifications

2.1 General Specifications

General specifications of XGT series

| No. | Item | Specifications | Related specifications | | |
|-----|----------------------|--|---|----------------------------|---------------------------------------|
| 1 | Ambient temperature | 0°C ~ +55°C | - | | |
| 2 | Storage temperature | -25°C ~ +70°C | - | | |
| 3 | Ambient humidity | 5 ~ 95%RH (Non-condensing) | - | | |
| 4 | Storage humidity | 5 ~ 95%RH (Non-condensing) | - | | |
| 5 | Vibration resistance | Occasional vibration | | - | |
| | | Frequency | Acceleration | Amplitude | How many times |
| | | 5 ≤ f < 8.4 Hz | - | 3.5 mm | |
| | | 8.4 ≤ f ≤ 150 Hz | 9.8 m/s ² (1G) | - | 10 times each directions (X, Y and Z) |
| | | For continuous vibration | | | |
| | | Frequency | Acceleration | Amplitude | |
| | | | 5 ≤ f < 8.4 Hz | - | 1.75 mm |
| | 8.4 ≤ f ≤ 150 Hz | 4.9 m/s ² (0.5G) | - | | |
| 6 | Shock resistance | <ul style="list-style-type: none"> Peak acceleration: 147 m/s²(15G) Duration: 11ms Half-sine, 3 times each direction per each axis | IEC61131-2 | | |
| 7 | Noise resistance | Square wave Impulse noise | AC: ± 1,500V DC: ± 900V | LS ELECTRIC standard | |
| | | Electrostatic discharge | Voltage : 4kV (contact discharging) | IEC 61131-2, IEC 61000-4-2 | |
| | | Radiated electromagnetic field noise | 80 ~ 1,000 MHz, 10V/m | IEC 61131-2, IEC 61000-4-3 | |
| | | Fast transient /bust noise | Segment Power supply module Digital/analog input/output communication interface | IEC 61131-2, IEC 61000-4-4 | |
| | Voltage | 2kV | 1kV | | |
| 8 | Environment | Free from corrosive gasses and excessive dust | - | | |
| 9 | Altitude | Up to 2,000 ms | - | | |
| 10 | Pollution degree | Less than equal to 2 | - | | |
| 11 | Cooling | Air-cooling | - | | |

Notes

- 1) IEC(International Electrotechnical Commission):
An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic fields, publishes international standards and manages applicable estimation system related with.
- 2) Pollution degree:
An index indicating pollution level of the operating environment which decides insulation performance of the devices. For instance, Pollution level 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

2.2 Performance Specifications

Specifications of High Speed counter module's basic performance, preset/gate input and transistor output are as described below.

2.2.1 Performance specifications

| Item | | Specification | |
|-----------------------------|---------------|--|---|
| | | XBF-HO02A | XGF-HD02A |
| Count Input signal | Signal | A-phase, B-phase | |
| | Input type | Voltage input (Open Collector) | Differential input (Line Drive): |
| | Signal level | DC 5/12/24V | RS-422A Line Drive/HTL LEVEL Line Drive |
| Maximum coefficient speed | | 200kpps | 500kpps (HTL input : 250kpps) |
| Number of channels | | 2 Channels | |
| Coefficient range | | Signed 32-bit (-2,147,483,648 ~ 2,147,483,647) | |
| Count mode | | Linear Count (When 32-bit range exceeded, Carry/Borrow occurs, the count value stopped) | |
| | | Ring Count (repeated count within setting range) | |
| Input pulse mode | | 1-phase input | |
| | | 2-phase input | |
| | | CW/CCW input | |
| Up/down Setting | 1-phase input | Increasing/decreasing operation setting by B-phase input | |
| | 2-phase input | Automatic setting by difference in phase | |
| | CW/CCW | A-phase input: increasing operation B-phase input: decreasing operation | |
| Multiplication function | 1-phase input | 1/2 multiplication | |
| | 2-phase input | 1/2/4 multiplication | |
| | CW/CCW | 1-multiplication | |
| Control input | Signal | Preset instruction input, auxiliary mode instruction input | |
| | Signal level | DC 5V/12V/24V (by terminal selection) input type | |
| | Signal type | Voltage | |
| External output | Output points | 2-point/channel (for each channel): terminal output available | |
| | Type | Select single-compared (>, >=, =, =, <=, <) or section compared output (included or excluded) | |
| | Output type | Open collector output (Sink) | |
| Operation Status Display | Input Signal | A-phase input, B-phase input, Preset instruction input, auxiliary mode instruction input | |
| | Output Signal | External output 0, External output 1 | |
| | Busy Status | Module Ready | |
| Count Enable | | To be set through program (count available only in enable status) | |
| Preset function | | To be set through terminal or program | |
| auxiliary mode function | | Count clear, Count latch, Section count(time setting value: 0~60000ms), Measurement of input frequency(for respective input phase), Measurement of counts per hour(time setting value: 0~60000ms) Count prohibited function | |
| Terminal | | 40 pin connector | |
| I/O occupied points | | Fixed point: 64 | |
| Internal consumed current | | 200mA | 260mA |
| Weight | | 90g | |

2.2.2 Pulse input specification

| Item | Specification | | | Line driver |
|-----------------------------|-------------------------|------------------------|----------------------|---|
| | Open collector | | | |
| Input volatage | DC 24V (17.0V~26.4V) | DC 12V (9.8V~13.2V) | DC 5V (4.5V~5.5V) | RS-422A line driver (5V level)/HTL line Driver(24V level) |
| Input current | 7mA~11mA | 7mA~11mA | 7mA~11mA | |
| Min. On guaranteed voltage | 17.0V | 9.8V | 4.1V | |
| Max. Off guaranteed voltage | 4.5V | 3.0V | 1.7V | |

2.2.3 Preset, auxiliary function input specification

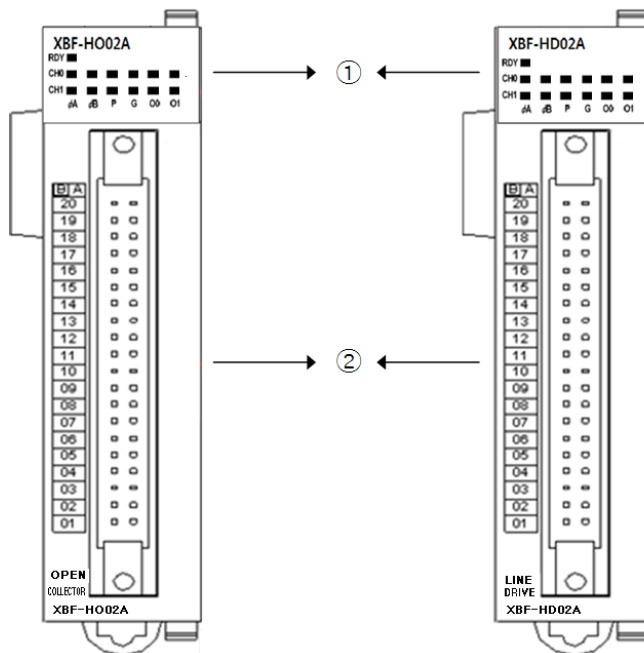
| Item | Specification | | |
|-----------------------------|-------------------------|------------------------|----------------------|
| Input volatage | DC 24V (17.0V~26.4V) | DC 12V (9.8V~13.2V) | DC 5V (4.5V~5.5V) |
| Input current | 7mA~11mA | 7mA~11mA | 7mA~11mA |
| Min. On guaranteed voltage | 17.0V | 9.8V | 4.1V |
| Max. Off guaranteed voltage | 4.5V | 3.0V | 1.7V |
| On delay time | 1 ms or less | | |
| Off delay time | 1 ms or less | | |

2.2.4 Comp. output specification

| Item | Specification |
|------------------------|----------------------|
| Output type | Transistor sink |
| Rated output | DC 24V, 100 mA/point |
| Leakage current | 0.1 mA or less |
| Saturated area voltage | 1.3 V or less |
| On delay time | 0.1 ms or less |
| Off delay time | 0.1 ms or less |

2.3 Part Names

2.3.1 Part Names

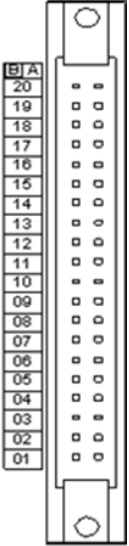


| No. | Name | Contents |
|-----|-----------------------------------|---|
| ① | Run LED (ΦA, ΦB, P, G, O0, O1) | On: relevant channel pulse inputting, Preset/Auxiliary function signal inputting, Comparison outputting Off: No input of relevant channel pulse, No input of preset/auxiliary function signal, No output of comparison |
| | Ready signal (RDY) | On: HSC module normal Off: Power off or CPU module reset, HSC module error Flicker: HSC module error |
| ② | External wiring connector | Connector to connect with external I/O |

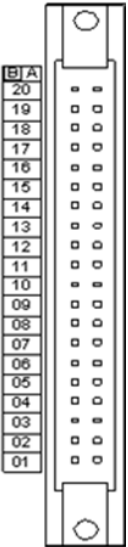
2.3.2 Specification of interface with external devices

1. Arrangement of connector pins

(1) XBF-HO02A

| Pin arrangement | B | A | Signal name | |
|--|-----|-----|-------------|------------------------------|
| | CH1 | CH0 | | |
|  | 20 | 20 | A24V | A phase pulse input 24V |
| | 19 | 19 | A12V | A phase pulse input 12V |
| | 18 | 18 | A5V | A phase pulse input 5V |
| | 17 | 17 | ACOM | A phase pulse input COM |
| | 16 | 16 | B24V | B phase pulse input 24V |
| | 15 | 15 | B12V | B phase pulse input 12V |
| | 14 | 14 | B5V | B phase pulse input 5V |
| | 13 | 13 | BCOM | B phase pulse input COM |
| | 12 | 12 | P24V | Preset input 24V |
| | 11 | 11 | P12V | Preset input 12V |
| | 10 | 10 | P5V | Preset input 5V |
| | 09 | 09 | PCOM | Preset input COM |
| | 08 | 08 | G24V | Auxiliary function input 24V |
| | 07 | 07 | G12V | Auxiliary function input 12V |
| | 06 | 06 | G5V | Auxiliary function input 5V |
| | 05 | 05 | GCOM | Auxiliary function input COM |
| | 04 | 04 | OUT0 | Comp. output 0 |
| | 03 | 03 | OUT1 | Comp. output 1 |
| | 02 | 02 | 24V | External power input 24V |
| | 01 | 01 | 24G | External power input GND |

(2) XBF-HD02A

| Pin arrangement | B | A | Signal name | |
|---|-----|-----|-------------|------------------------------------|
| | CH1 | CH0 | | |
|  | 20 | 20 | A I + | A I phase differentiation input + |
| | 19 | 19 | A I - | A I phase differentiation input - |
| | 18 | 18 | A II + | A II phase differentiation input + |
| | 17 | 17 | A II - | A II phase differentiation input - |
| | 16 | 16 | B I + | B I phase differentiation input + |
| | 15 | 15 | B I - | B I phase differentiation input - |
| | 14 | 14 | B II + | B II phase differentiation input + |
| | 13 | 13 | B II - | B II phase differentiation input - |
| | 12 | 12 | P24V | Preset input 24V |
| | 11 | 11 | P12V | Preset input 12V |
| | 10 | 10 | P5V | Preset input 5V |
| | 09 | 09 | PCOM | Preset input COM |
| | 08 | 08 | G24V | Auxiliary function input 24V |
| | 07 | 07 | G12V | Auxiliary function input 12V |
| | 06 | 06 | G5V | Auxiliary function input 5V |
| | 05 | 05 | GCOM | Auxiliary function input COM |
| | 04 | 04 | OUT0 | Comp. output 0 |
| | 03 | 03 | OUT1 | Comp. output 1 |
| | 02 | 02 | 24V | External power input 24V |
| | 01 | 01 | 24G | External power input GND |

2. Internal circuit

Describes internal circuit of HSC module to connect HSC module with external device

(1) XBF-HO02A

| I/O | Internal circuit | No. | Terminal | Pin No. | | Signal name |
|--------|------------------|-----|----------|---------|-----|------------------------------|
| | | | | CH0 | CH1 | |
| Input | | ① | A24V | B20 | A20 | A phase pulse input 24V |
| | | ② | A12V | B19 | A19 | A phase pulse input 12V |
| | | ③ | A5V | B18 | A18 | A phase pulse input 5V |
| | | ④ | ACOM | B17 | A17 | A phase pulse input COM |
| | | ① | B24V | B16 | A16 | B phase pulse input 24V |
| | | ② | B12V | B15 | A15 | B phase pulse input 12V |
| | | ③ | B5V | B14 | A14 | B phase pulse input 5V |
| | | ④ | BCOM | B13 | A13 | B phase pulse input COM |
| | | ⑤ | P24V | B12 | A12 | Preset input 24V |
| | | ⑥ | P12V | B11 | A11 | Preset input 12V |
| | | ⑦ | P5V | B10 | A10 | Preset input 5V |
| | | ⑧ | PCOM | B09 | A09 | Preset input COM |
| | | ⑤ | G24V | B08 | A08 | Auxiliary function input 24V |
| | | ⑥ | G12V | B07 | A07 | Auxiliary function input 12V |
| | | ⑦ | G5V | B06 | A06 | Auxiliary function input 5V |
| | | ⑧ | GCOM | B05 | A05 | Auxiliary function input COM |
| Output | | ⑨ | OUT0 | B04 | A04 | Comp. output 0 |
| | | ⑩ | OUT1 | B03 | A03 | Comp. output 1 |
| | | ⑪ | 24V | B02 | A02 | External power input 24V |
| | | ⑫ | 24G | B01 | A01 | External power input GND |

Notes

External power (24V: A02, B02, 24G: A01, B01) is power source to output comparison output to terminal (A03, B03, A04, B04). Connect when using comparison output.

(2) XBF-HD02A

| I/O | Internal circuit | No. | Terminal | Pin. No. | | Signal |
|--------|------------------|-----|----------|----------|-----|------------------------------------|
| | | | | CH0 | CH1 | |
| Input | | ① | AI+ | B20 | A20 | A I phase differentiation input + |
| | | ② | AII+ | B19 | A19 | A II phase differentiation input + |
| | | ③ | AI- | B18 | A18 | A I phase differentiation input - |
| | | ④ | AII- | B17 | A17 | A II phase differentiation input - |
| | | ① | BI+ | B16 | A16 | B I phase differentiation input + |
| | | ② | BII+ | B15 | A15 | B II phase differentiation input + |
| | | ③ | BI- | B14 | A14 | B I phase differentiation input - |
| | | ④ | BII- | B13 | A13 | B II phase differentiation input - |
| | | ⑤ | P24V | B12 | A12 | Preset input 24V |
| | | ⑥ | P12V | B11 | A11 | Preset input 12V |
| | | ⑦ | P5V | B10 | A10 | Preset input 5V |
| | | ⑧ | PCOM | B09 | A09 | Preset input COM |
| | | ⑤ | G24V | B08 | A08 | Auxiliary function input 24V |
| | | ⑥ | G12V | B07 | A07 | Auxiliary function input 12V |
| | | ⑦ | G5V | B06 | A06 | Auxiliary function input 5V |
| | | ⑧ | GCOM | B05 | A05 | Auxiliary function input COM |
| Output | | ⑨ | OUT0 | B04 | A04 | Comp. output 0 |
| | | ⑩ | OUT1 | B03 | A03 | Comp. output 1 |
| | | ⑪ | 24V | B02 | A02 | External power input 24V |
| | | ⑫ | 24G | B01 | A01 | External power input GND |

Notes

- (1) AI+, AI-, BI+, BI- are line driver input terminal of 5V level.
- (2) AII+, AII-, BII+, BII- are line driver input terminal of 24V level.

(3) Example Input/Output wiring by using Smart Link Board

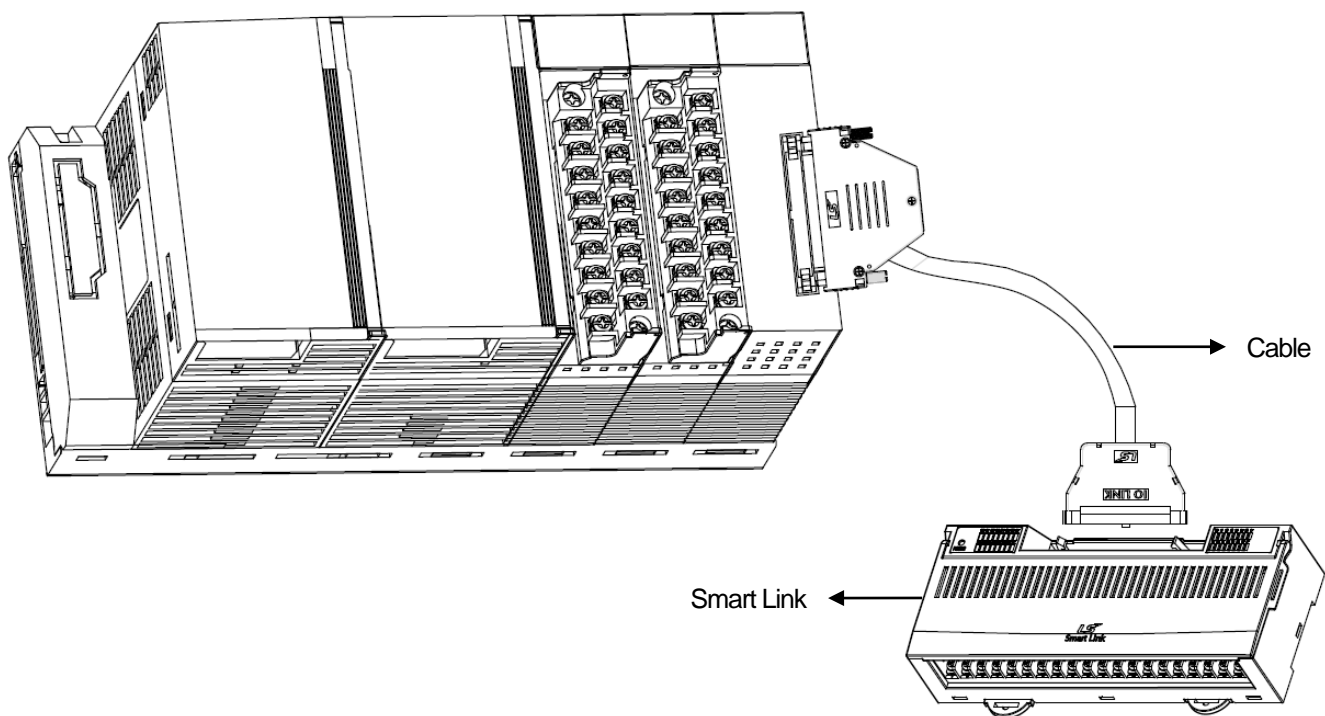
- (a) When using HSC module, easy wiring is available by connecting the I/O connector with Smart Link Board. The available Smart Link Board and I/O cable are as follows.

| Model | Specification | No. of Pin |
|-----------|----------------------------|----------------------|
| XBF-H002A | HSC Module(Open collector) | 40 Pin Connector x 1 |
| XBF-HD02A | HSC Module(Line Drive) | 40 Pin Connector x 1 |

- (b) The company prepares smart link products for the convenience of using our Connector type HSC modules. For further information, please refer to the data sheet contained in a Smart Link product. (Refer to (d) Connection Diagram to confirm the differences between TG7-1H40CA and TG7-1H40S)

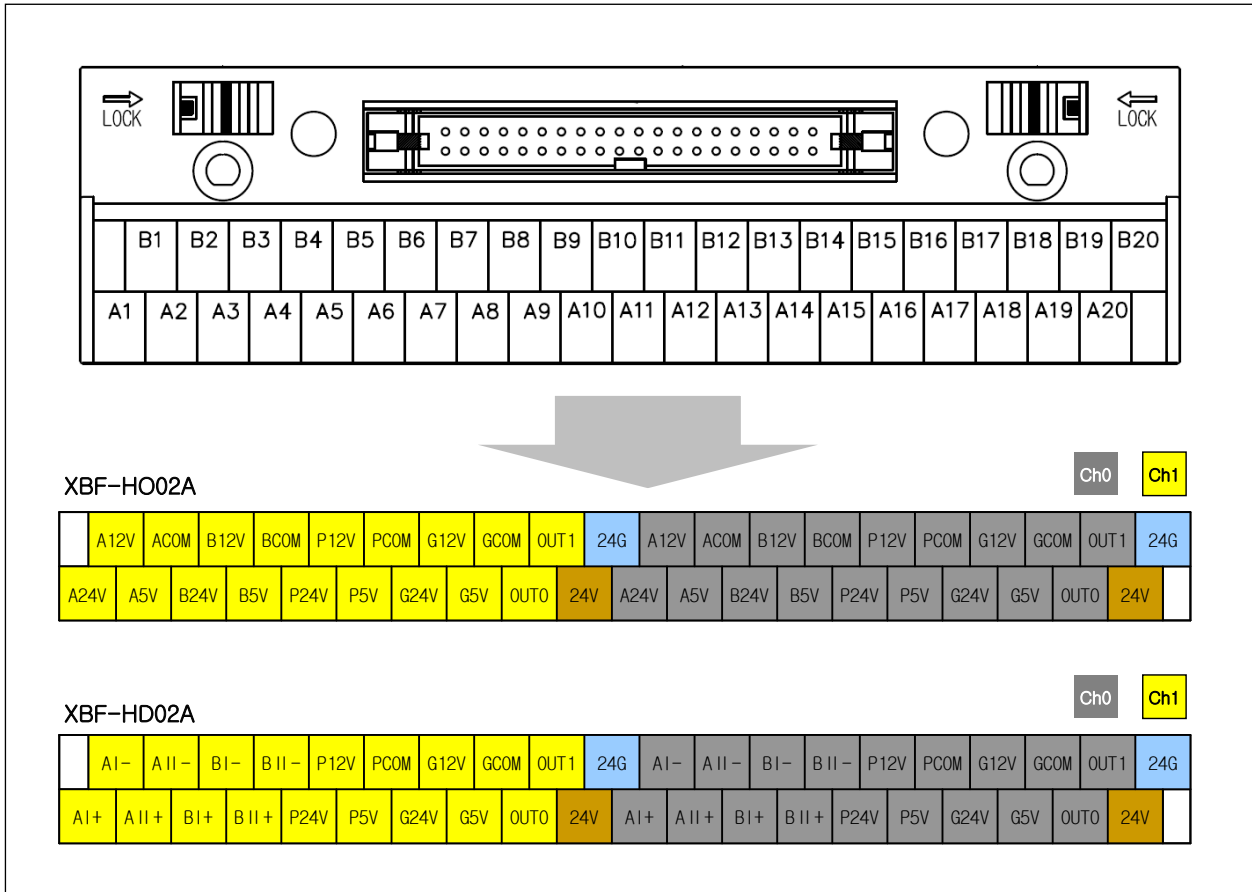
| | Model | Cable | Length of Cable |
|----------------|------------------------------------|----------------|-----------------|
| Terminal Board | TG7-1H40S | C40HH-05SB-XBI | 0.5m |
| | | C40HH-10SB-XBI | 1m |
| | | C40HH-15SB-XBI | 1.5m |
| | | C40HH-20SB-XBI | 2m |
| | | C40HH-30SB-XBI | 3m |
| | TG7-1H40CA (20Pin Common Added) | C40HH-05SB-XBI | 0.5m |
| | | C40HH-10SB-XBI | 1m |
| | | C40HH-15SB-XBI | 1.5m |
| | | C40HH-20SB-XBI | 2m |
| | | C40HH-30SB-XBI | 3m |

(C) Smart Link Connection

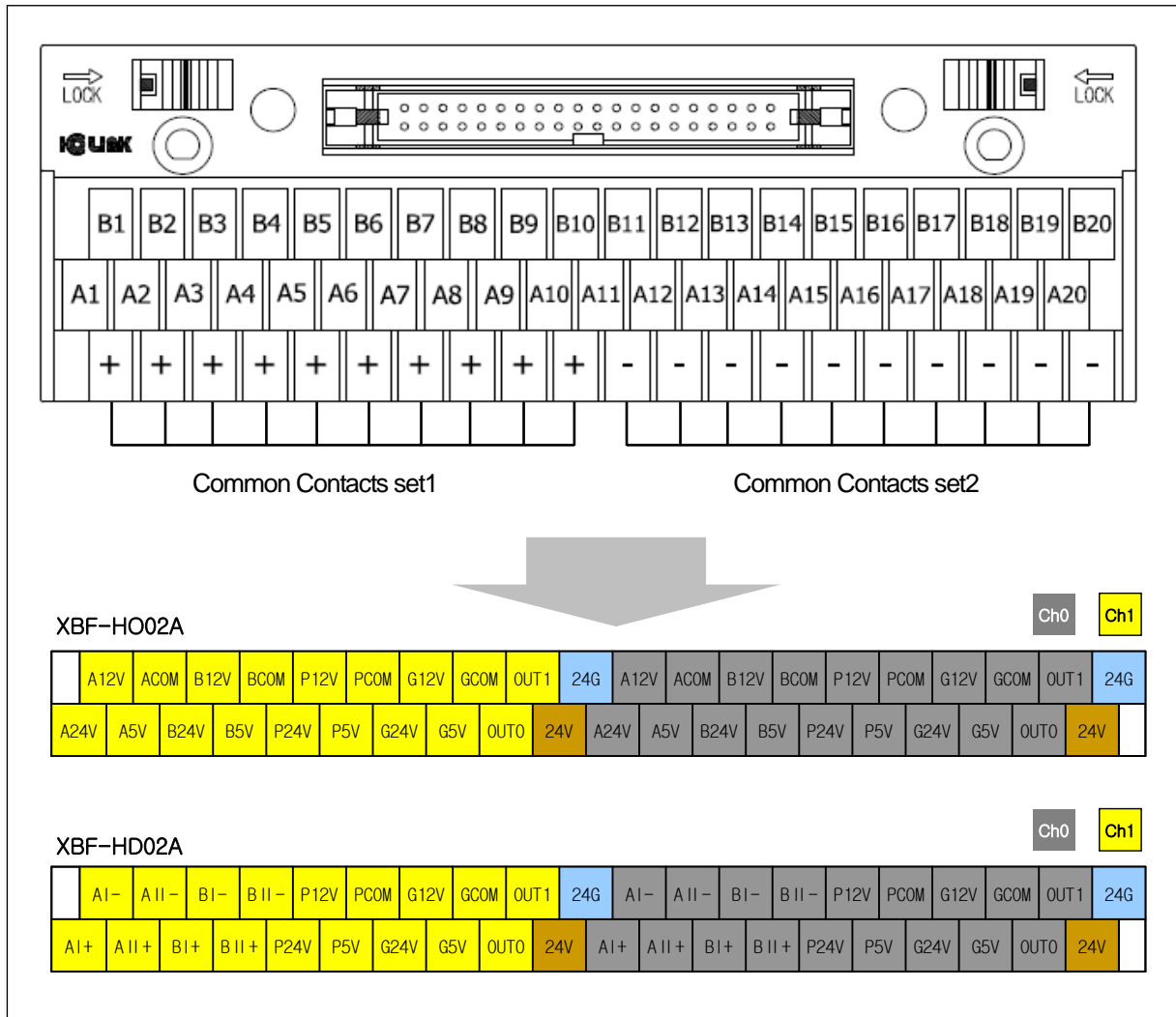


(d) Smart Link Connection Diagram

- TG7-1H40S



-TG7-1H40CA



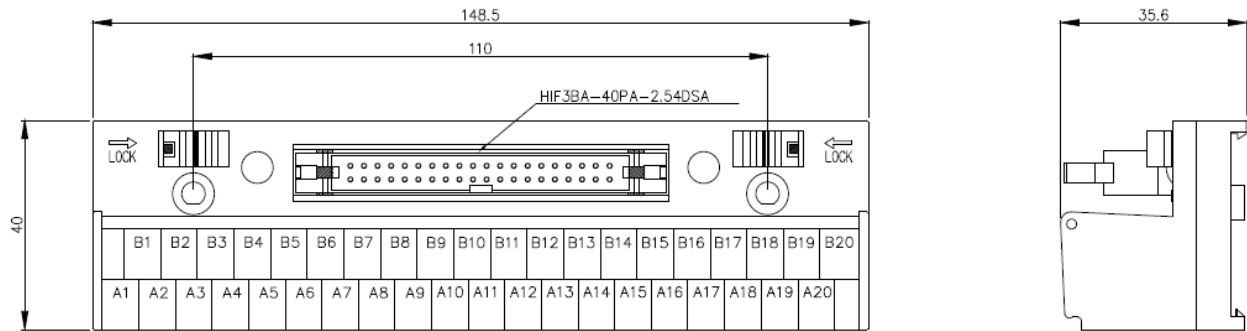
(e) Smart Link Specifications and Dimensions

- TG7-1H40S

i) Specifications

| | |
|-----------------------|-------------------------------|
| Rated Voltage | AC, DC 125V |
| Rated Current | 1A |
| Withstanding Voltage | 600V 1min |
| Insulation resistance | 100MΩ (DC 500V) |
| Applicable Wire | 1.25mm ² /MAX |
| T/B Screw | M3 X 10L |
| Screw Torque | 1.2N • m(12Kgf • cm) |
| Case | Modified PPO(Noryl)(UL 94V-0) |

ii) Dimensions(mm)

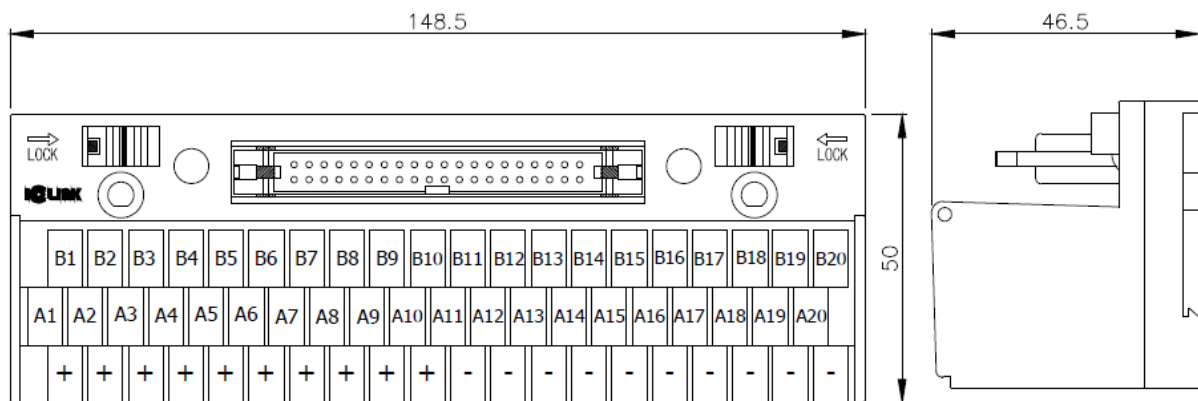


-TG7-1H40CA

i) Specifications

| | | |
|------------------------|--------|--------------------------------------|
| Rated Voltage | | 125V AC / 24V DC |
| Rated Current | IO | 1A |
| | Common | 10A (Total) |
| Insulation resistance | | 100MΩ (DC 500V) |
| Withstanding Voltage | | AC500V 1min |
| Applicable Wire | | AWG22-16 (MAX / 1.5mm ²) |
| Contact Screw | | M3 X 10L |
| Screw Torque | | 1.2N • m(12Kgf • cm) |
| Ambient Temperature | | -10℃ ~ +50℃ (Non-condensing) |
| Terminal Block & Cover | | Modified PPO |
| Protective Cover | | Polycarbonate |
| PCB | | Epoxy 1.6t |

ii) Dimensions(mm)



2.4 Function

2.4.1 Input pulse type

1. 1 phase input

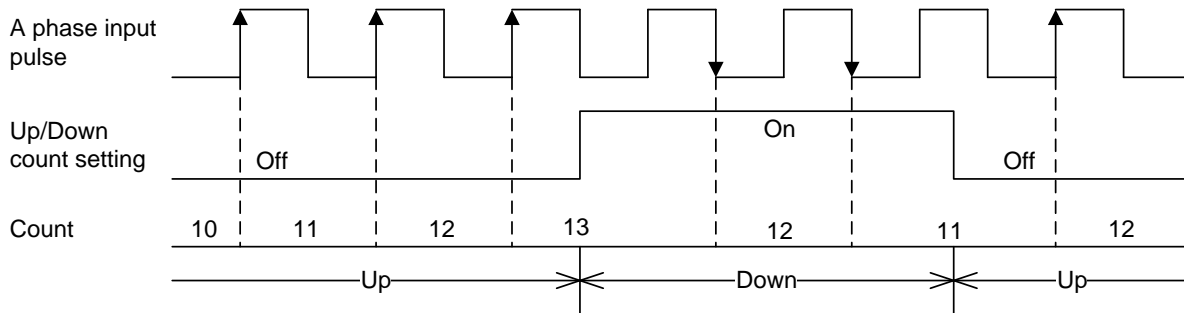
(1) Up/Down operation by program setting

(a) 1 phase 1 input 1 multiplication input

When input pulse of A phase is rising, count operates and up/down count operation is set by program

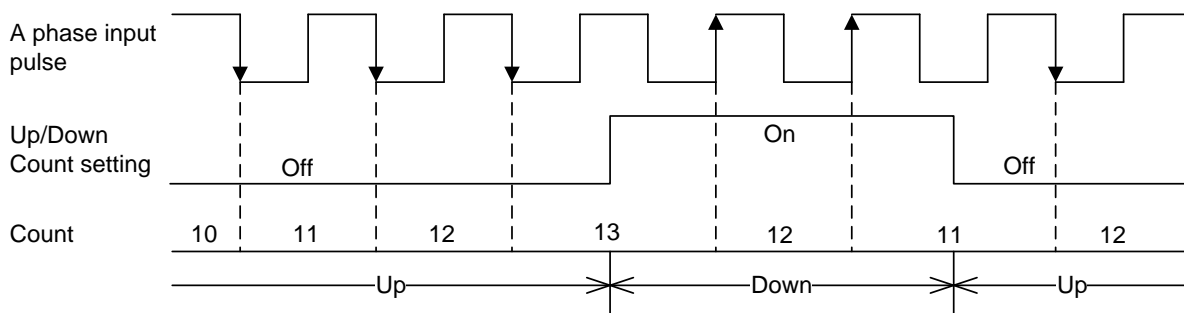
1) High Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Up/Down count setting Off | Up count (+1) | - |
| Up/Down count setting On | - | Down count (-1) |



2) Low Active Mode

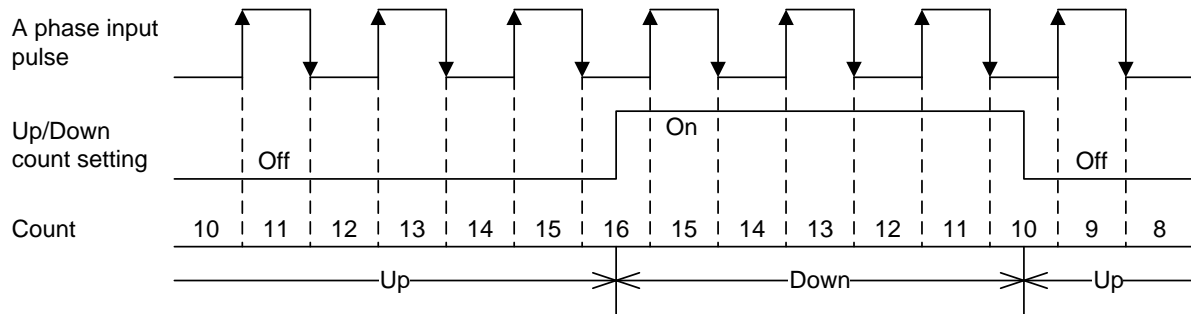
| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Up/Down count setting Off | - | Up count (+1) |
| Up/Down count setting On | Down count (-1) | - |



(b) 1 phase 1 input 2 multiplication input

When input pulse of A phase is rising and falling, count operates and up/down count operation is set by program

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Up/Down count setting Off | Up count (+1) | Up count (+1) |
| Up/Down count setting On | Down count (-1) | Down count (-1) |



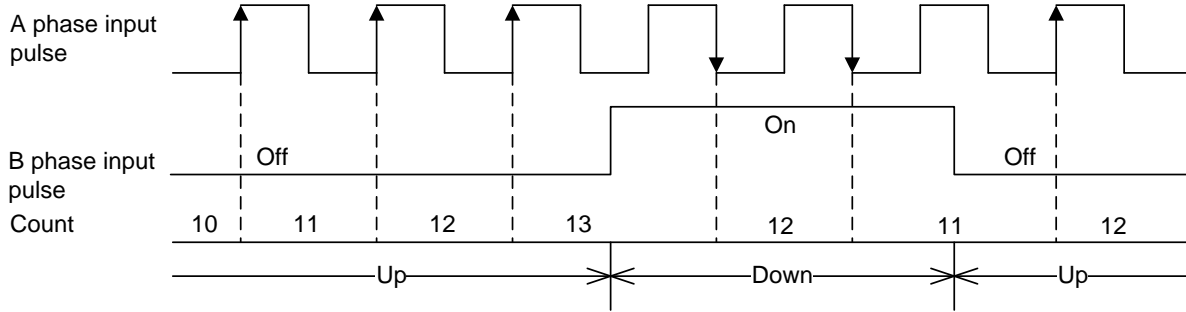
(2) Up/Down count operation by B phase input signal

(a) 1 phase 2 input 1 multiplication input

When input pulse of A phase is rising, count operates and up/down count operation is set by level of B phase input pulse.

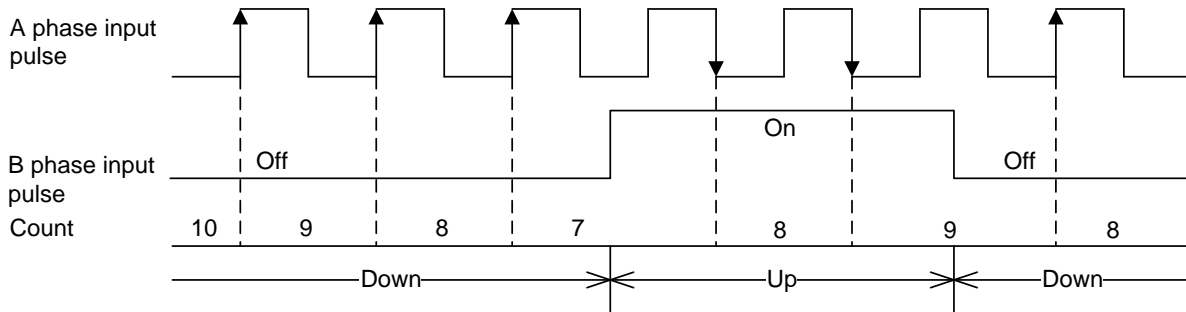
1) High Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| B phase input pulse Off | Up count (+1) | - |
| B phase input pulse On | - | Down count (-1) |



2) Low Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| B phase input pulse Off | Down count (-1) | - |
| B phase input pulse On | - | Up count (+1) |

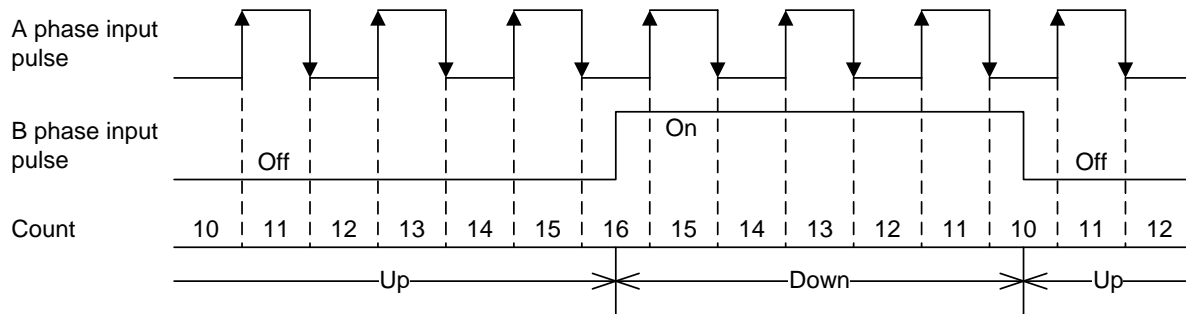


(b) 1 phase 2 input 2 multiplication input

When input pulse of A phase is rising and falling, count operates and up/down count operation is set by level of B phase input pulse.

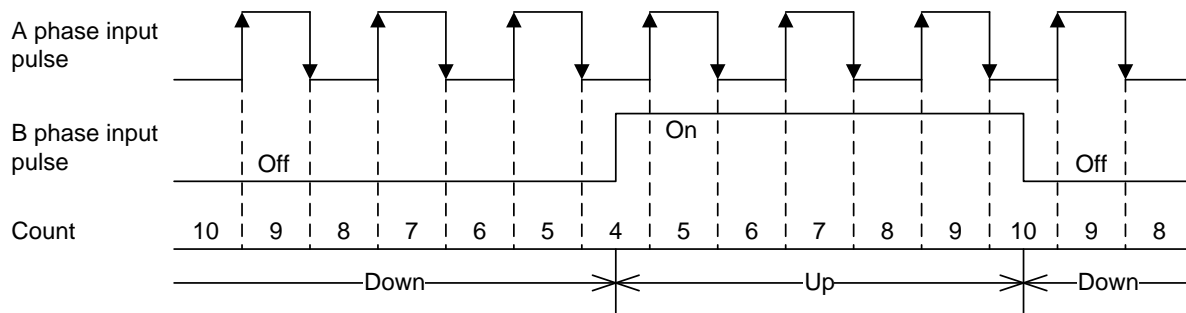
1) High Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| B phase input pulse Off | Up count (+1) | Up count (+1) |
| B phase input pulse On | Down count (-1) | Down count (-1) |



2) Low Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| B phase input pulse Off | Down count (-1) | Down count (-1) |
| B phase input pulse On | Up count (+1) | Up count (+1) |



2. 2 phase input

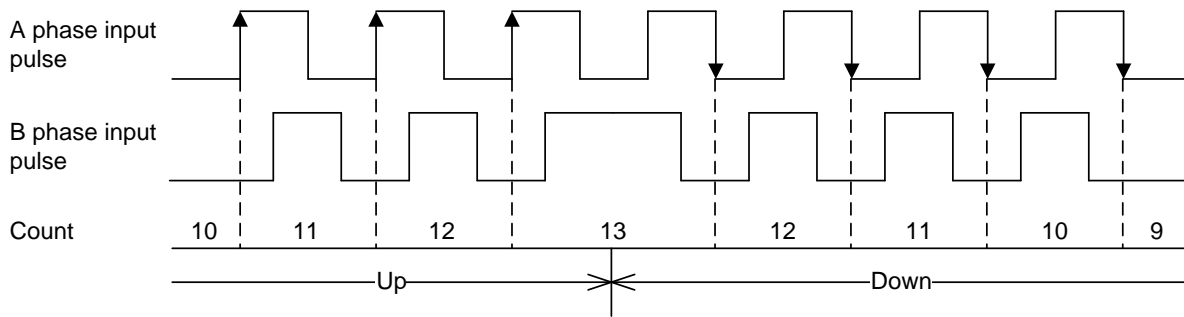
(1) 2 phase 1 multiplication input

1) High Active Mode

When input pulse of A phase is ahead of B phase input pulse, at rising edge of A phase input pulse, Up count is operated.

When input pulse of B phase is ahead of A phase input pulse, at falling edge of A phase input pulse, Down count is operated.

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Phase of A and B (A-B) | Up count (+1) | - |
| Phase of A and B (B-A) | - | Down count (-1) |

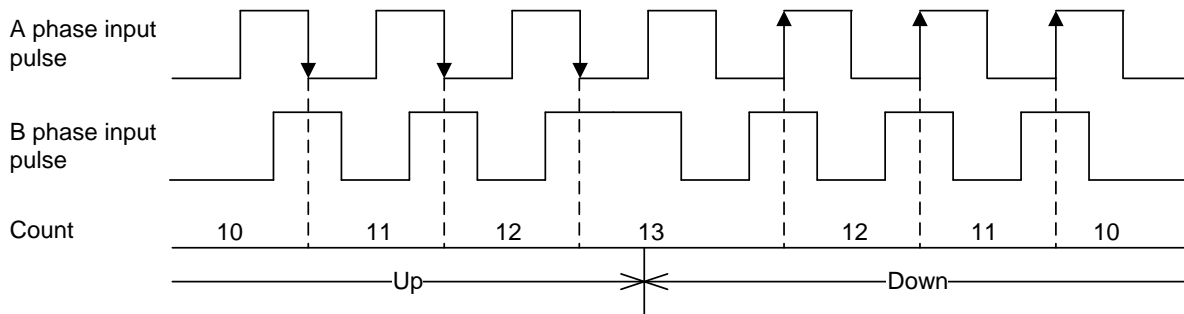


2) Low Active Mode

When input pulse of A phase is ahead of B phase input pulse, at falling edge of A phase input pulse, Up count is operated.

When input pulse of B phase is ahead of A phase input pulse, at rising edge of A phase input pulse, Down count is operated.

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Phase of A and B (A-B) | - | Up count (+1) |
| Phase of A and B (B-A) | Down count (-1) | - |



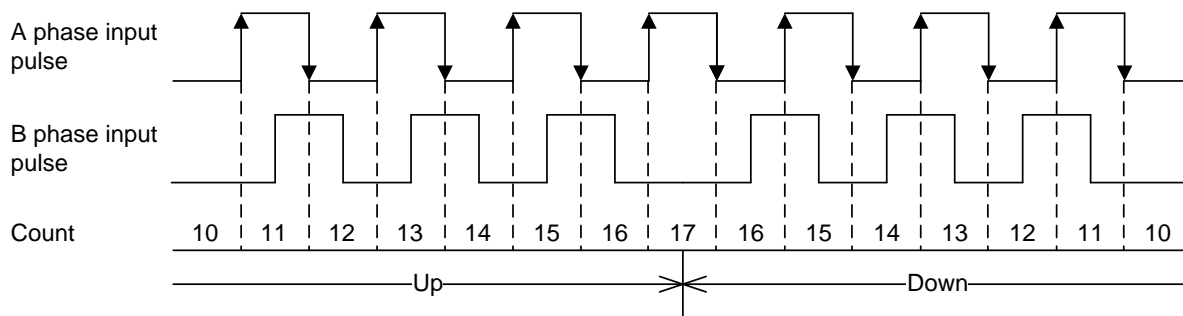
(2) 2 phase 2 multiplication input

When input pulse of A phase is ahead of B phase input pulse, at rising and falling edge of A phase input pulse, Up count is operated.

When input pulse of B phase is ahead of A phase input pulse, at rising and falling edge of A phase input pulse, Down count is operated.

When 2 phase 2 multiplication input mode, Low Active and High Active mode operation is same.

| Up/Down count classification | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|
| Phase of A and B (A-B) | Up count (+1) | Up count (+1) |
| Phase of A and B (B-A) | Down count (-1) | Down count (-1) |



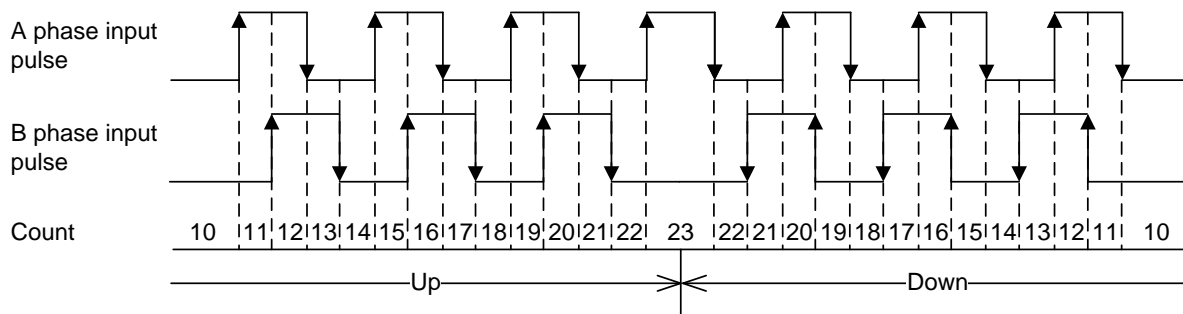
(3) 2 phase 4 multiplication input

When input pulse of A phase is ahead of B phase input pulse, at rising and falling edge of A and B phase input pulse, Up count is operated.

When input pulse of B phase is ahead of A phase input pulse, at rising and falling edge of A and B phase input pulse, Up count is operated.

When 2 phase 4 multiplication input mode, Low Active and High Active mode operation is same.

| Up/Down count classification | A phase pulse rising | A phase pulse falling | A phase pulse rising | A phase pulse falling |
|------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| Phase of A and B (A-B) | Up count (+1) | Up count (+1) | Up count (+1) | Up count (+1) |
| Phase of A and B (B-A) | Down count (-1) | Down count (-1) | Down count (-1) | Down count (-1) |

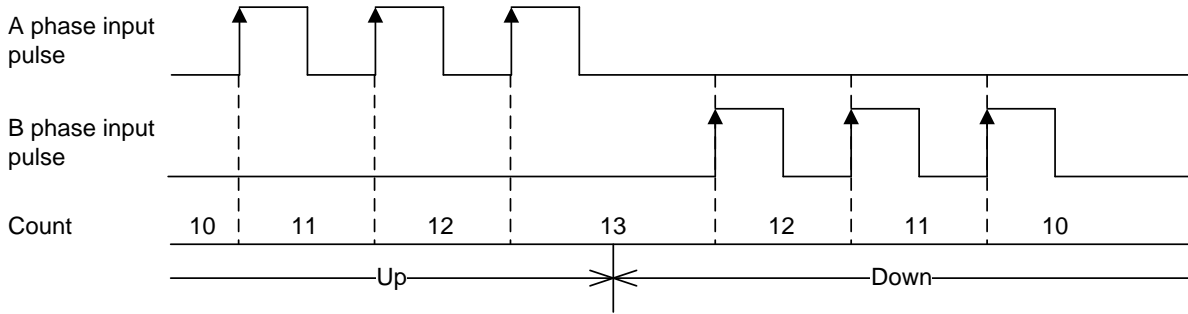


3. CWCCW(ClockWise/Counter ClockWise) input

Count is operated at rising edge of A phase input pulse or B phase input pulse and Up/Down count operation is determined by level of A or B input pulse

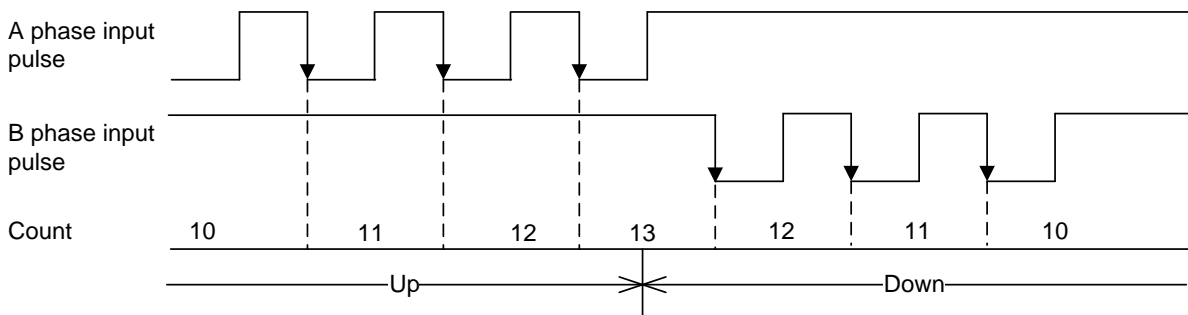
1) High Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling | B phase pulse rising | B phase pulse falling |
|------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| B phase input pulse Off | Up count (+1) | - | - | - |
| A phase input pulse Off | - | - | Down count (-1) | - |



2) Low Active Mode

| Up/Down count classification | A phase pulse rising | A phase pulse falling | B phase pulse rising | B phase pulse falling |
|------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| B phase input pulse On | - | Up count (+1) | - | - |
| A phase input pulse On | - | - | - | Down count (-1) |



2.4.2 Count Mode

1. Linear count

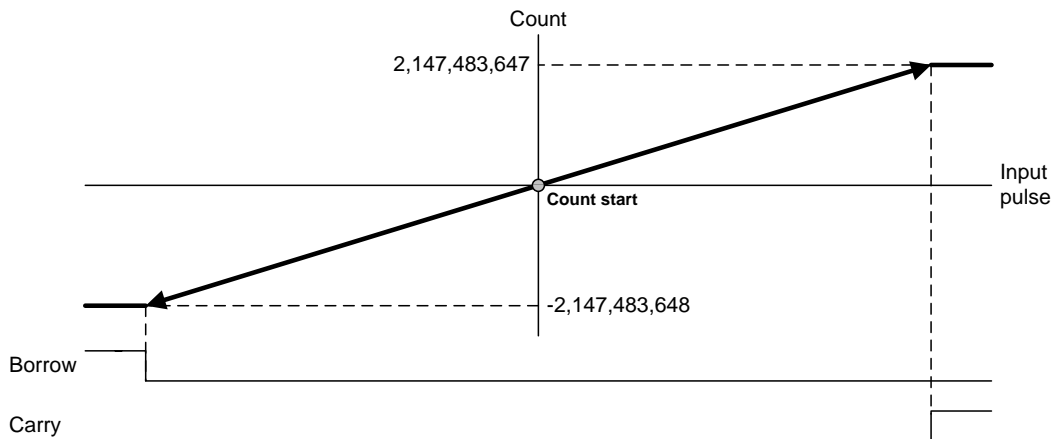
(1) Linear Count range: -2,147,483,648 ~ 2,147,483,647

(2) Up count

If count value reaches the maximum value while increased, Carry will occur, and Carry occurs, count stops and increasing is not available but decreasing is available.

(3) Down count

If count value reaches the minimum value while decreased, Borrow will occur and Borrow occurs, count stops and decreasing is not available but increasing is available



2. Ring count

(1) Count operation is executed within the user defined range repeatedly.

(2) Ring Count range: ring count min. value ~ ring count max. value

(3) Ring count display

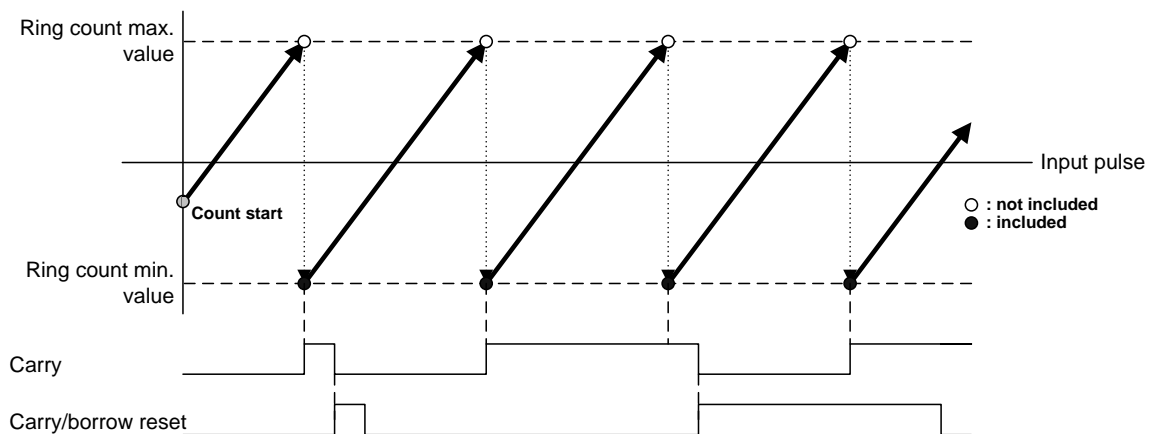
If Ring Counted, minimum value of Ring Count is displayed as count, but the maximum value is not displayed as count.

(4) Ring count operation

(a) ring count min. value ≤ Current count ≤ ring count max. value

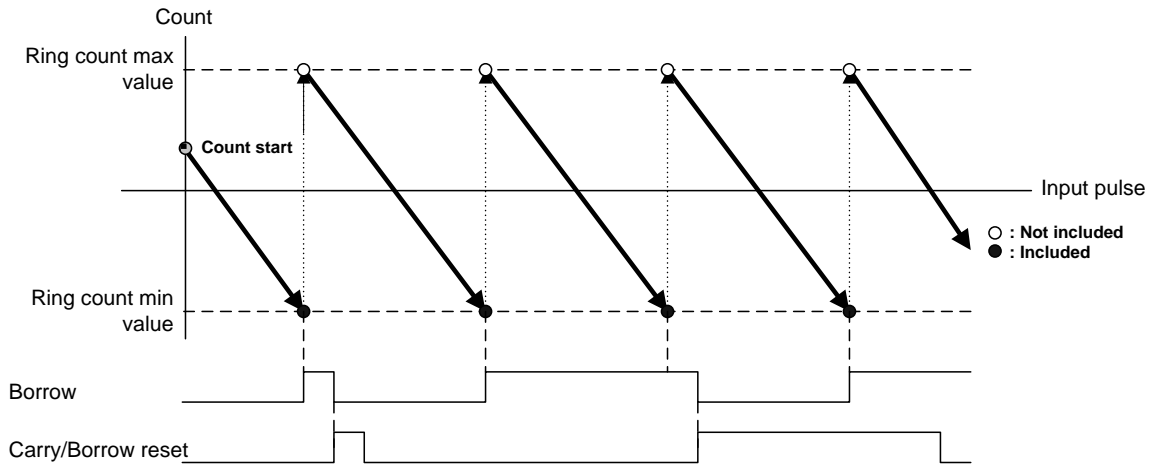
1) Up count

If count value exceeds maximum value during increasing count, Carry only occurs and count is executed starting from min. value



2) Down count

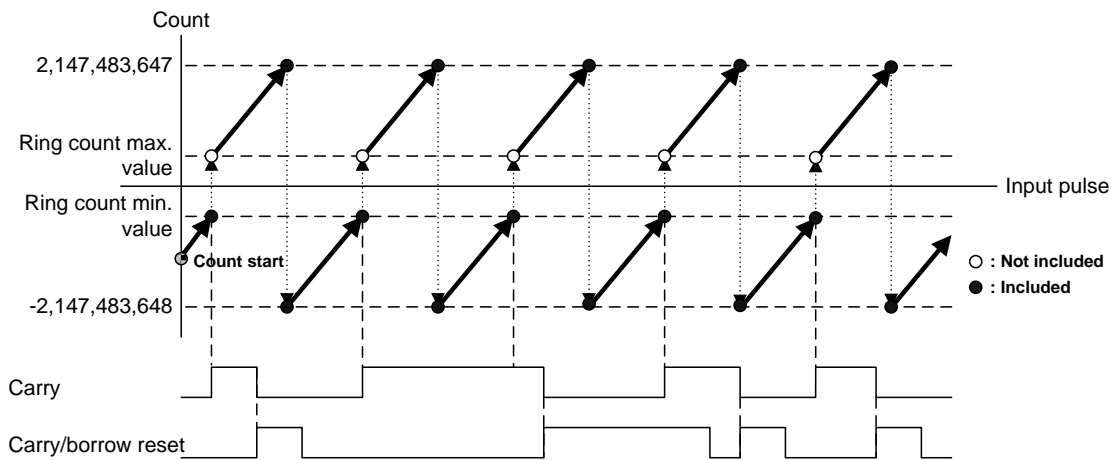
If count value reaches minimum value during decreasing count, Borrow only occurs and count is executed starting from max. value



(b) $-2,147,483,648 \leq \text{current count} < \text{ring count min. value}$ or $\text{ring count max. value} < \text{current count} \leq 2,147,483,647$

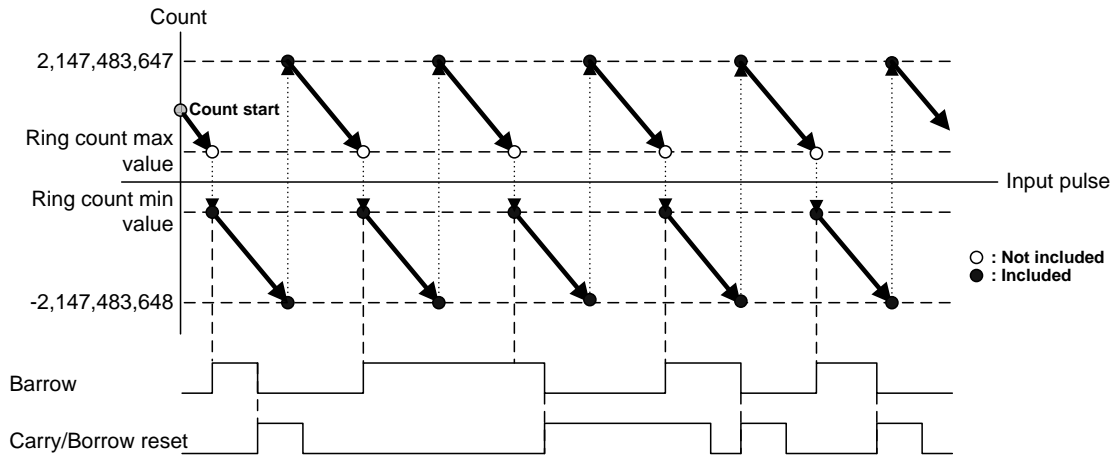
1) Up count

If count reaches ring count max. value, it changes into ring count min value and carry occurs and count is executed until 2,147,483,647. If count exceeds 2,147,483,647, count is changed into -2,147,483,648 and executed repeatedly.



2) Down count

If count reaches min. value, borrow occurs and count is changed into ring count max. value. Count is executed until 2,147,483,647. If count reaches -2,147,483,648, count is changed into 2,147,483,648 and executed again.

**Notes**

When setting ring count max/min value, if current count is out of range of ring count, module assumes that that is mistake of user and LED flickers and error occurs. If the user executes preset operation and changes the current count to be within ring count range, LED is off and error disappears.

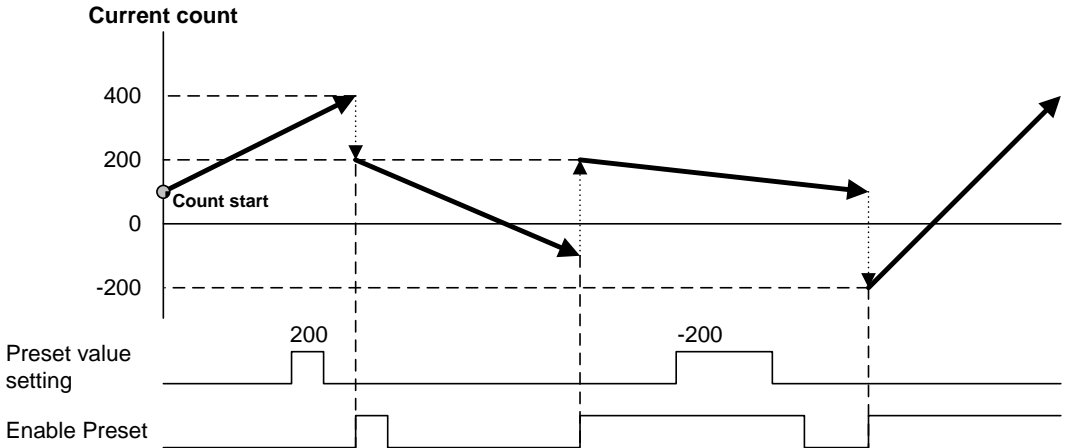
2.4.3 Preset

(1) When Enable Preset is On, current count is changed into preset setting value. Only with setting of preset, current count is not changed and you have to execute the Enable Preset to change the current count.

(2) Operation method

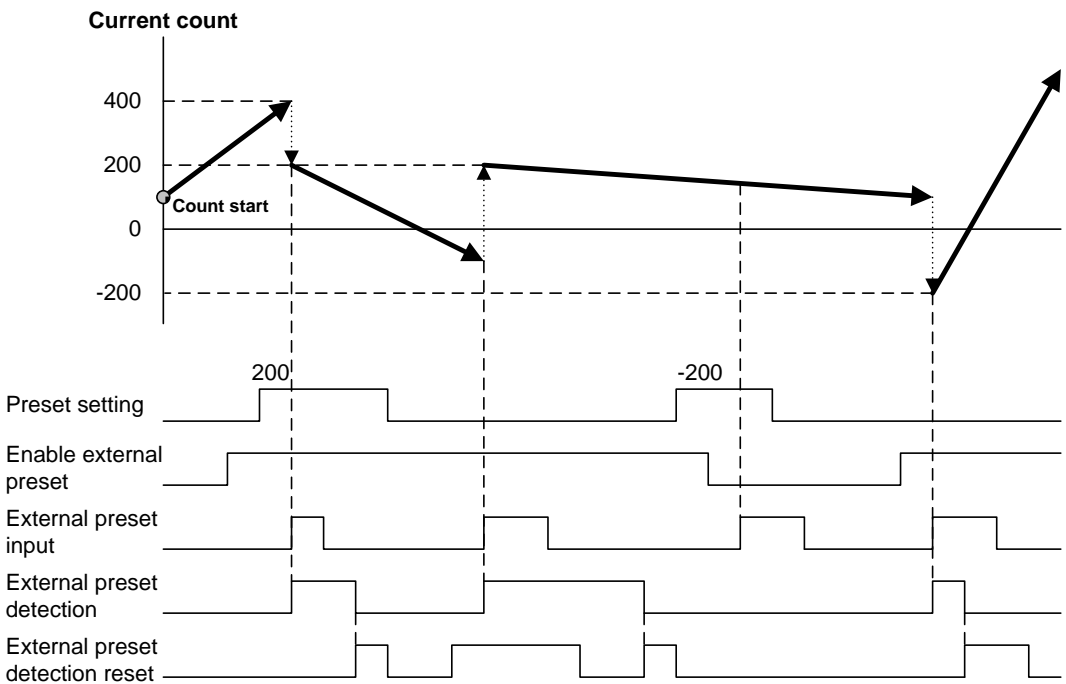
(a) Internal preset

Setting preset value → Enable Preset On



(b) External preset

Setting preset value → External Preset selection command On → External Preset Input signal On



Notes

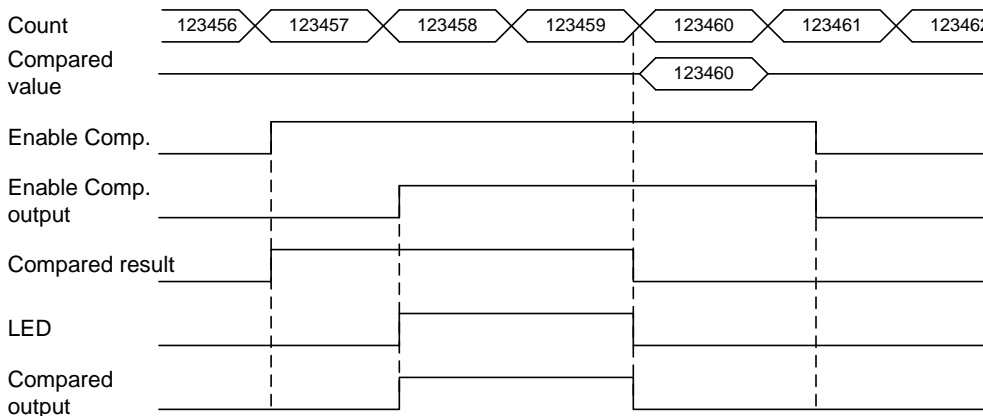
- (1) To use preset function by external input signal, set Enable Preset as 1 (On), turn on external preset input signal.
- (2) If you execute the preset by external input signal, external preset detection becomes 1 (On), When external preset detection is 1(On), external preset is not executed. In order to change external preset detection as 0 (Off), turn on external preset detection reset..

2.4.4 Compared output

- (1) High Speed counter module has a compared output function used to compare present count value with compared value in size to output as compared.
- (2) Available compared outputs are 2 for 1 channel, which can be used separately.
- (3) Compared output conditions are 7 associated with $<$, \leq , $=$, $>$, $\leq\leq$, $\geq\geq$
- (4) In order to make actual comparison enabled after compared output condition set, the compared enable signal is to be On, at this time, output is displayed only on program (U device or Global variable), and in order to send out the actual external output with LED turned On, the output enable signal is to be On.

1. Preset value $<$ Compared value

If counted present value is less than compared value, output is sent out, and if present value increases to be equal to or greater than compared value, output is not sent out.

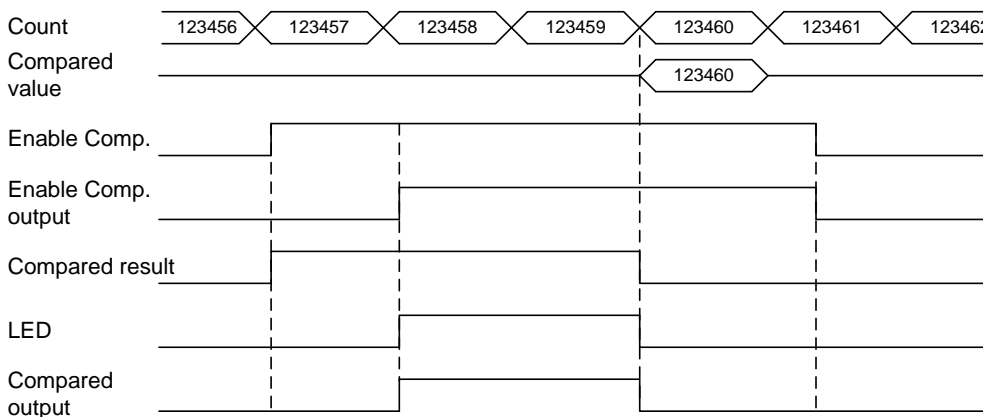


Notes

- (1) Compared result can be checked at U device for XBM,XBC, Global variable for XEC
- (2) Compared output is a signal to be output at external terminal (A03, A04, B03, B04).

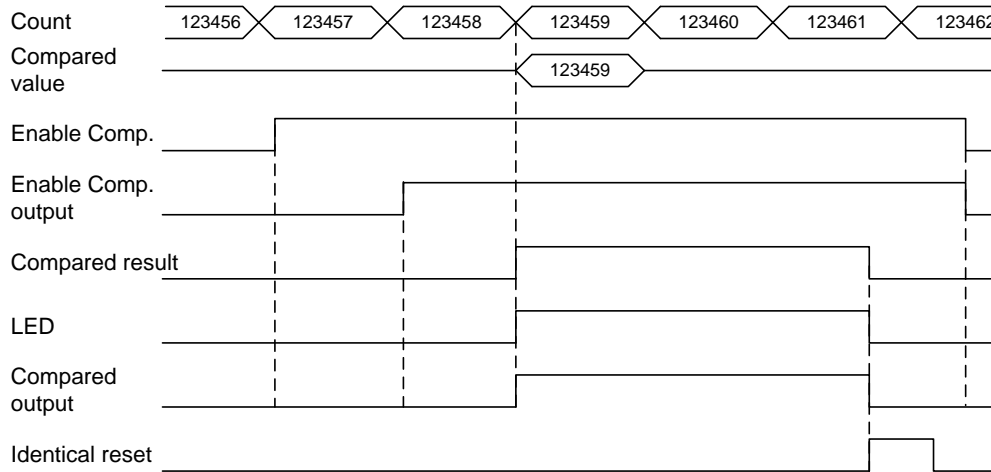
2. Count value \leq Compared value

If present count value is less than or equal to compared value, output is sent out, and if count value increases to be greater than compared value, output is not sent out.



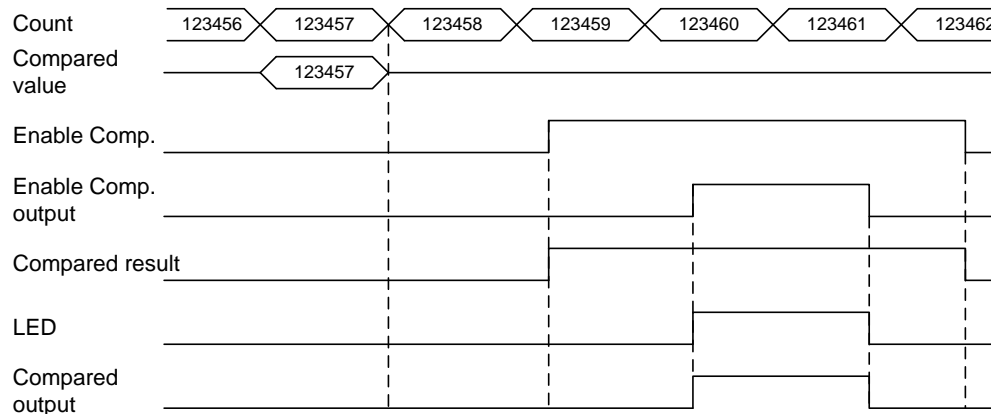
3. Count value = Compared value

If present count value is equal to compared value, output is sent out, and even if count value increases to be greater or less than compared value, output is kept On. In order to turn the output Off, identical reset signal is to be On.



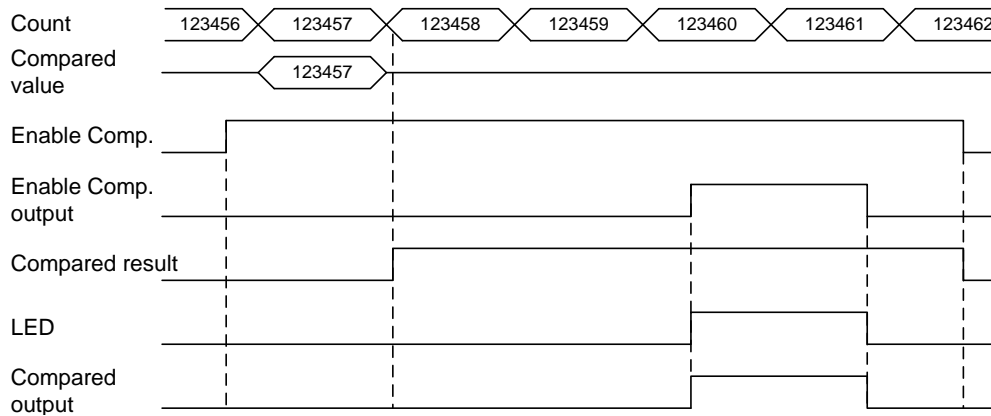
4. Count value \geq Compared value

If present count value is greater than or equal to compared value, output is sent out, and if count value decreases to be less than compared value, output is not sent out.



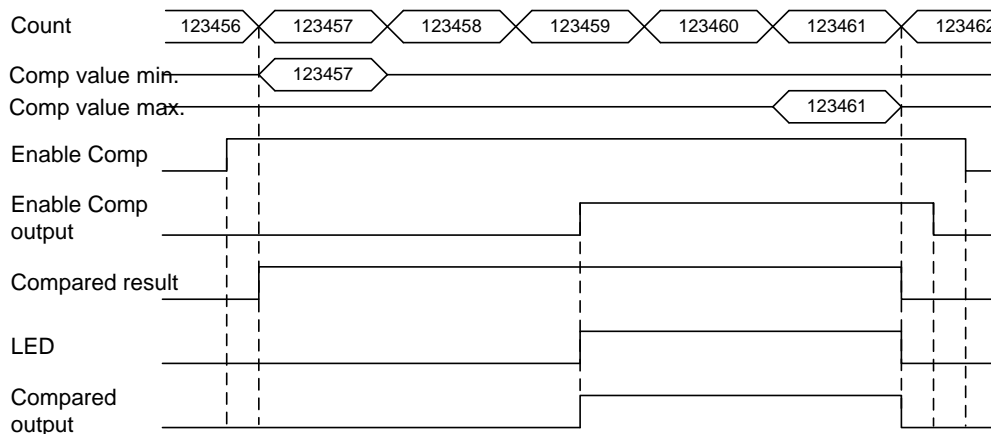
5. Count value > Compared value

If present count value is greater than compared value, output is sent out, and if count value decreases to be less than or equal to compared value, output is not sent out.



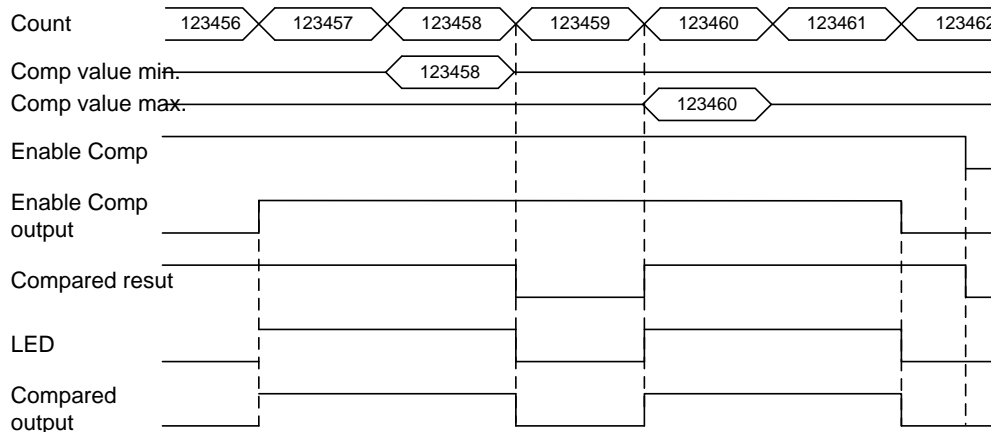
6. Compared value min. ≤ Count value ≤ Compared value max.

If present count value is greater than or equal to compared value 1 and less than or equal to compared value 2, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.



7. Count value \leq Compared value min., Count value \geq Compared value max.

If present count value is less than or equal to compared value 1 and greater than or equal to compared value 2, output is sent out, and if count value increases/decreases to exceed compared value's range, output is not sent out.



8. When main unit plc stopped, output signal by compared value out status setting.

When main unit plc stopped, you can select to keep an output or prohibit an output through compared output status setting

Remark

- (1) The output is changed to Off regardless of compared value of compared output when basic unit is stopped if the present state can't output.
- (2) The output is changed to On→Off regardless of compared value of compared output when basic unit is stopped if the present state can't output.
- (3) The output is changed to compared flag On→Off at the active status mode of compared function compared value of compared output when basic unit is stopped if the present state can't output.

2.4.5 Carry Signal

1. Carry Signal occurs
 - (1) When count range maximum value of 2,147,483,647 is reached during Linear Count.
 - (2) When maximum value of Ring Count changed to the minimum value during Ring Count.
2. Count when Carry Signal occurs
 - (1) Count stops if Carry occurs during Linear Count.
 - (2) Count does not stop even if Carry occurs during Ring Count.
3. Carry reset
The Carry generated can be cancelled by Carry/Borrow reset signal On.
As mentioned below, no cleared.

| Count Mode | Description |
|--------------|--|
| Linear Count | In case current count value 2,147,483,647 |
| Ring Count | Current count change to minimum value of ring count by occurring carry. it makes present value keep. |

2.4.6 Borrow Signal

1. Borrow signal occurs
 - (1) When count range minimum value of -2,147,483,648 is reached during Linear Count.
 - (2) When minimum value of Ring Count changed to the maximum value during Ring Count user-defined Ring Count minimum value maximum value.
2. Count when Borrow signal occurs
 - (1) Count stops if Borrow occurs during Linear Count.
 - (2) Count does not stop even if Borrow occurs during Ring Count..
3. Borrow reset
The Borrow generated can be cancelled by Carry/Borrow reset signal On.
As mentioned below, no cleared.

| Count Mode | Description |
|--------------|---|
| Linear Count | In case current count value -2,147,483,648 |
| Ring Count | Current count change to maximum -1 of value of ring count by occurring borrow. it makes present value keep. |

2.4.7 Auxiliary mode

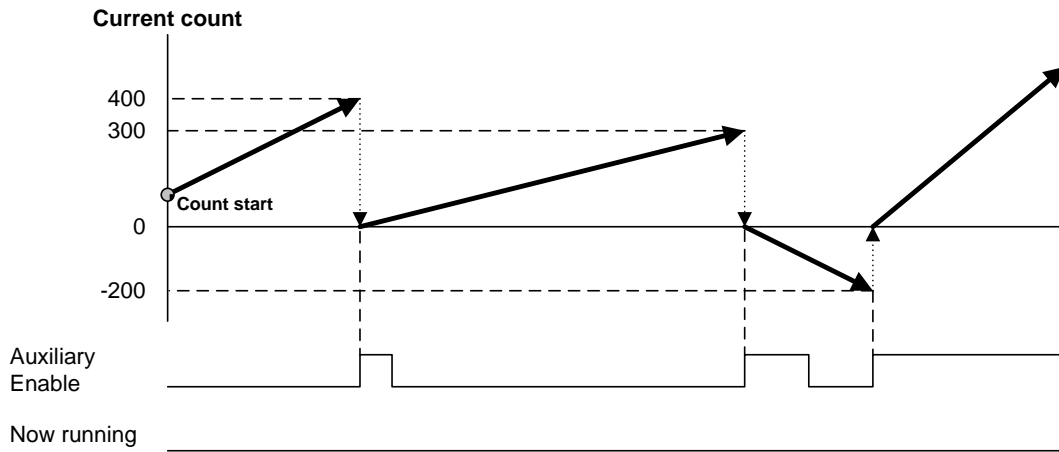
High Speed counter module provides 6 auxiliary modes as well as basic count function and compared output function. In order to use the auxiliary modes, auxiliary mode enable signal is to be "On".

Notes

- (1) To use auxiliary function by program, turn off the external auxiliary mode and turn on Enable Auxiliary
- (2) To use auxiliary function by an external signal, turn on the external auxiliary mode and turn on External auxiliary input signal (GATE).

1. Count clear

- (1) When Auxiliary Mode enable signal is On, present count value is set to 0.
- (2) Setting method
Set auxiliary mode setting mode to 1 → Auxiliary mode enable signal On.

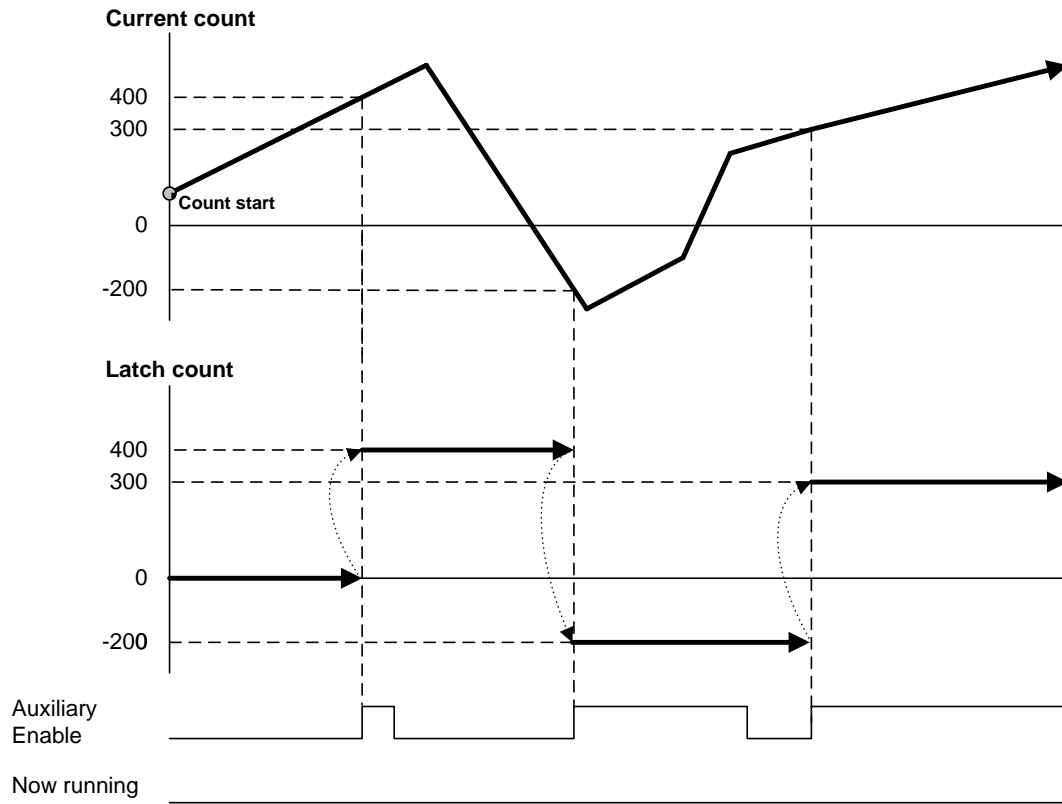


2. Count Latch

(1) When auxiliary mode enable signal is On, present count value is latched

(2) Setting method

Set auxiliary mode setting mode to 2 → Auxiliary mode enable signal On



3. Sampling Count

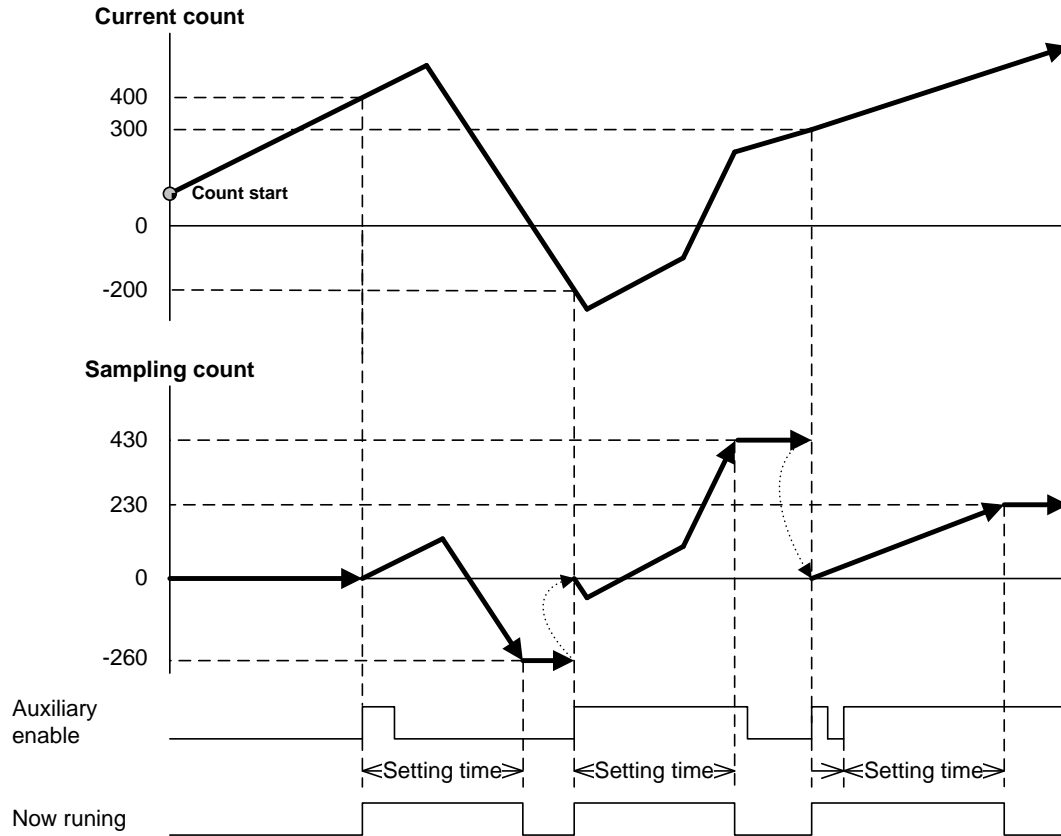
(1) When auxiliary mode enable signal is On, it counts for a specified time.

(2) Setting method

Set auxiliary mode setting mode to 3 → Time setting → Auxiliary mode enable signal On

(3) Display during auxiliary mode operation

Sampling Count function operates for a specified time when auxiliary mode enable signal is On, and the auxiliary mode in progress signal is On at the same time.



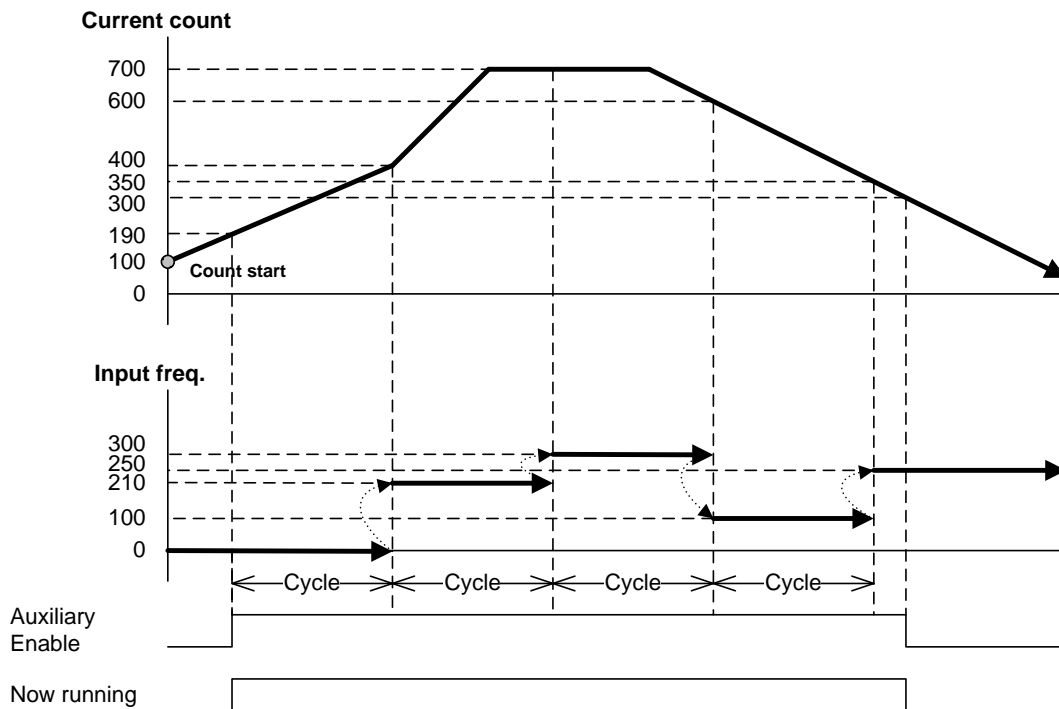
4. Input Frequency Measure

- (1) While auxiliary mode enable signal is On, it indicates frequency of input pulse. Unit of input frequency conforms to setting of frequency unit.
- (2) Setting method
Set auxiliary mode setting mode to 4 → Set frequency unit → Auxiliary mode enable signal On.
- (3) Frequency input mode can be specified as below, whose update cycle and resolution will be decided based on the applicable mode.

| Frequency unit setting | Unit [Hz] | Updated cycle [ms] |
|------------------------|-----------|--------------------|
| 0 | 1 | 1000 |
| 1 | 10 | 100 |
| 2 | 100 | 10 |
| 3 | 1000 | 1 |

(4) Display during auxiliary mode operation

While auxiliary mode enable signal is On, Now Running signal is on



※ On the figure, unit is 1Hz and updated cycle is 1000msec.

5. Revolution/Unit time

(1) While auxiliary mode enable signal is On, it calculates the number of input pulses for a specified time and indicates the revolution/unit time. To use this function, setting time and No. of pulse/revolution should be set.

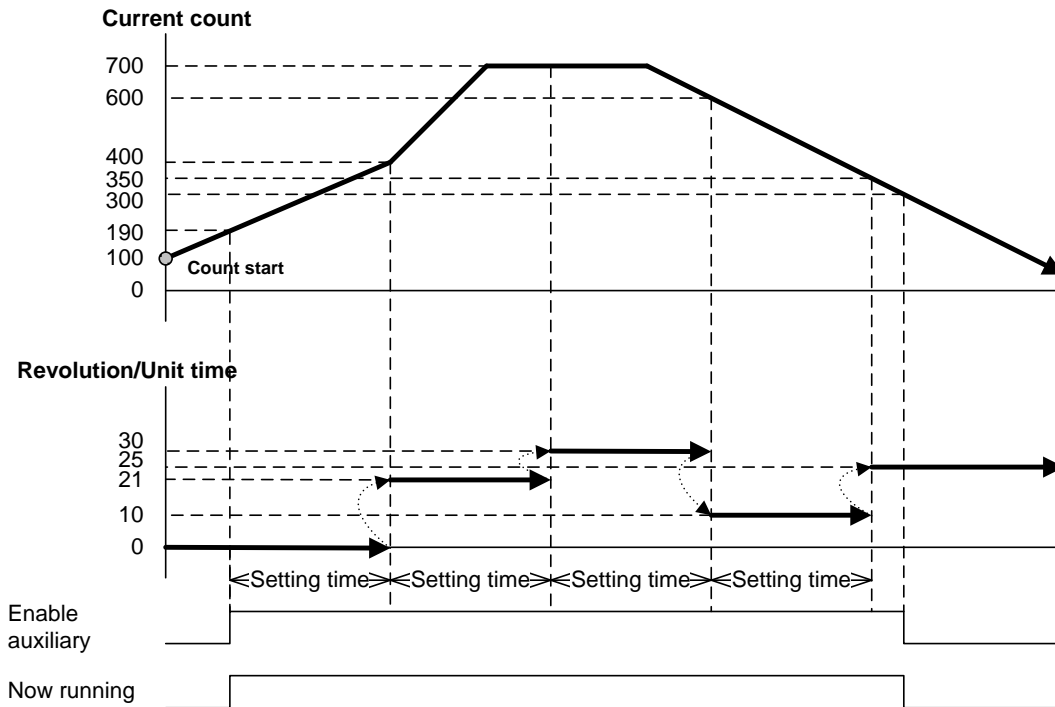
(2) Setting method

Set auxiliary mode setting mode to 5 setting → Time setting, No. of pulse/revolution → Auxiliary mode enable signal On.

(3) With the number of pulses per revolution input and time set to 1 minute (60000ms), the value of RPM is displayed.

(4) Display during auxiliary mode operation

While auxiliary mode enable signal is On, Now Running signal is on



※ On the figure, the number of pulse/revolution is set to be 10.

6. Count Disable

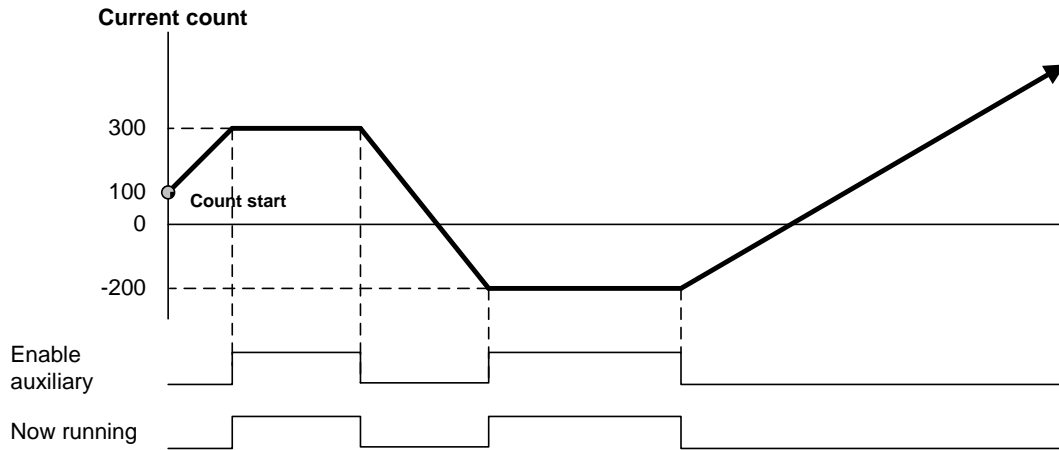
(1) While auxiliary mode enable signal is On, count operation stops.

(2) Setting method

Set auxiliary mode setting mode to 6 → Auxiliary mode enable signal On

(3) Display during auxiliary mode operation

While auxiliary mode enable signal is On, Now Running signal is on



Chapter 3 Installation and Wiring

3.1 Installation

3.1.1 Installation environment

This product is of high reliance regardless of installation environment. However, for the sake of reliance and stability of the system, please pay attention to those precautions described below.

- (1) Environmental conditions
 - (a) To be installed on the control panel waterproof and dustproof.
 - (b) No continuous shocks or vibration will be expected.
 - (c) Not to be exposed to the direct sunlight.
 - (d) No dew should be caused by rapid temperature change.
 - (e) Ambient temperature should be kept 0 - 55°C.
- (2) Installation work
 - (a) No wiring waste is allowed inside PLC when wiring or drilling screw holes.
 - (b) To be installed on a good location to work on.
 - (c) Don't let it installed on the same panel as a high-voltage device is on.
 - (d) Duct or surrounded module should be farther than 50cm from the HSC.
 - (e) Make sure that the PE terminal is grounded.

3.1.2 Handling precautions

Precautions for handling High Speed counter module are as described below from the opening to the installation.

- (1) Don't let it dropped or shocked hard.
- (2) Don't remove PCB from the case. It will cause abnormal operation
- (3) Don't let any foreign materials including wiring waste inside the top of the module when wiring.
Remove foreign materials if any inside.
- (4) Don't install or remove the module while powered On.

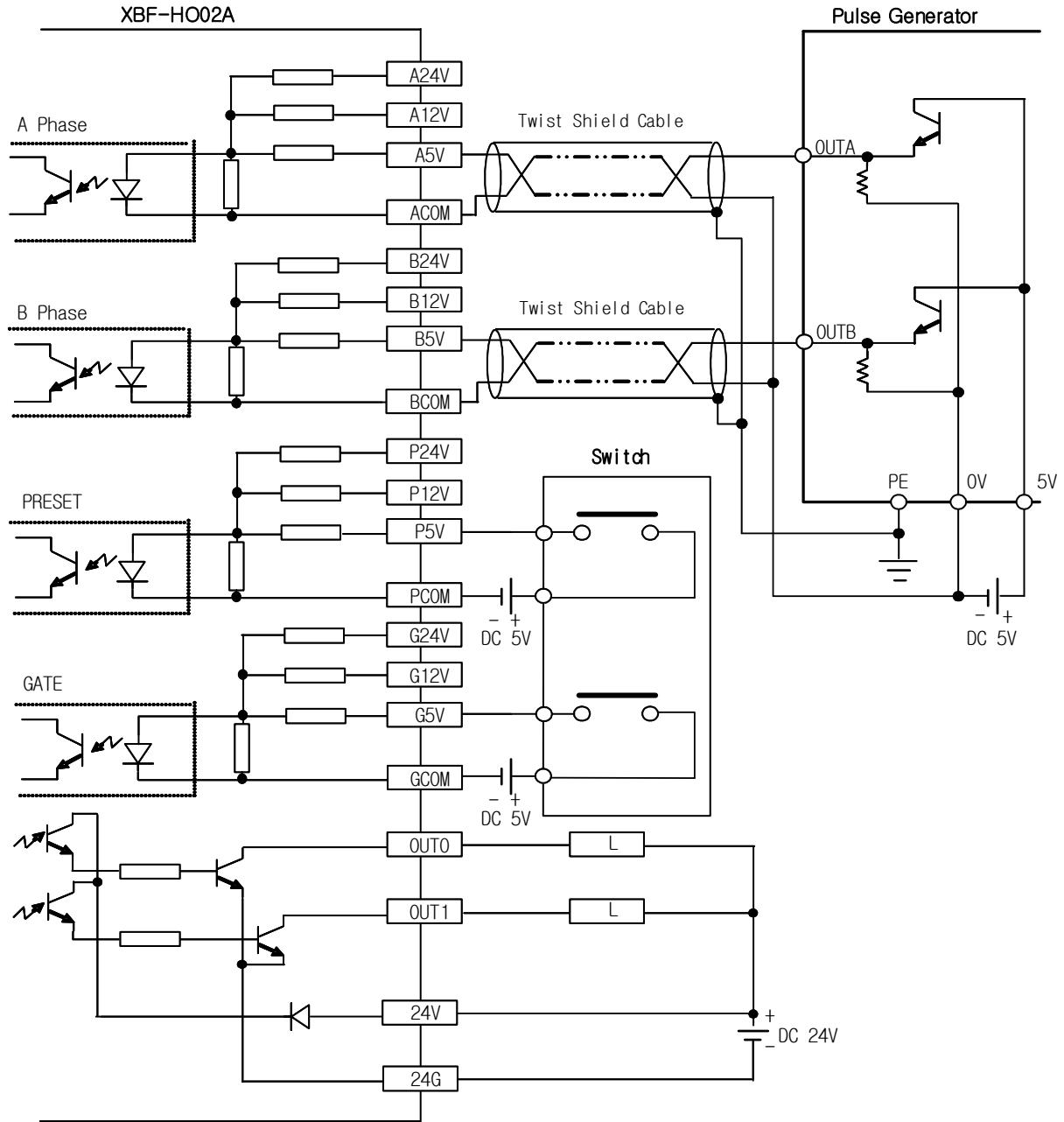
3.2 Wiring Precautions

3.2.1 Wiring Precautions

- (1) Pay attention to do action about external noise during wiring for the pulse input of the high counter module.
- (2) Surely use twisted pair shielded cable, grounded with 3 class applied.
- (3) Keep away from power cable or I/O line which may cause noise.
- (4) Connect A-phase only for 1-phase input.
- (5) Please take the wiring with consideration the maximum output distance of pulse generator.

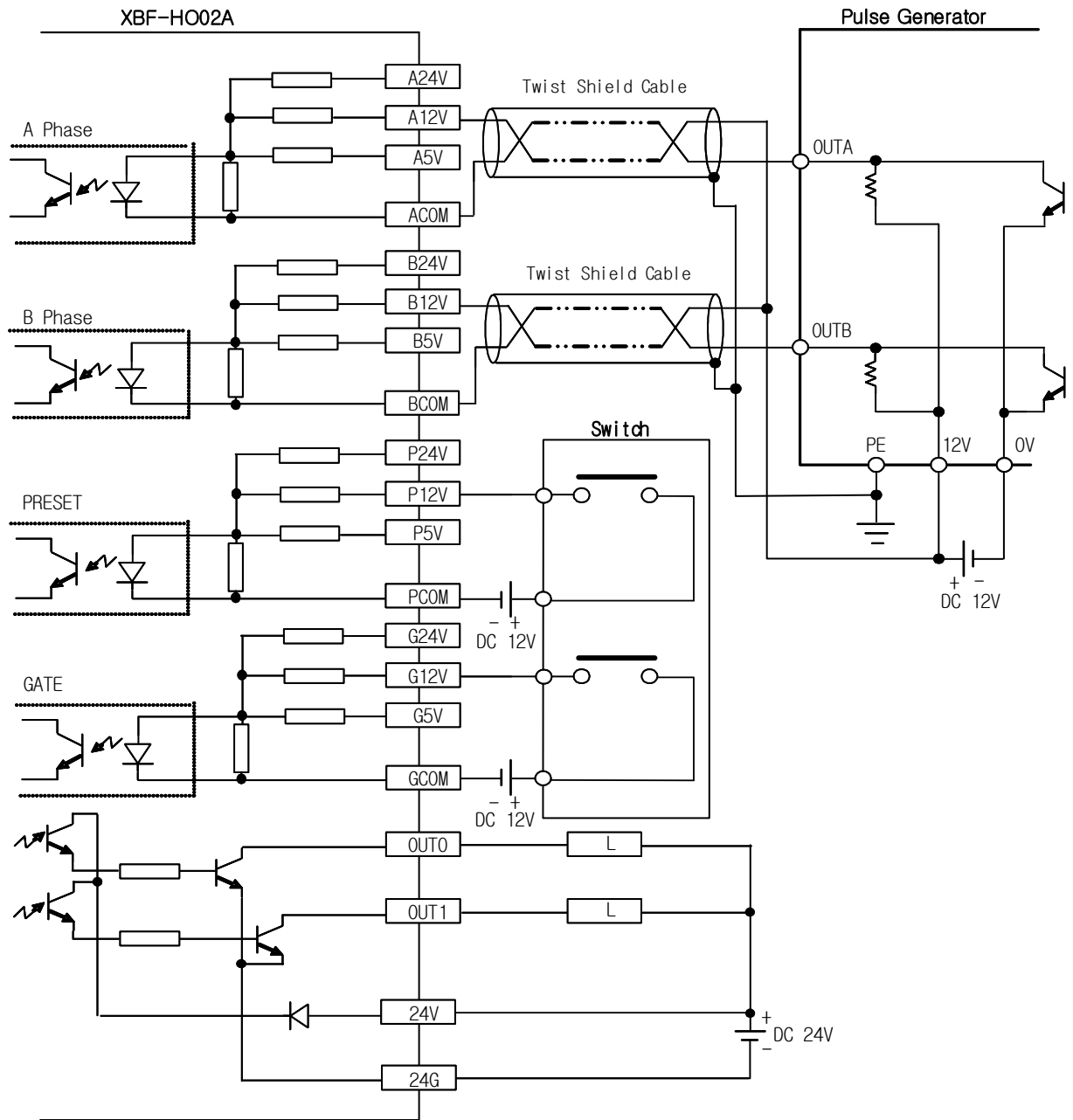
3.2.2 Example of DC5V voltage output wiring

- If the pulse generator is voltage output type, example of wiring with HSC is as shown below;
- The wiring will be the same if the pulse generator (Encoder or Manual pulse generator) of voltage output type is used through Totem Pole output.



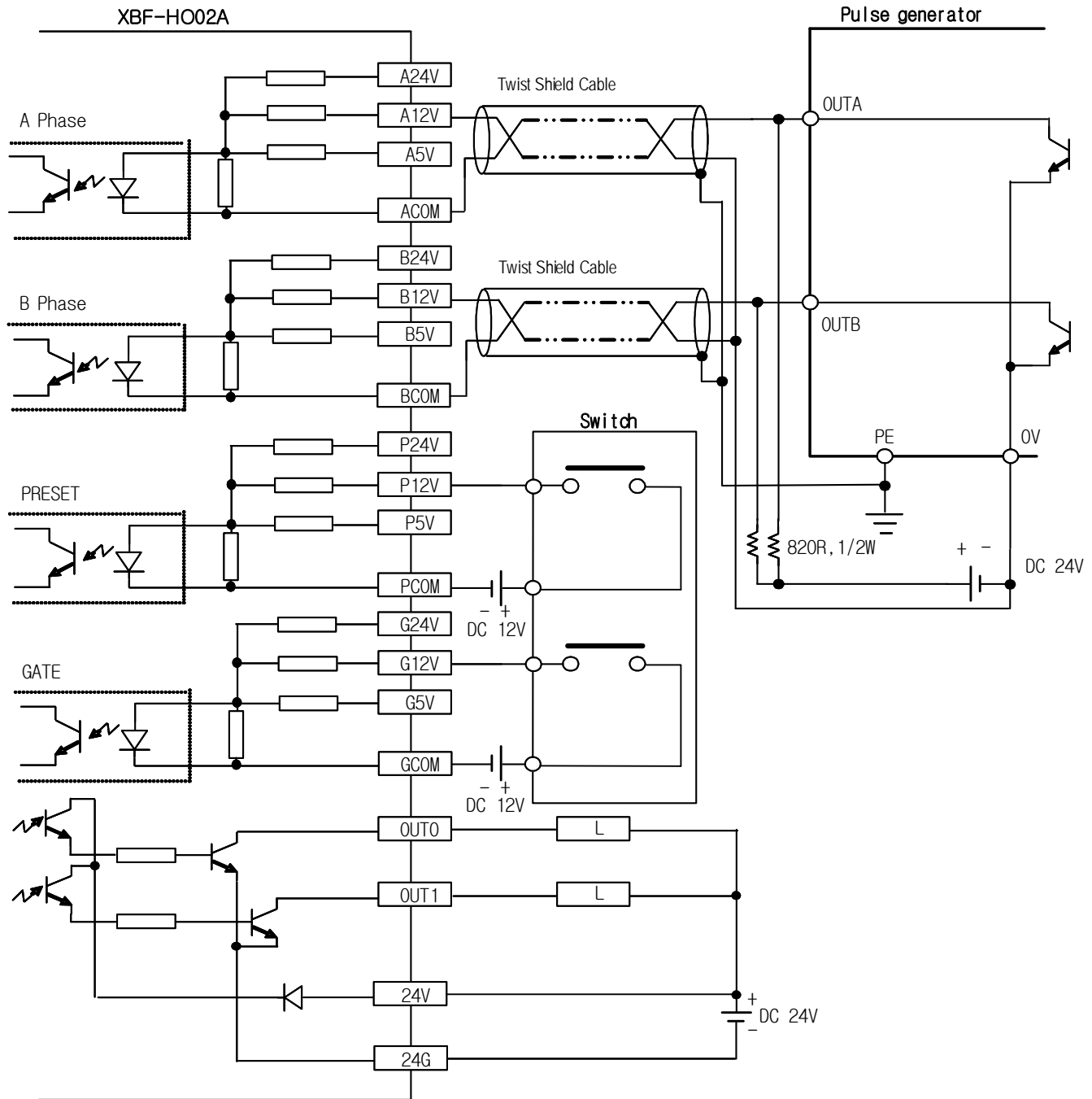
3.2.3 Example of DC12V NPN Open Collector output wiring

This is the wiring example which it used the pulse generator (Encoder or Manual pulse generator) of NPN Open Collector output type.



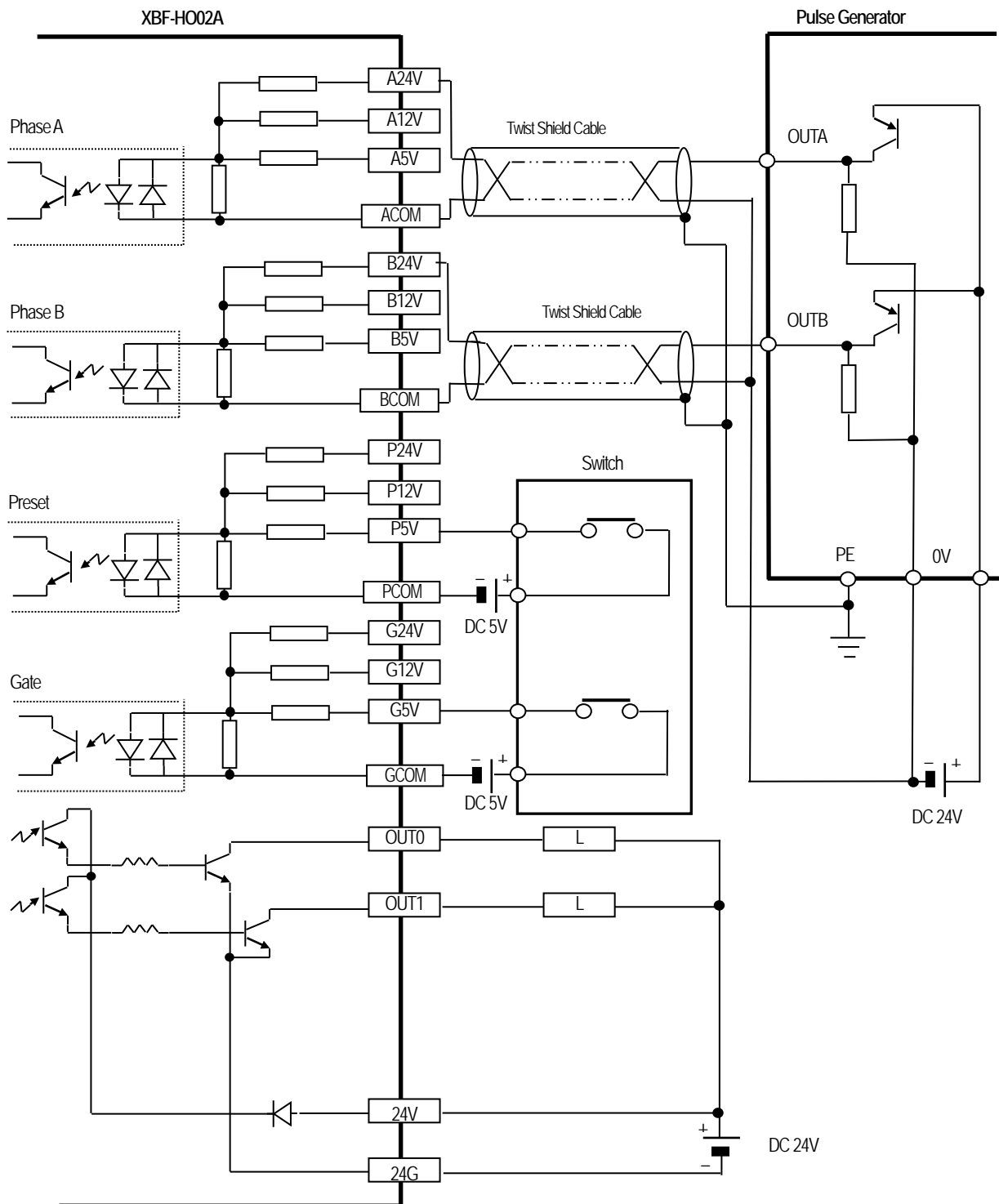
Remark

In case external line noise environment, Between pulse generator(encoder or manual pulse generator) and HSC wiring need to attach a resistance by noise to protect malfunction as below the wiring example.
 (External Pull Up Resistance use to adjust specification of external device.)



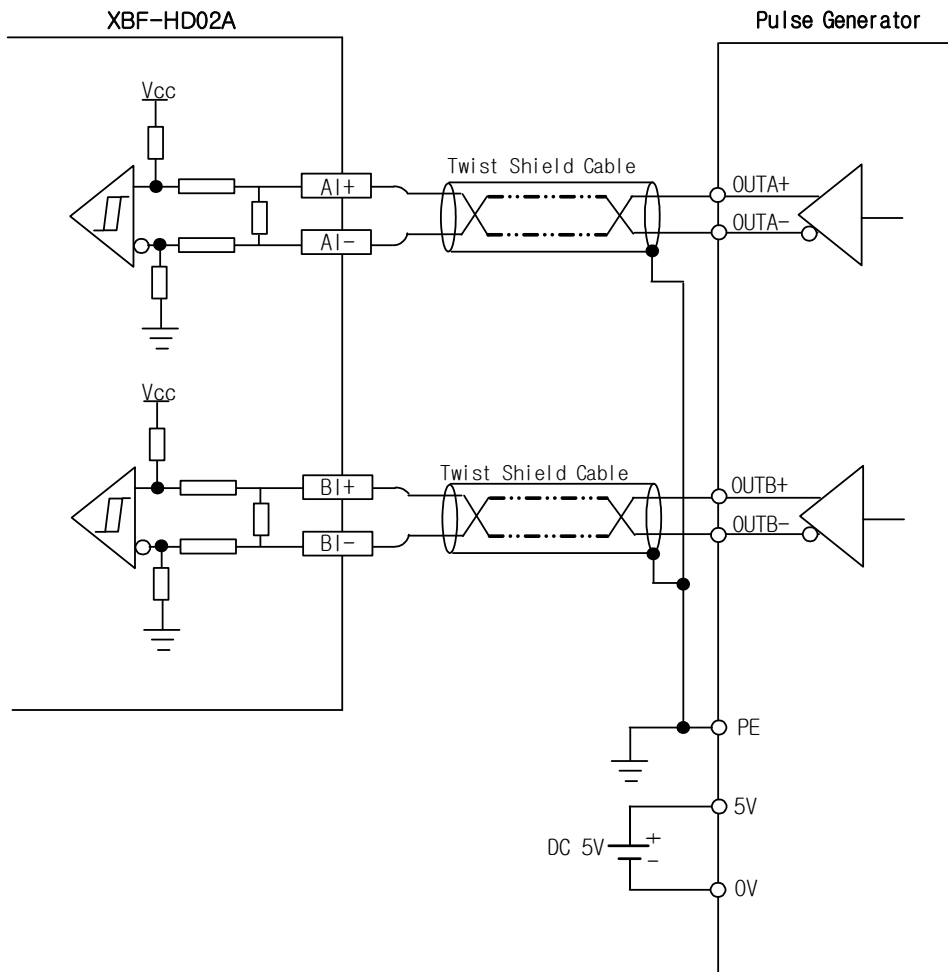
3.2.4 Example of DC24V PNP Open Collector output wiring

This is the wiring example which it used the pulse generator (Encoder or Manual pulse generator) of PNP Open Collector output type.



3.2.5 Example of Line Driver output wiring

This is the wiring example which it used the pulse generator (Encoder or Manual pulse generator) of RS-422A Line Driver (5V level) output type.



Remark

In case of 24V Level Line Driver, please connect to All+, All-, BII+, BII- terminal.
Be careful wiring and you must consider maximum output distance of pulse generator.

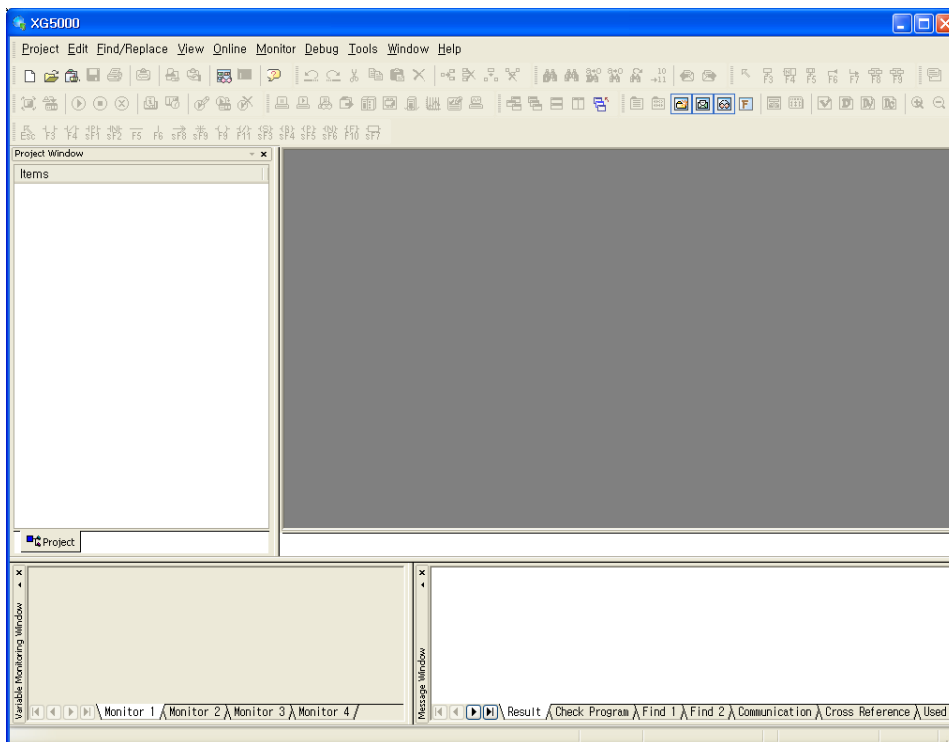
Chapter 4 Operation Procedures and Monitoring


Operation setting and monitor functions of XG5000 program will be described in this chapter among operation methods of High-speed counter module.

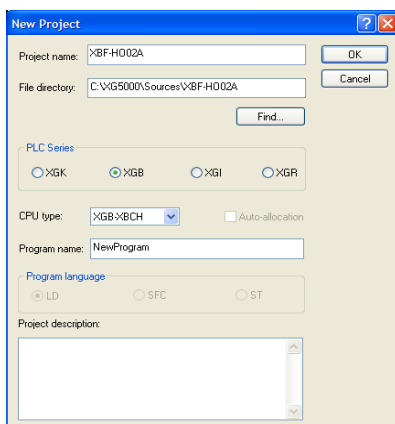
4.1 XG5000 Execution

4.1.1 Execution and Connection of XG5000

- 1) After XG5000 installed, click XG5000 execution icon to display the initial screen of XG5000 program as shown below.

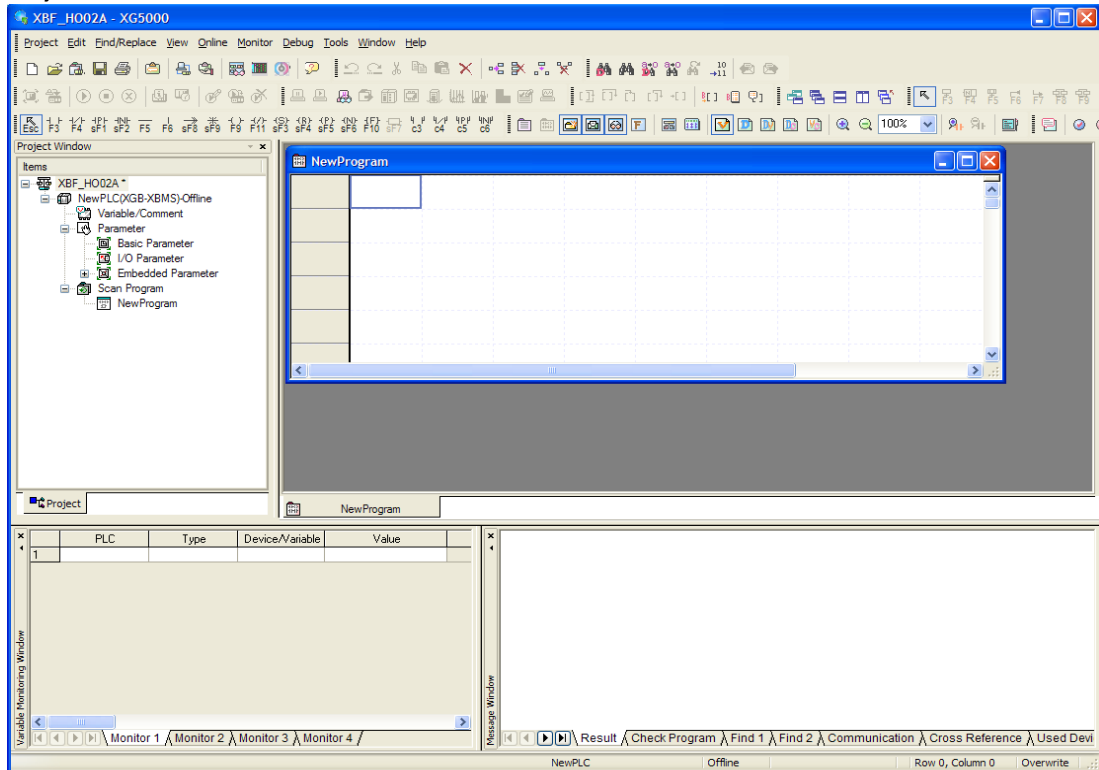


- 2) On the [Project] menu, click [New Project] or  on the icon menu to display the screen as shown below.

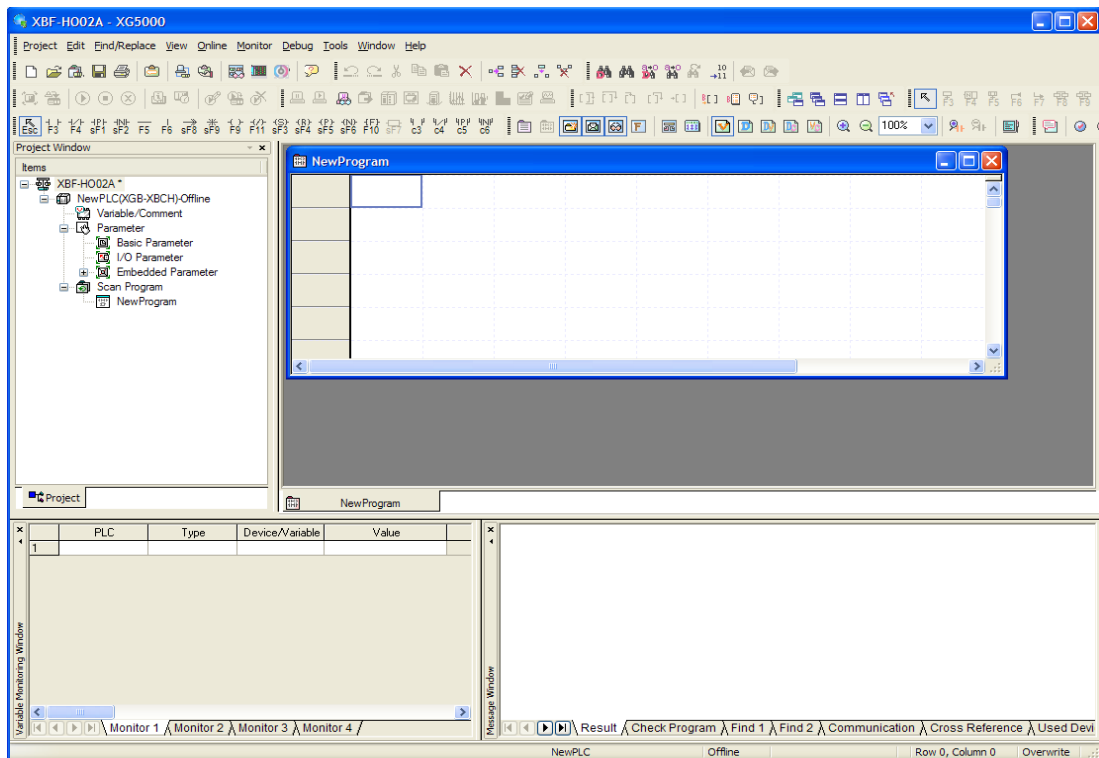


3) Project screen is as below.

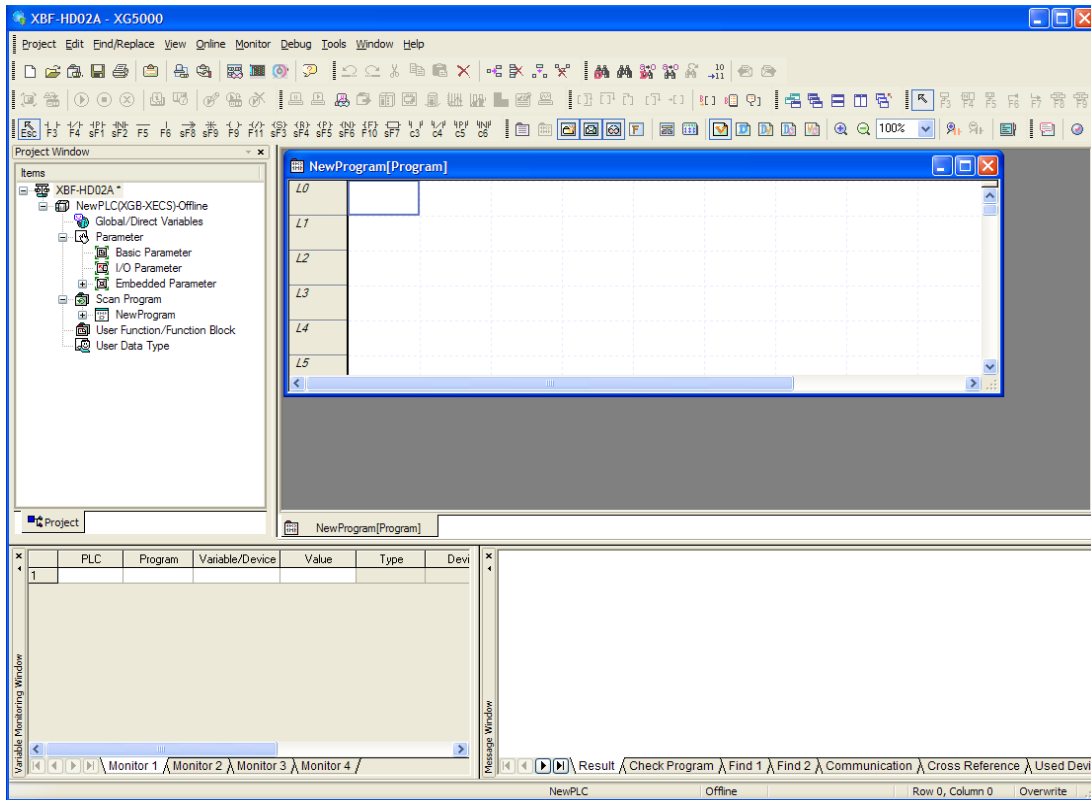
Project screen of XBM series




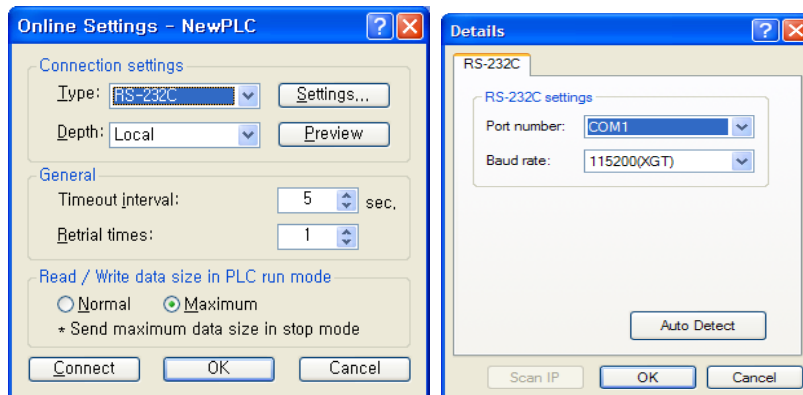
Project screen of XBC series




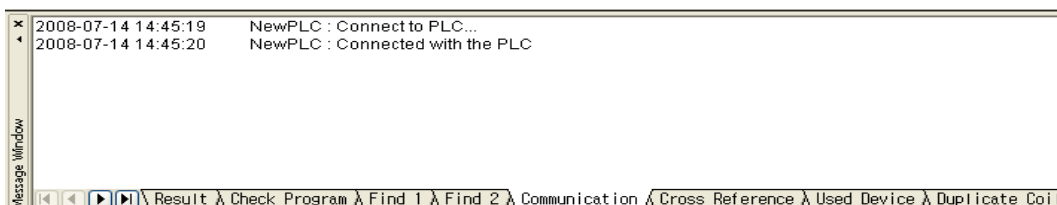
Project screen of XEC series



4) If a project is created, click [Online]-[Connection Settings] or  on the icon menu to specify the connection method and connection stage, and then click [Settings] to specify the communication port and the communication speed(115,200).



5) After all settings complete, click [Online]-[Connect] or  on the icon menu. Click [Communication] tab on [Message Window] to check the connection.

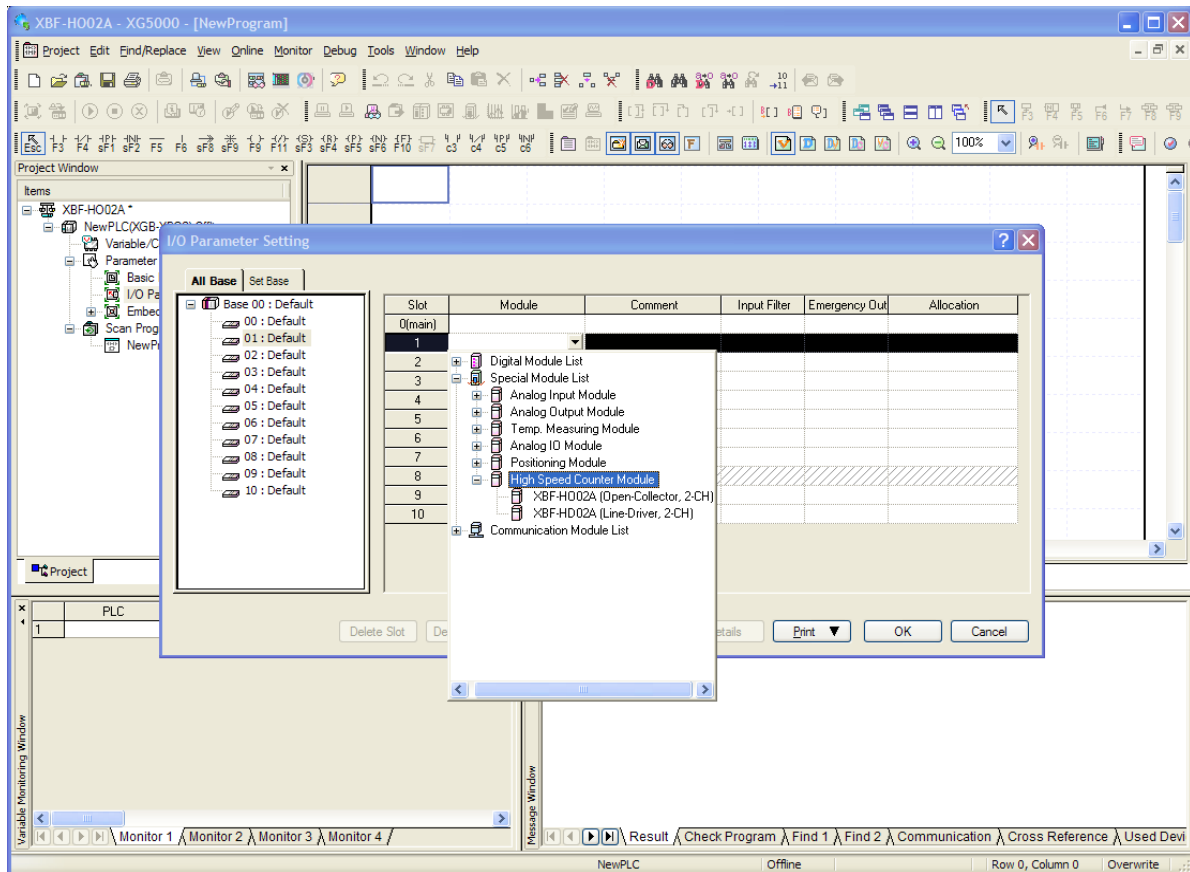


4.2 Parameters Setting

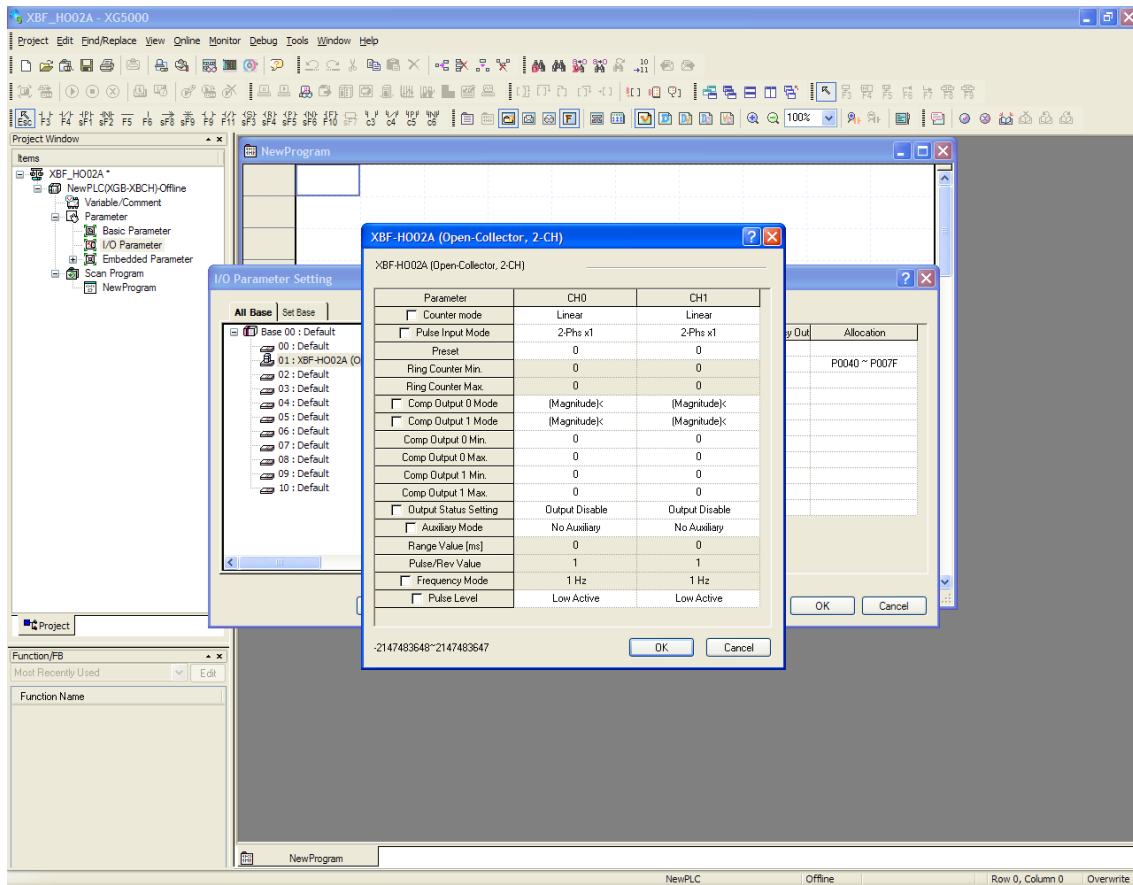
This description is based on XG5000 Project of XBC series, because it is the same to parameter setting method of XBM/XBC/XEC series.

4.1.2 Parameters setting

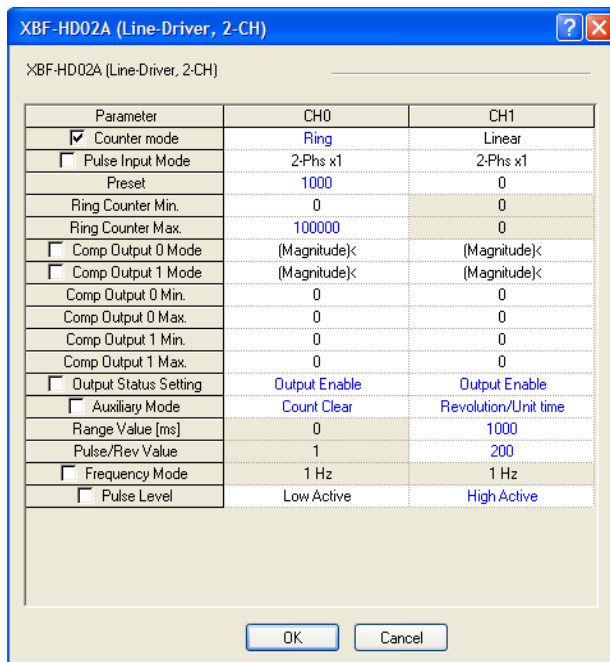
- 1) Double-click [I/O parameters] on the [Project Window] to the left of the project created on XG5000.
- 2) If [I/O parameters setting] window is displayed, click the module area of the applicable slot to select the applicable module



3) Double-click the applicable slot selected to specify the parameters, or click [Details] to display the screen where parameters can be set.



4) Set parameters as necessary for operation on the parameters setting window.




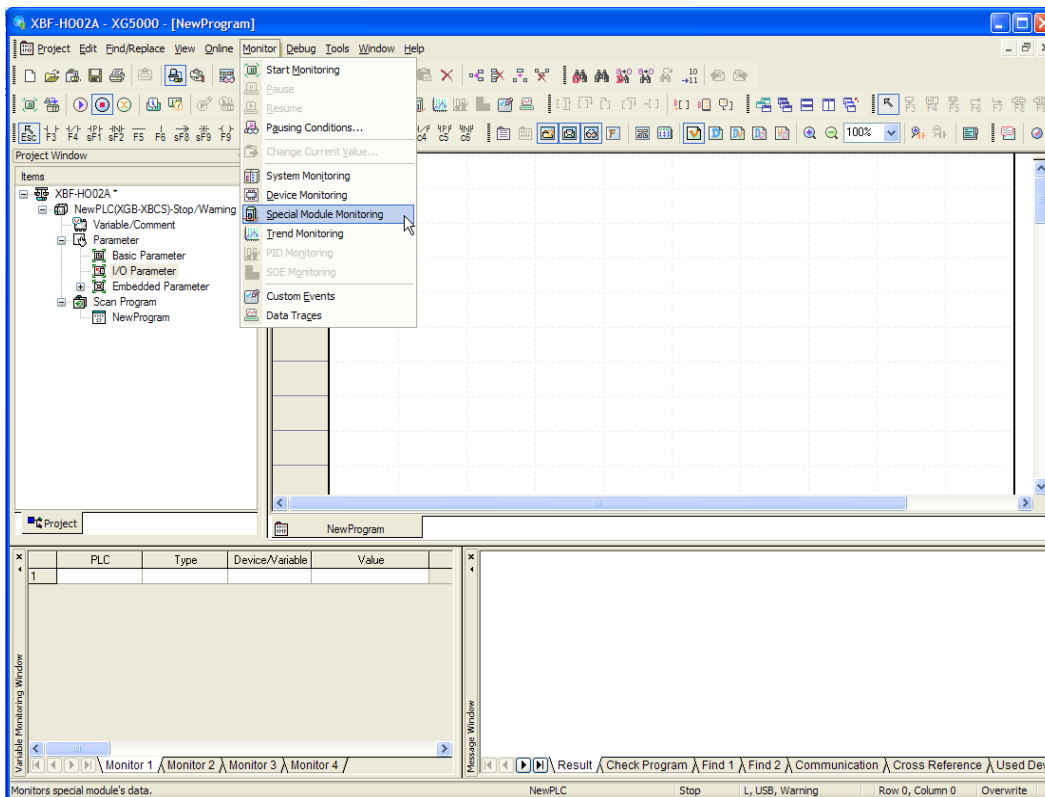
※ You must make the scan program to change parameter of the high speed counter module during CPU RUN mode.

4.3 Monitoring and Test

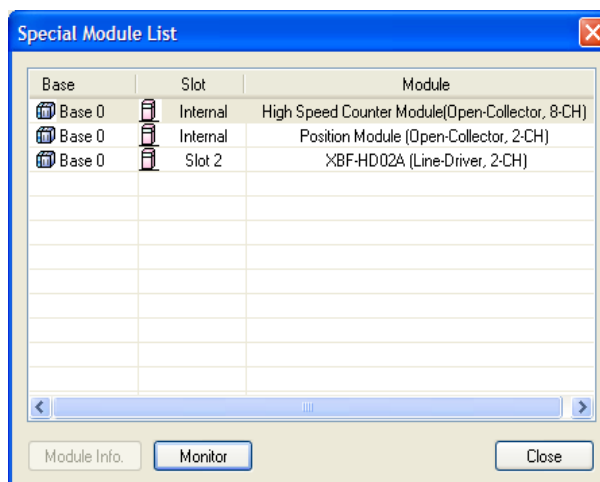
This description is based on XG5000 Project of XBC series, because it is the same to parameter setting method of XBM/XBC/XEC series.

4.3.1 Monitoring and Test

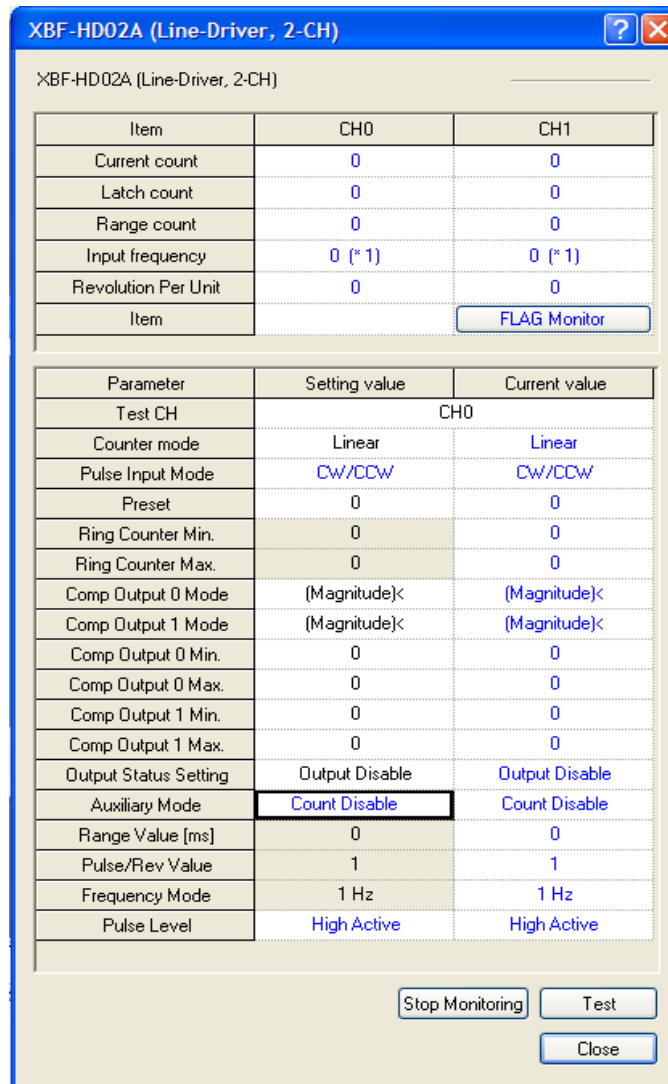
- 1) After connected to PLC CPU through XG5000, click [Online]-[Special Module Monitoring] or  on the icon menu to display the screen as shown below.



- 2) On the module list dialog box, the special modules presently installed on PLC system will be displayed.



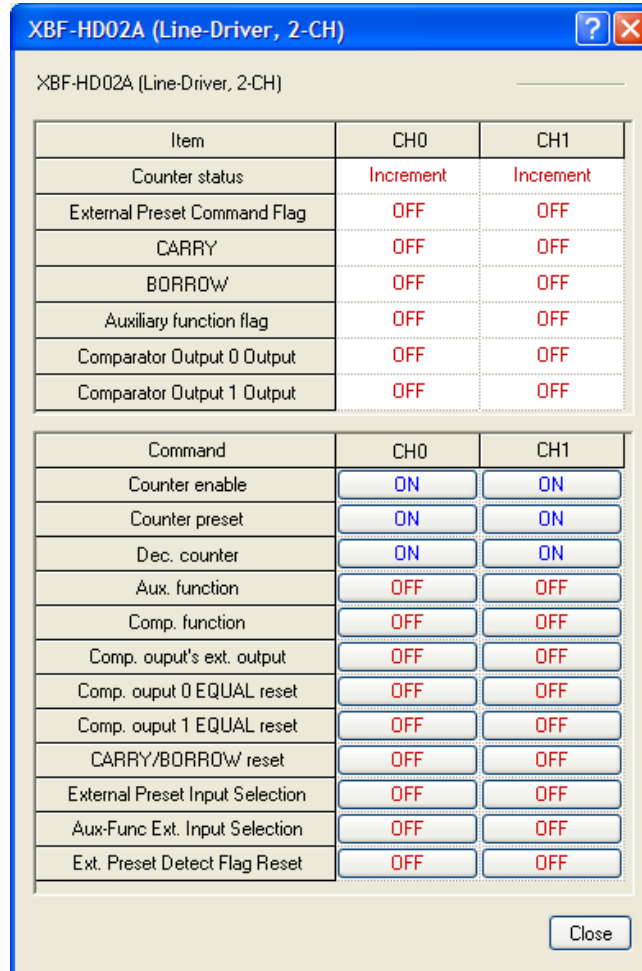
- 3) Select the applicable module and click the monitoring button to display the monitoring/ test screen as shown below, whose functions are as follows;
- On the upper monitoring screen, each special module's monitoring item values are displayed.
 - On the bottom test screen, each module's parameter items can be changed individually.
- If you click TEST button, setting values is applied to current value.



Remark

- (1) It is applied to only test operation to the parameter which changed by Test button. If test operation is concluded, the high speed counter module is operated by the parameter which was set by I/O parameter or by the scan program.
- (2) If PLC CPU module is STOP mode, it is available to test operation and monitoring function. But in case of RUN mode, it is available only to monitoring function.

- 4) In order to monitor the I/O contact status, click the applicable channel's flag monitoring button to display the monitoring screen where each I/O contact status can be checked.

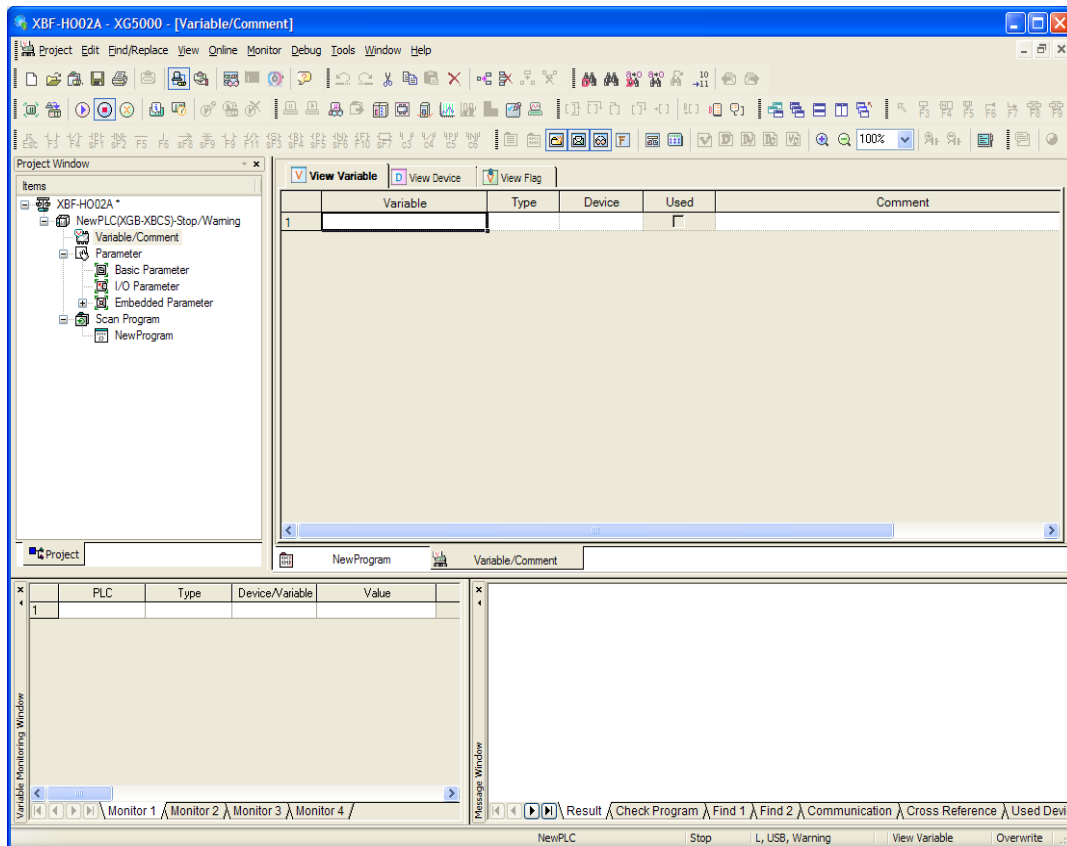


4.4 Registration of U Devices

It is described to the method to register automatically U devices in XG5000 Project of XBC series.

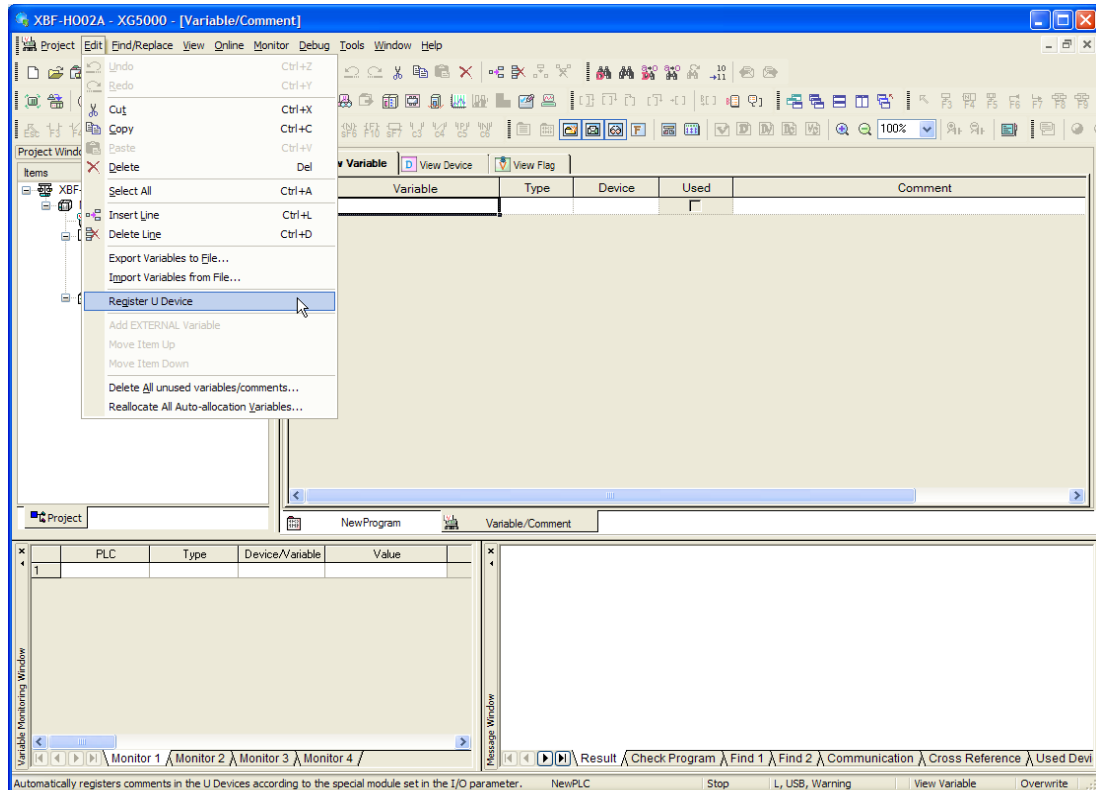
4.4.1 Variable/Comment screen

If you double click [Variables/Comment] of [Project Window], variables and comments which was registered already are displayed.

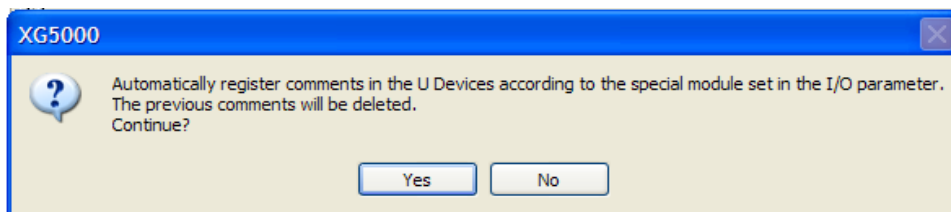


4.4.2 Registration of U Devices

- 5) Select [Edit]→[Register U Device].
(First, [Variable/Comment] window has to be executed.)



- 6) Click [Yes] to complete the U device registration that is set at [I/O parameter setting]



The screenshot displays the 'Variable/Comment' window in the XBF-H002A - XG5000 software. The window title is 'XBF-H002A - XG5000 - [Variable/Comment]'. The interface includes a menu bar (Project, Edit, Find/Replace, View, Online, Monitor, Debug, Tools, Window, Help) and a toolbar with various icons. On the left, the 'Project Window' shows a tree structure for 'NewPLC(XGB-XBCS)-Stop/Waming', including 'Variable/Comment', 'Parameter', 'Basic Parameter', 'I/O Parameter', 'Embedded Parameter', 'Scan Program', and 'NewProgram'. The main area is a table with columns for Variable, Type, Device, Used, and Comment. The table lists 24 variables, all of type BIT, with their respective device addresses and comments. At the bottom, there is a 'Variable Monitor' section with a table and a 'Message Window'.

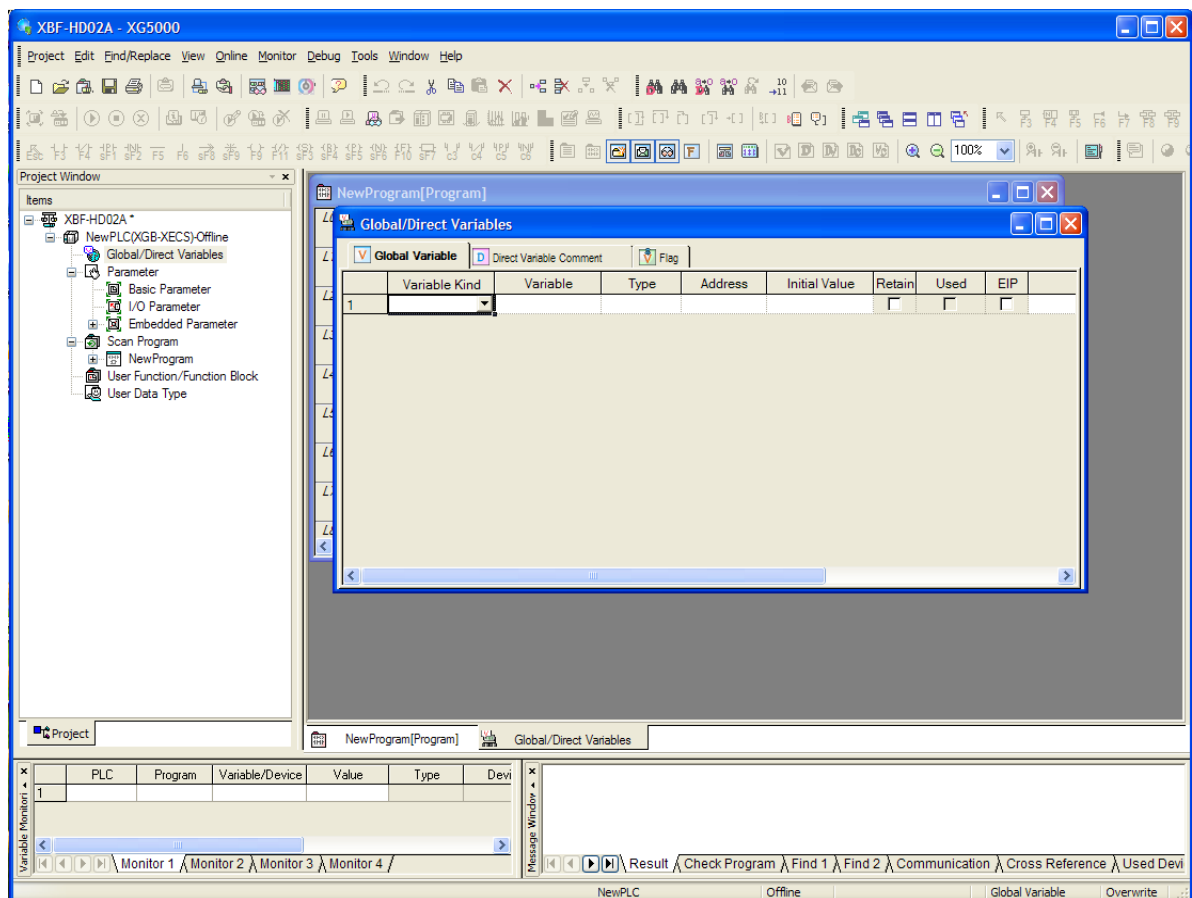
| Variable | Type | Device | Used | Comment |
|----------|-----------------|--------------|--------------------------|---|
| 1 | _02_CH0_DN | BIT U02.00.0 | <input type="checkbox"/> | HSC Module: CH0 Count Inc/Dec Flag |
| 2 | _02_CH0_EXTPRE | BIT U02.00.1 | <input type="checkbox"/> | HSC Module: CH0 External Preset Command Flag |
| 3 | _02_CH0_CRY | BIT U02.00.3 | <input type="checkbox"/> | HSC Module: CH0 Carry |
| 4 | _02_CH0_BRW | BIT U02.00.4 | <input type="checkbox"/> | HSC Module: CH0 Borrow |
| 5 | _02_CH0_AUXING | BIT U02.00.5 | <input type="checkbox"/> | HSC Module: CH0 Auxiliary Function Flag |
| 6 | _02_CH0_CMPOUT0 | BIT U02.00.6 | <input type="checkbox"/> | HSC Module: CH0 Comparator Output0 Output |
| 7 | _02_CH0_CMPOUT1 | BIT U02.00.7 | <input type="checkbox"/> | HSC Module: CH0 Comparator Output1 Output |
| 8 | _02_CH0_ERR | BIT U02.00.E | <input type="checkbox"/> | HSC Module: CH0 Error Flag |
| 9 | _02_RDY | BIT U02.00.F | <input type="checkbox"/> | HSC Module: Module Ready |
| 10 | _02_CH1_DN | BIT U02.01.0 | <input type="checkbox"/> | HSC Module: CH1 Count Inc/Dec Flag |
| 11 | _02_CH1_EXTPRE | BIT U02.01.1 | <input type="checkbox"/> | HSC Module: CH1 External Preset Command Flag |
| 12 | _02_CH1_CRY | BIT U02.01.3 | <input type="checkbox"/> | HSC Module: CH1 Carry |
| 13 | _02_CH1_BRW | BIT U02.01.4 | <input type="checkbox"/> | HSC Module: CH1 Borrow |
| 14 | _02_CH1_AUXING | BIT U02.01.5 | <input type="checkbox"/> | HSC Module: CH1 Auxiliary Function Flag |
| 15 | _02_CH1_CMPOUT0 | BIT U02.01.6 | <input type="checkbox"/> | HSC Module: CH1 Comparator Output0 Output |
| 16 | _02_CH1_CMPOUT1 | BIT U02.01.7 | <input type="checkbox"/> | HSC Module: CH1 Comparator Output1 Output |
| 17 | _02_CH1_ERR | BIT U02.01.E | <input type="checkbox"/> | HSC Module: CH1 Error Flag |
| 18 | _02_CH0_CNTEN | BIT U02.23.0 | <input type="checkbox"/> | HSC Module: CH0 Counter Enable(Level) Command |
| 19 | _02_CH0_PREEN | BIT U02.23.1 | <input type="checkbox"/> | HSC Module: CH0 Preset Enable(Edge) Command |
| 20 | _02_CH0_DWNCNT | BIT U02.23.2 | <input type="checkbox"/> | HSC Module: CH0 Inc/Dec Count Setting(Level) Command |
| 21 | _02_CH0_AUXEN | BIT U02.23.3 | <input type="checkbox"/> | HSC Module: CH0 Auxiliary Function Enable(Edge,Level) Com |
| 22 | _02_CH0_CMPEN | BIT U02.23.4 | <input type="checkbox"/> | HSC Module: CH0 Count Comparison Function Enable(Level) |
| 23 | _02_CH0_OUTEN | BIT U02.23.5 | <input type="checkbox"/> | HSC Module: CH0 Comparator Output Enable(Level) Commar |
| 24 | _02_CH0_EQORST | BIT U02.23.6 | <input type="checkbox"/> | HSC Module: CH0 Comp-Output 0 EQUAL Reset(Edge) Comr |

4.5 Registration of Special module variable

It is described to the method to register automatically variables[Global variables/Constants] of high speed counter module in XG5000 Project of XEC series.

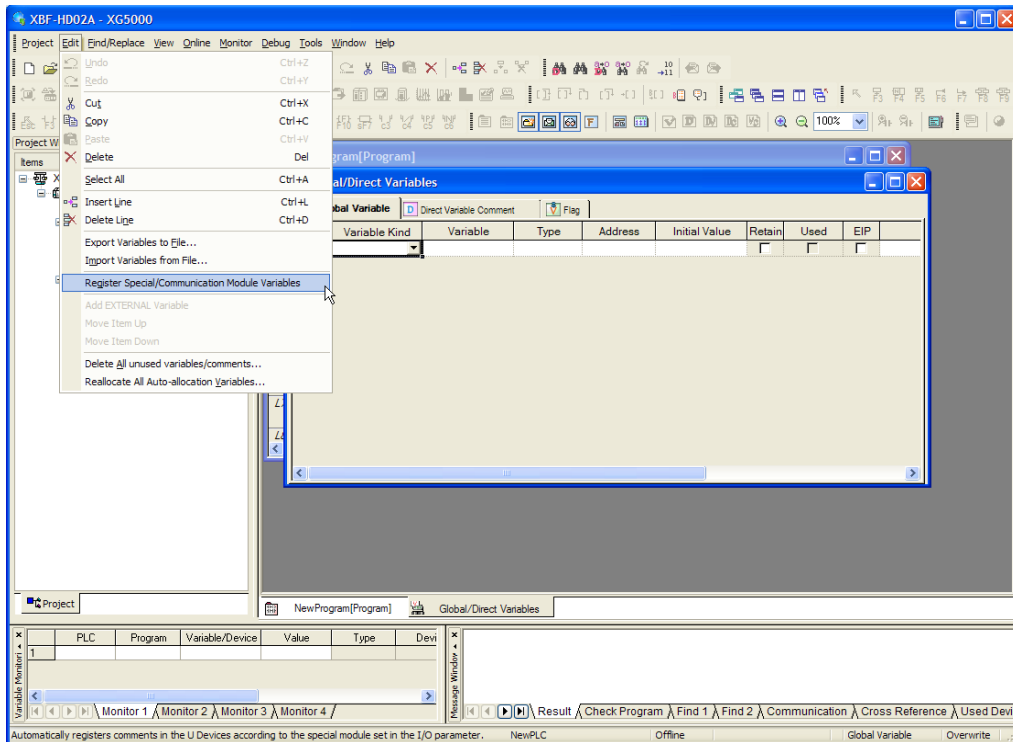
4.5.1 Global/Direct Variables screen

If you double click [Global/direct Variables] of [Project Window], variables and comments which was registered already are displayed.

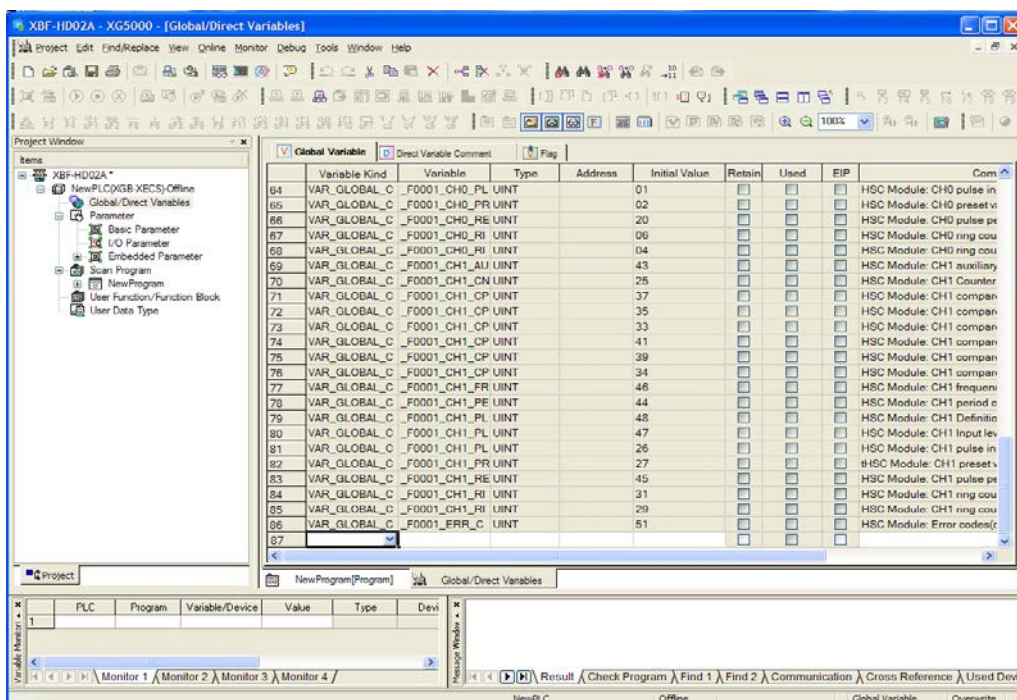
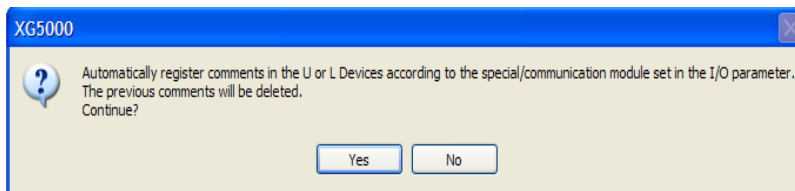


4.5.2 Registration of the special module variables

- 7) Select [Edit]→ [Register Special Module variables].
(First, [Global/Direct Variables] window has to be executed.)



8) Click [Yes] to complete the special module variables registration that is set at [I/O parameter setting]



Chapter 5 Internal Memory & I/O Signals

5.1 Internal Memory

High Speed Counter has the internal memory used for data "Write/Read" to/from PLC CPU. The commands used for "Write" from PLC CPU to High Speed Counter's internal memory are PUT and PUTP, and the commands used for "Read" are GET and GETP. Configuration of the internal memory and the data is as described below.

5.1.1 Configuration of the internal memory

(1) Input setting area

| Internal memory address | | Details | Data setting range |
|-------------------------|-----------|--|----------------------------|
| Channel 0 | Channel 1 | | |
| 0 | 25 | Select counter mode | 0 ~ 1 |
| 1 | 26 | Select pulse input mode | 0 ~ 7 |
| 2 | 27 | Set preset value | -2147483648~ 2147483648 |
| 3 | 28 | | |
| 4 | 29 | Minimum value of Ring count | -2147483648~ 2147483648 |
| 5 | 30 | | |
| 6 | 31 | Maximum value of Ring count | -2147483648~ 2147483648 |
| 7 | 32 | | |
| 8 | 33 | Select OUT 0 type | 0 ~ 6 |
| 9 | 34 | Select OUT 1 type | 0 ~ 6 |
| 10 | 35 | OUT0 compared based value (single-compared)/ minimum setting value (section compared) | -2147483648~ 2147483648 |
| 11 | 36 | | |
| 12 | 37 | OUT0 compared based value maximum setting value (section- compared) | -2147483648~ 2147483648 |
| 13 | 38 | | |
| 14 | 39 | OUT1 compared based value (single-compared)/ minimum setting value (section-compared) | -2147483648~ 2147483648 |
| 15 | 40 | | |
| 16 | 41 | OUT1 compared based value maximum setting value (section-compared) | -2147483648~ 2147483648 |
| 17 | 42 | | |
| 18 | 43 | Select auxiliary mode | 0 ~ 6 |
| 19 | 44 | Sampling count time setting or Revolution/Unit time setting | 0 ~ 60000 |
| 20 | 45 | Revolutions per hour function, pulses per revolution input | 0 ~ 60000 |
| 21 | 46 | Select frequency display mode | 0 ~ 3 |
| 22 | 47 | Select Low Active or High Active | 0 ~ 1 |
| 23 | 48 | Define output status when PLC CPU stops | 0 ~ 1 |

(2) Output area of error code

| Internal memory address | | Details | Command |
|-------------------------|-----------|--|---------|
| Channel 0 | Channel 1 | | |
| 51 | | Error code (channel 0, channel 1 common) | GET |

5.1.2 Details & Data Configuration

(1) Count mode setting (CH0: 0 address, CH1: 25 address)

| Setting value | Details |
|---------------|--------------|
| 0 | Linear count |
| 1 | Ring count |

(2) Pulse input mode setting (CH0: 1 address, CH1: 26 address)

| Setting value | Details |
|---------------|------------------------------------|
| 0 | 2-phase 1-multiplication |
| 1 | 2-phase 2-multiplication |
| 2 | 2-phase 4-multiplication |
| 3 | CW / CCW |
| 4 | 1-phase, 1-input, 1-multiplication |
| 5 | 1-phase, 1-input, 2-multiplication |
| 6 | 1-phase, 2-input, 1-multiplication |
| 7 | 1-phase, 2-input, 2-multiplication |

(3) Comparison output types (CH0: 8, 9 address, CH1: 33, 34 address)

| Setting value | Details |
|---------------|---|
| 0 | If present value < compared reference value, OUT□ is On |
| 1 | If present value =< compared reference value, OUT□ is On |
| 2 | If present value = compared reference value, OUT□ is On |
| 3 | If present value >= compared reference value, OUT□ is On |
| 4 | If present value > compared reference value, OUT□ is On |
| 5 | If compared minimum value =< present value =< compared maximum value, OUT□ is On |
| 6 | If compared minimum value >= present value, present value >= compared maximum value, OUT□ is On |

※ Here, □ means 0 or 1.

(4) Auxiliary mode setting (CH0: 18 address, CH1: 43 address)

| Setting value | Details |
|---------------|----------------------------|
| 0 | Auxiliary mode is not used |
| 1 | Count Clear |
| 2 | Count Latch |
| 3 | Sampling Count |
| 4 | Input Frequency Measure |
| 5 | Revolution/Unit time |
| 6 | Count Disable |

(5) Frequency mode setting (CH0: 21 address, CH1: 46 address)

| Setting value | Details |
|---------------|------------------------------|
| 0 | 1 Hz unit displayed |
| 1 | 10 Hz unit displayed |
| 2 | 100 Hz unit displayed |
| 3 | 1000 unit displayed (= 1kHz) |

(6) Input pulse level setting (CH0: 22 address, CH1: 47 address)

| Setting value | Details |
|---------------|----------------------|
| 0 | Output disable |
| 1 | Output kept as it is |

(7) Output status setting at PLC stop (CH0: 23 address, CH1 : 48 address)

| Setting value | Details |
|---------------|----------------------|
| 0 | Output disable |
| 1 | Output kept as it is |

5.2 I/O Signals

(1) Input setting area

| Channel 0 | Channel 1 | Details |
|-----------------|-----------------|----------------------------|
| Uxy.02 ~ Uxy.03 | Uxy.12 ~ Uxy.13 | Present count value |
| Uxy.04 ~ Uxy.05 | Uxy.14 ~ Uxy.15 | Latch count value |
| Uxy.06 ~ Uxy.07 | Uxy.16 ~ Uxy.17 | Sampling count value |
| Uxy.08 ~ Uxy.09 | Uxy.18 ~ Uxy.19 | Input frequency value |
| Uxy.10 ~ Uxy.11 | Uxy.20 ~ Uxy.21 | Revolutions per hour value |

※ Here, 'xy' stands for the position High Speed Counter module is installed on. (xy => x:base no., y:slot no.)

(2) Operation status display and Operation command area

| PLC <- High Speed Counter(Input) | | | PLC -> High Speed Counter(Output) | |
|----------------------------------|----------|----------------------------|-----------------------------------|--|
| CH | Signal | Details | Signal | Details |
| CH0 | Uxy.00.0 | Up/Down count status | Uxy.23.0 | Count operation enable signal (Level) |
| | Uxy.00.1 | External preset input flag | Uxy.23.1 | Preset enable signal (edge) |
| | Uxy.00.2 | - | Uxy.23.2 | Up/Down count setting signal (Level) |
| | Uxy.00.3 | Carry flag | Uxy.23.3 | Auxiliary function use command(edge/ level) |
| | Uxy.00.4 | Borrow flag | Uxy.23.4 | Compared function use command(Level) |
| | Uxy.00.5 | Flag during auxiliary mode | Uxy.23.5 | Compared output external terminal enabled signal(Level) |
| | Uxy.00.6 | OUT0 output signal | Uxy.23.6 | OUT0 coincidence output reset signal (Edge) |
| | Uxy.00.7 | OUT1 output signal | Uxy.23.7 | OUT1 coincidence output reset signal (Edge) |
| | Uxy.00.8 | - | Uxy.23.8 | - |
| | Uxy.00.9 | - | Uxy.23.9 | - |
| | Uxy.00.A | - | Uxy.23.A | Carry/Borrow reset signal (Edge) |
| | Uxy.00.B | - | Uxy.23.B | Preset external input setting signal(Level) |
| | Uxy.00.C | - | Uxy.23.C | External auxiliary function selection (Level) |
| | Uxy.00.D | - | Uxy.23.D | External input preset flag reset signal(Edge) |
| | Uxy.00.E | Error flag | Uxy.23.E | - |
| | Uxy.00.F | Module Ready | Uxy.23.F | - |
| CH1 | Uxy.01.0 | Up/Down count status | Uxy.24.0 | Count operation enable signal (Level) |
| | Uxy.01.1 | External preset input flag | Uxy.24.1 | Preset enable signal (edge) |
| | Uxy.01.2 | - | Uxy.24.2 | Up/Down count setting signal (Level) |
| | Uxy.01.3 | Carry flag | Uxy.24.3 | Auxiliary function use command (edge/ level) |
| | Uxy.01.4 | Borrow flag | Uxy.24.4 | Compared function use command (Level) |
| | Uxy.01.5 | Flag during auxiliary mode | Uxy.24.5 | Compared output external terminal enabled signal (Level) |
| | Uxy.01.6 | OUT0 output signal | Uxy.24.6 | OUT0 coincidence output reset signal (Edge) |
| | Uxy.01.7 | OUT1 output signal | Uxy.24.7 | OUT1 coincidence output reset signal (Edge) |
| | Uxy.01.8 | - | Uxy.24.8 | - |
| | Uxy.01.9 | - | Uxy.24.9 | - |
| | Uxy.01.A | - | Uxy.24.A | Carry/Borrow reset signal (Edge) |
| | Uxy.01.B | - | Uxy.24.B | Preset external input setting signal (Level) |
| | Uxy.01.C | - | Uxy.24.C | External auxiliary function selection (Level) |
| | Uxy.01.D | - | Uxy.24.D | External input preset flag reset signal(Edge) |
| | Uxy.01.E | Error flag | Uxy.24.E | - |
| | Uxy.01.F | - | Uxy.24.F | - |

※Here, the size of Uxy.ab is 1 word and the size of Uxy.ab.i is 1 bit.

Chapter 6 Global Constant and Global Variable

It is described to global constant and global variable for XEC series.

Remark

It is terminology for XGB IEC type PLC series to Global constant(VAL_GLOBAL_CONST) and Global variable(VAL_GLOBAL). In XBM/XBC series, global constant is equivalent to the internal memory, global variable is to input/output signal(U device).

6.1 Global Constant

CPU module of XEC series are sharing the global constant area for the data transmission and receiving. It is PUT_### for the function block to transmit the data form XEC CPU module to the global constant area of the high speed counter module, the receiving function block is GET_###. About PUT_###, GET_### function block, please refer to the 'chapter 7 Programming'.

6.1.1 The configuration of Global Constant

1. Input data

| Channel 0 Channel 1 | Const Value | Contents | Data setting range |
|--|-------------|--|-----------------------------|
| _Fxy_CH0_CNT_MODE _Fxy_CH1_CNT_MODE | 00 25 | Count types | 0 or 1 |
| _Fxy_CH0_PLS_MODE _Fxy_CH1_PLS_MODE | 01 26 | Pulse input types | 0 ~ 7 |
| _Fxy_CH0_PRESET _Fxy_CH1_PRESET | 02 27 | Preset value | -2147483648 ~ 2147483647 |
| _Fxy_CH0_RING_MIN _Fxy_CH1_RING_MIN | 04 29 | Ring count minimum value | -2147483648 ~ 2147483647 |
| _Fxy_CH0_RING_MAX _Fxy_CH1_RING_MAX | 06 31 | Ring count maximum value | -2147483648 ~ 2147483647 |
| _Fxy_CH0_CP0_MODE _Fxy_CH1_CP0_MODE | 08 33 | Type of comparison output 0 | 0 ~ 6 |
| _Fxy_CH0_CP1_MODE _Fxy_CH1_CP1_MODE | 09 34 | Type of comparison output 1 | 0 ~ 6 |
| _Fxy_CH0_CP0_MIN _Fxy_CH1_CP0_MIN | 10 35 | Comparison reference value of comparison output 0(single comparison)/minimum value(section comparison) | -2147483648 ~ 2147483647 |
| _Fxy_CH0_CP0_MAX _Fxy_CH1_CP0_MAX | 12 37 | Maximum value of comparison output 0 (section comparison) | -2147483648 ~ 2147483647 |
| _Fxy_CH0_CP1_MIN _Fxy_CH1_CP1_MIN | 14 39 | Comparison reference value of comparison output 1(single comparison)/minimum value(section comparison) | -2147483648 ~ 2147483647 |
| _Fxy_CH0_CP1_MAX _Fxy_CH1_CP1_MAX | 16 41 | Maximum value of comparison output 1 (section comparison) | -2147483648 ~ 2147483647 |
| _Fxy_CH0_AUX_MODE _Fxy_CH1_AUX_MODE | 18 43 | Type of additional function | 0 ~ 6 |
| _Fxy_CH0_PERIOD _Fxy_CH1_PERIOD | 19 44 | Setting time of sampling count or of setting time "revolution per unit time" | 0 ~ 60000 |
| _Fxy_CH0_REV_UNIT _Fxy_CH1_REV_UNIT | 20 45 | Pulse per 1 rotation of "revolution per unit time" | 0 ~ 60000 |
| _Fxy_CH0_FREQ_MODE _Fxy_CH1_FREQ_MODE | 21 46 | Frequency display unit of "input frequency measure" | 0 ~ 3 |
| _Fxy_CH0_PLS_LVL _Fxy_CH1_PLS_LVL | 22 47 | Select Low Active or High Active | 0 ~ 1 |
| _Fxy_CH0_PLCSTOP_OUT_EN _Fxy_CH1_PLCSTOP_OUT_EN | 23 48 | Define output status when PLC CPU stops | 0 ~ 1 |

| Remark |
|--|
| (1) 'Fxy' : 'x' means the base number of the high speed counter module, 'y' means the slot number of it. |
| (2) Constant value can not be modified, because it is the address of input data area. |
| (3) Constant value is the same as the internal memory address of XBM/XBC series. |

2. Output area of the error code

| Channel 0 Channel 1 | Constant value | Contents | Function Block |
|------------------------|----------------|--|----------------|
| _Fxy_ERR_CODE | 51 | Error code (channel 0, channel 1 common) | GET_### |

6.1.2 The Configuration and Contents of Data

1. Count types (channel 0: _Fxy_CH0_CNT_MODE, channel 1: _Fxy_CH1_CNT_MODE)

| Setting value | Contents |
|---------------|--------------|
| 0 | Linear count |
| 1 | Ring count |

2. Pulse input types (channel 0: _Fxy_CH0_PLS_MODE, channel 1: _Fxy_CH1_PLS_MODE)

| Setting value | Contents |
|---------------|--------------------------------|
| 0 | 2 phase 1 multiplier |
| 1 | 2 phase 2 multiplier |
| 2 | 2 phase 4 multiplier |
| 3 | CW/CCW |
| 4 | 1 phase /1 input /1 multiplier |
| 5 | 1 phase /1 input /2 multiplier |
| 6 | 1 phase /2 input /1 multiplier |
| 7 | 1 phase /2 input /2 multiplier |

3. Comparison output types (channel 0: _Fxy_CH0_CP□_MODE, channel 1: _Fxy_CH1_CP□_MODE)

| Setting value | Contents |
|---------------|---|
| 0 | In case of current count value < comparison reference value, OUT□ is On |
| 1 | In case of current count value ≤ comparison reference value, OUT□ is On |
| 2 | In case of current count value = comparison reference value, OUT□ is On |
| 3 | In case of current count value ≥ comparison reference value, OUT□ is On |
| 4 | In case of current count value > comparison reference value, OUT□ is On |
| 5 | In case of comparison minimum value ≤ current count value ≤ comparison maximum value, OUT□ is On |
| 6 | In case of comparison minimum value ≥ current count value, current count value ≤ comparison maximum value, OUT□ is On |

※ Here, □ means 0 or 1.

4. Additional function types (channel 0: _Fxy_CH0_AUX_MODE, channel 1: _Fxy_CH1_AUX_MODE)

| Setting value | Contents |
|---------------|----------------------------------|
| 0 | Not used |
| 1 | Count clear |
| 2 | Count latch |
| 3 | Sampling count |
| 4 | Input frequency measure |
| 5 | Revolution measure per unit time |
| 6 | Count disable |

5. The frequency display unit of input frequency measure
 (channel 0: `_Fxy_CH0_FREQ_MODE`, channel 1: `_Fxy_CH1_FREQ_MODE`)

| Setting value | Contents |
|---------------|---------------|
| 0 | 1Hz |
| 1 | 10Hz |
| 2 | 100Hz |
| 3 | 1000Hz(=1kHz) |

6. Setting area of comparison output status

| Constant value | Contents | Default |
|----------------|-------------|------------|
| 0 | Low Active | Low Active |
| 1 | High Active | |

7. When XGB CPU module is STOP mode, comparison output status
 (channel 0: `_Fxy_CH0_PLCSTOP_OUT_EN`, channel 1: `_Fxy_CH1_PLCSTOP_OUT_EN`)

| Constant value | Contents |
|----------------|--------------------|
| 0 | Output disable |
| 1 | Ouput preservation |

6.2 Global Variable

1. The range of output data

| Channel 0 | Channel 1 | Contents |
|-------------|-------------|--------------------------|
| _xy_CH0_CNT | _xy_CH1_CNT | Current count value |
| _xy_CH0_FRQ | _xy_CH1_FRQ | Count latch |
| _xy_CH0_LTH | _xy_CH1_LTH | Sampling count |
| _xy_CH0_RNG | _xy_CH1_RNG | Input frequency count |
| _xy_CH0_RPU | _xy_CH1_RPU | Revolution per unit time |

Remark

- (1) Here, 'x' means the base number which the high speed counter module is mounted, and 'y' means the slot number of it.
- (2) It is double word (dword) to the data type of the range of output data.

2. The display of operation status and the range of operation command

| Channel | Output (CPU Module ← High speed counter) | | Input (CPU Module → High speed counter) | |
|----------|--|-------------------------------------|--|--|
| | Status | Contents | Command | Contents |
| Channel0 | _xy_CH0_DN | Count Up/Down status | _xy_CH0_CNTEN | Count enable (level) |
| | _xy_CH0_EXTPRE | Input detection of external preset | _xy_CH0_PREEN | Preset enable (edge) |
| | _xy_CH0_CRY | Carry detection | _xy_CH0_DWNCNT | Up/Down count selection (level) |
| | _xy_CH0_BRW | Borrow detection | _xy_CH0_AUXEN | Additional function enable(level/edge) |
| | _xy_CH0_AUXING | In operation of additional function | _xy_CH0_CMPEN | Comparison enable (level) |
| | _xy_CH0_CMPOUT0 | The status of comparison output 0 | _xy_CH0_OUTEN | Comparison output enable (level) |
| | _xy_CH0_CMPOUT1 | The status of comparison output 1 | _xy_CH0_EQ0RST | Equal (=) reset of comparison output 0 (edge) |
| | _xy_CH0_ERR | Error detection | _xy_CH0_EQ1RST | Equal (=) reset of comparison output 1 (edge) |
| | _xy_RDY | Module ready | _xy_CH0_CRTBRW_RST | Carry/Borrow reset (edge) |
| | - | - | _xy_CH0_EXTPST_EN | External preset selection (edge) |
| | - | - | _xy_CH0_EXTAUX_EN | Selection of external additional function (edge) |
| - | - | _xy_CH0_EXTPST_RST | Detection reset of external preset(edge) | |
| Channel1 | _xy_CH1_DN | Count Up/Down status | _xy_CH1_CNTEN | Count enable (level) |
| | _xy_CH1_EXTPRE | Input detection of external preset | _xy_CH1_PREEN | Preset enable (edge) |
| | _xy_CH1_CRY | Carry detection | _xy_CH1_DWNCNT | Up/Down count selection (level) |
| | _xy_CH1_BRW | Borrow detection | _xy_CH1_AUXEN | Additional function enable(level/edge) |
| | _xy_CH1_AUXING | In operation of additional function | _xy_CH1_CMPEN | Comparison enable (level) |
| | _xy_CH1_CMPOUT0 | The status of comparison output 0 | _xy_CH1_OUTEN | Comparison output enable (level) |
| | _xy_CH1_CMPOUT1 | The status of comparison output 1 | _xy_CH1_EQ0RST | Equal (=) reset of comparison output 0 (edge) |
| | _xy_CH1_ERR | Error detection | _xy_CH1_EQ1RST | Equal (=) reset of comparison output 1 (edge) |
| | - | - | _xy_CH1_CRTBRW_RST | Carry/Borrow reset (edge) |
| | - | - | _xy_CH1_EXTPST_EN | External preset selection (edge) |
| | - | - | _xy_CH1_EXTAUX_EN | Selection of external additional function (edge) |
| - | - | _xy_CH1_EXTPST_RST | Detection reset of external preset(edge) | |

Remark

It is bool type to the data type of the display of operation status and the range of operation command.

Chapter 7 Programming

Here describes how to program by using instruction (XBM/XBC series) or function block (XEC) at scan program of XG5000

7.1 Instruction and Function Block

Here describes instruction and function block to read and write data of HSC module at XGB CPU module.

Remark

There is difference on terminology used in XBM/XBC series and XEC series. The following table indicates the relation of terminology used in HSC module.



| XBM/XBC series | XEC series |
|-----------------------|-----------------|
| Instruction | Function Block |
| Internal memory | Global constant |
| I/O signal (U device) | Global variable |
| Device | Variable |
| F area | Flag |

7.1.1 Instruction of XBM/XBC series

1. GET/GETP instruction

It is an instruction used to read the details of High Speed counter module's internal memory to PLC CPU. The read data can be saved on PLC CPU memory (except F area).

(1) Operation of GET/GETP instruction

| | | |
|------|---|-------|
| GET | Always executed with execution condition On () | Level |
| GETP | Executed with execution condition of operation start () | Edge |

(2) Configuration of GET/GETP Instruction

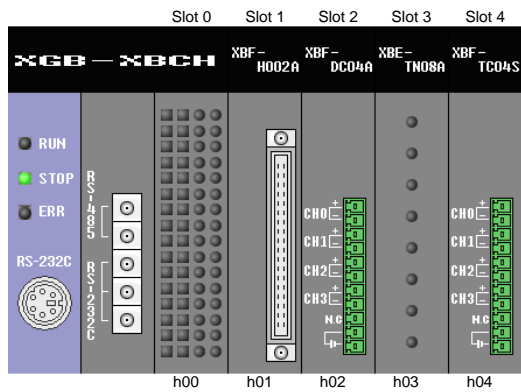
Execution condition



| Type | Description | Area Available | Type |
|------|--|-------------------------|----------------------------|
| n1 | Slot No. the special module is installed on | Integer | Hexadecimal is recommended |
| n2 | Start address of special module's operation parameters setting area to read data | Integer | |
| n3 | Device's start address with saved data to read | M, P, K, L, T, C, D, #D | |
| n4 | Number of words data to read | Integer | |

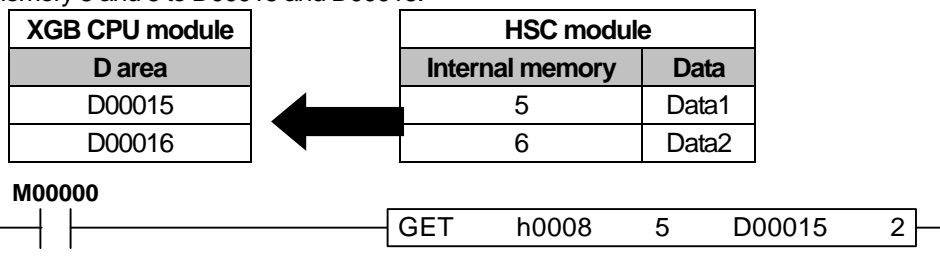
(a) How to set base and slot number

1) Basic base



(3) Use of GET/GETP instruction

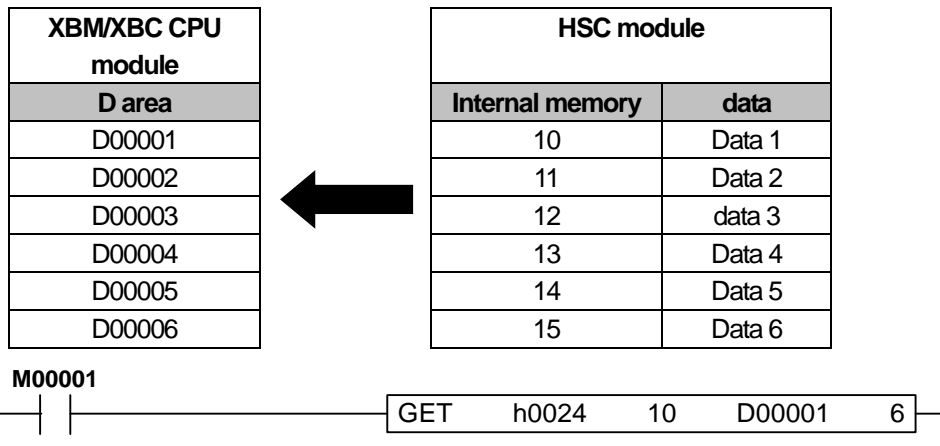
(a) HSC module is installed at slot 8 of basic base and While M00000 is On, it transmits the data (data1, data2) of internal memory 5 and 6 to D00015 and D00016.



(b) It transmits data at rising edge of M00000.




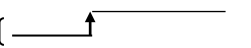
(c) HSC module is installed at slot 4 of extension base stage 2. While M00001 is on, it transmits data of internal memory 10 ~ 15 to D00001 ~ D00006.



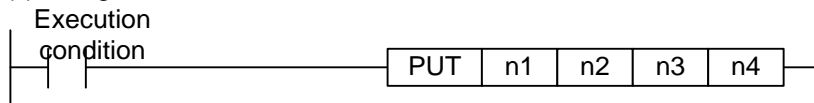
2. PUT/PUTP instruction

Instruction to write data from XGB CPU module to internal memory area

(1) PUT/PUTP instruction

| | | |
|------|---|-------|
| PUT | Always executed with execution condition On () | Level |
| PUTP | Executed with execution condition of operation Start () | Edge |

(2) Configuration of PUT/PUTP instruction



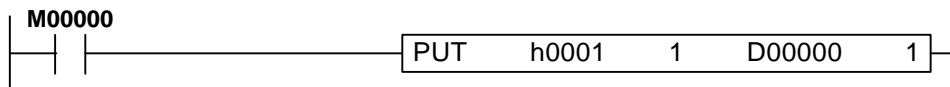
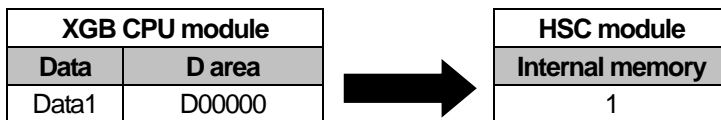
| Type | Description | Available area | Reference |
|------|--|-------------------------|----------------------------|
| n1 | Slot No. the special module is installed on | Integer | Hexadecimal is recommended |
| n2 | Start address of special module's internal memory to write data. | Integer | |
| n3 | Device's start address or integer with saved data to write. | M, P, K, L, T, C, D, #D | |
| n4 | Number of words data to write | Integer | |

(a) Base and slot number setting method

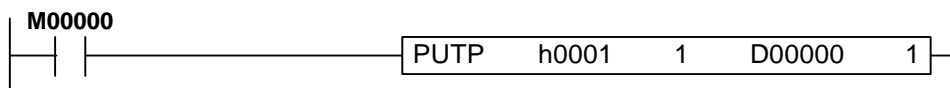
It is same with GET/GETP instruction

(3) Use of PUT/PUTP instruction

(a) HSC module is equipped at 1 slot of basic base. While M0000 is On, it transmits data of D00000 (data1) to internal memory address 1



(b) It transmits data at the rising edge of M0000



7.1.2 Function Block of XEC

1. GET function block

Function Block to read data of Global constant area at XEC CPU module. That data can be saved at variable area of XEC CPU module (Except flag area).

(1) GET function block configuration

| Function block | | Classification | Variable | Description |
|----------------|--------|----------------|-----------------------------------|-------------|
| | Input | REQ | Request execution | |
| | | BASE | Base where HSC module is equipped | |
| | | SLOT | Slot where HSC module is equipped | |
| | | MADDR | Global constant area | |
| | Output | DONE | Function Block execution status | |
| | | STAT | Error information | |
| | | DATA | Output data | |

Remark

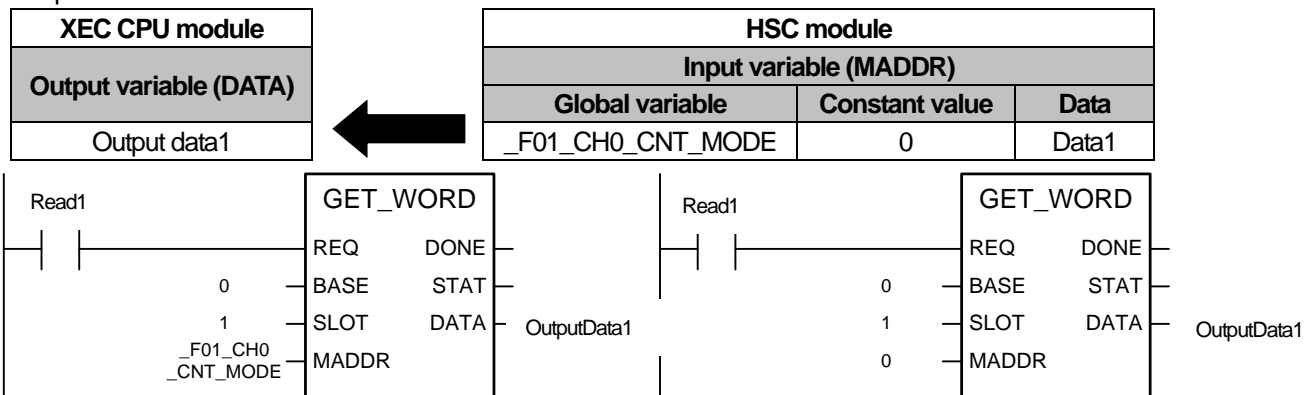
- (1) '###' means that WORD, DWORD, INT, UINT, DINT, UDINT type is available.
- (2) For 'REQ', edge signal or level signal is available.
- (3) For 'MADDR', Global constant or integer is available.
- (4) 'Output data' is data read from Global constant.
- (5) In case of XGR, HSC module should be equipped at extension base.

Function block is classified as follows according to output variable type.

| Function Block | Output variable type | Operation description |
|----------------|----------------------|---|
| GET_WORD | WORD | Reads WORD data from Global constant area (MADDR). |
| GET_DWORD | DWORD | Reads DWORD data from Global constant area (MADDR). |
| GET_INT | INT | Reads INT data from Global constant area (MADDR). |
| GET_UINT | UINT | Reads UINT data from Global constant area (MADDR). |
| GET_DINT | DINT | Reads DINT data from Global constant area (MADDR). |
| GET_UDINT | UDINT | Reads UDINT data from Global constant area (MADDR). |

(2) Use of GET function block

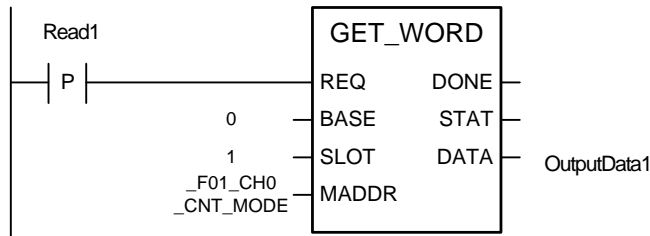
(a) HSC module is equipped at slot 8 of basic base. While 'Read1' is on, it transmits data of '_F01_CH0_CNT_MODE' to 'Output data1'



Remark

- (1) Results of above two examples are same.
- (2) For detail of Global variable, refer to XG5000 user manual.

(b) It transmits data at the rising edge of execution condition



2. PUT function block

Function Block to write the data into Global constant area at XEC CPU module.

(1) Configuration of PUT function block

| Function Block | | classification | Variable | Description |
|----------------|-------|----------------|-----------------------------------|---------------------------------|
| | Input | REQ | Request execution | |
| | | BASE | Base where HSC module is equipped | |
| | | SLOT | Slot where HSC module is equipped | |
| | | MADDR | Global constant area | |
| | | DATA | Input data | |
| | | Output | DONE | Function block execution status |
| | | | STAT | Error information |

Remark

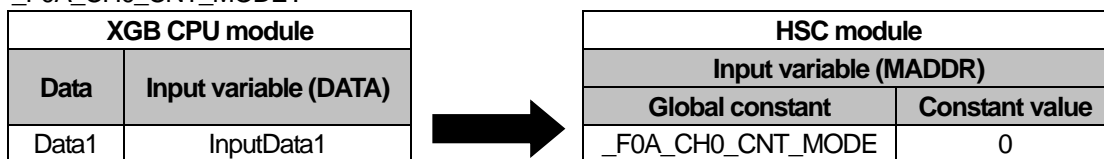
- (1) '###' means that WORD, DWORD, INT, UINT, DINT, UDINT type is available.
- (2) For 'REQ', edge signal or level signal is available.
- (3) For 'MADDR', Global constant or integer is available.
- (4) 'Output data' is data read from Global constant.
- (5) In case of XGR, HSC module should be equipped at extension base.

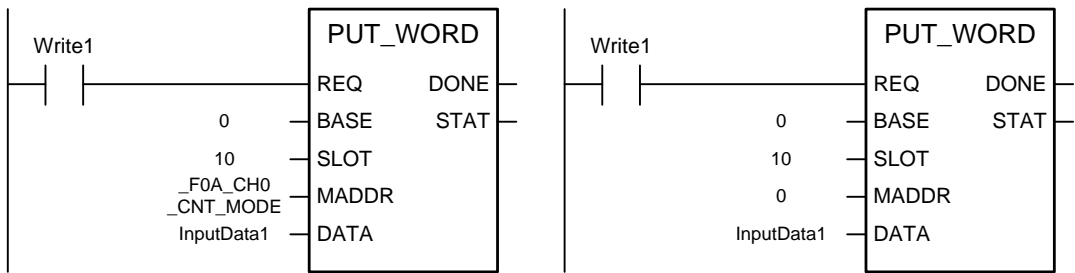
Function block is classified as follows according to output variable type.

| Function block | Input variable type | Operation description |
|----------------|---------------------|--|
| PUT_WORD | WORD | Writes WORD data to Global constant area (MADDR). |
| PUT_DWORD | DWORD | Writes DWORD data to Global constant area (MADDR). |
| PUT_INT | INT | Writes INT data to Global constant area (MADDR). |
| PUT_UINT | UINT | Writes UINT data to Global constant area (MADDR). |
| PUT_DINT | DINT | Writes DINT data to Global constant area (MADDR). |
| PUT_UDINT | UDINT | Writes UDINT data to Global constant area (MADDR). |

(2) Use of PUT function block

(a) HSC module is equipped at slot 10 of basic base. While 'Write1' is on, it transmits data (Data1) of 'InputData1' to '_F0A_CH0_CNT_MODE'.

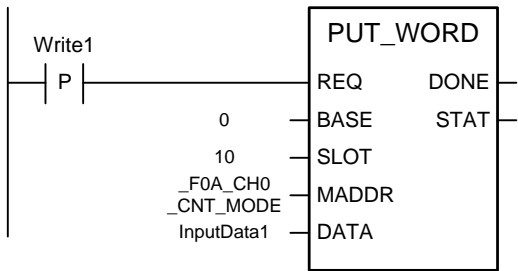




Remark

(1) Operations of above two examples are same.
 (2) For detail of Global variable, refer to 'XG5000 user manual'.

(b) It transmits data at the rising edge of execution condition



7.2 Program

1. XGB system is explained referring to the following system HSC module is equipped at slot 1 of basic base.

7.2.1 Count mode setting

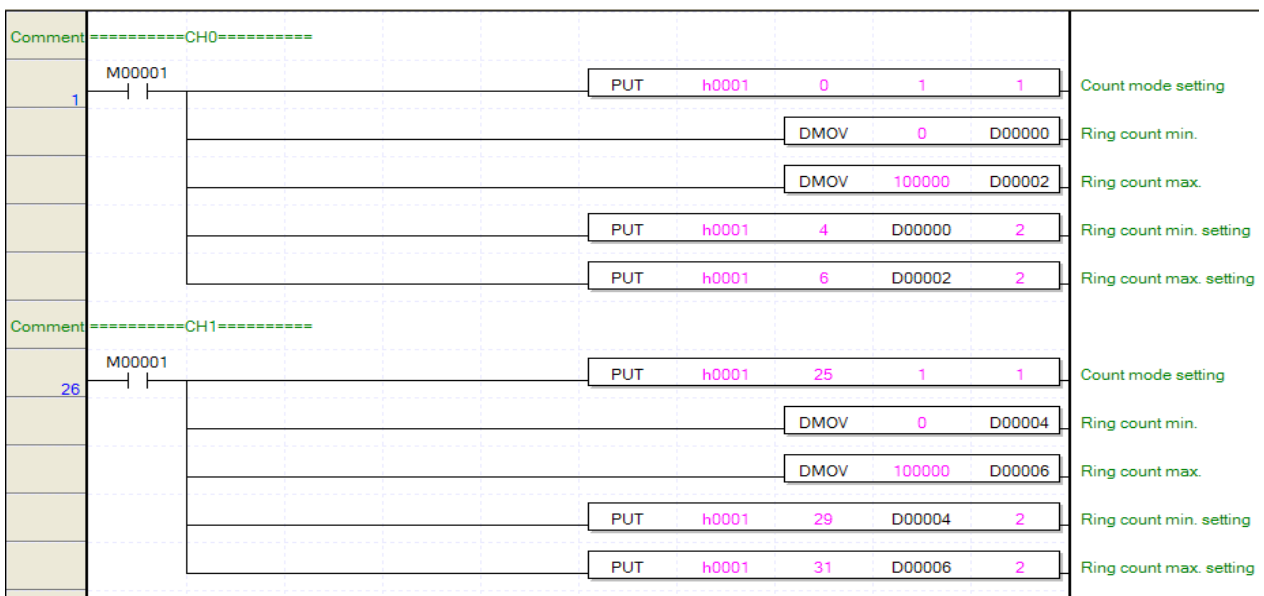
Example explaining how to set Ring Count Min. and Max. As for setting method by 'I/O Parameter', refer to Chapter 4.

1. Setting content

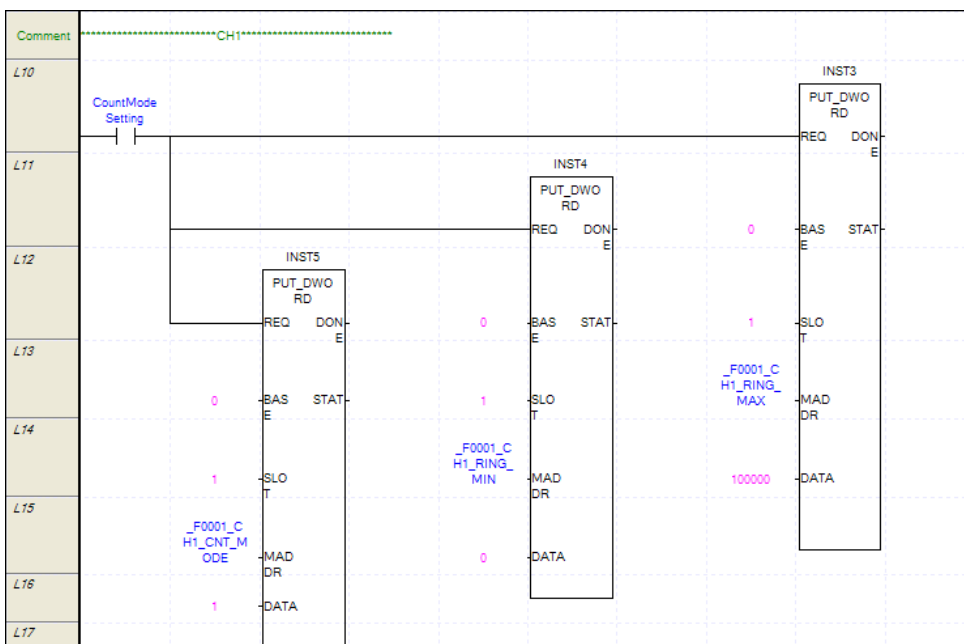
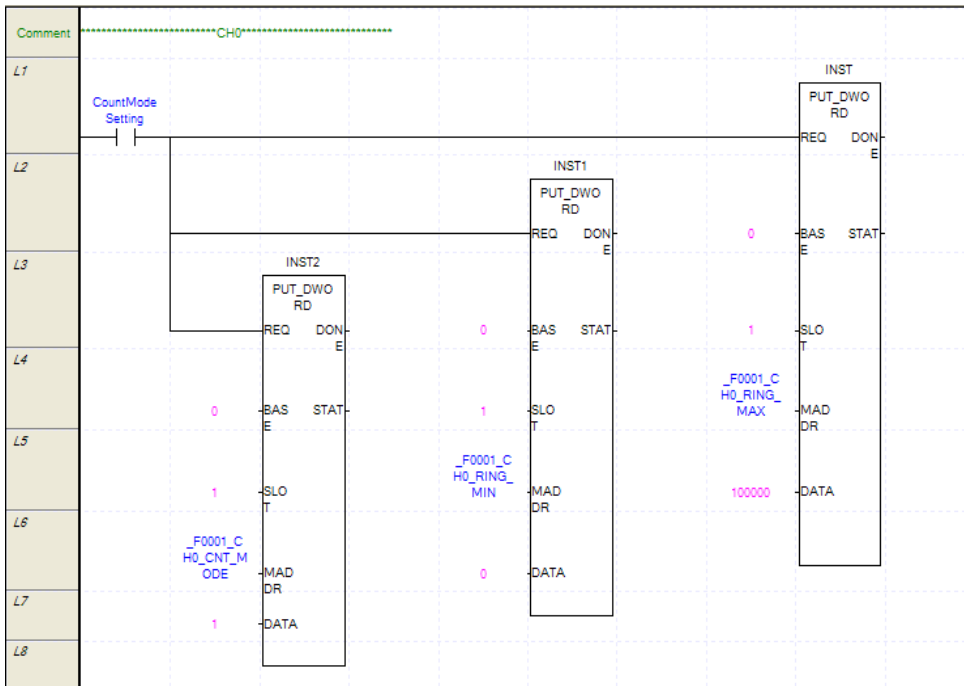
| Parameter | CH0 | CH1 |
|-------------------|-----------------|-----------------|
| Count mode | 1: Ring counter | 1: Ring counter |
| Ring counter min. | 0 | 0 |
| Ring counter max. | 100000 | 100000 |

2. Program

(1) Scan program of XBM/XBC series

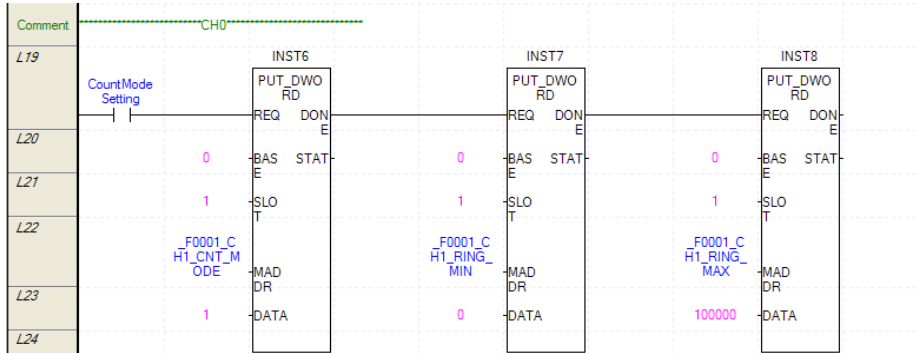


(2) Scan program of XECseries.

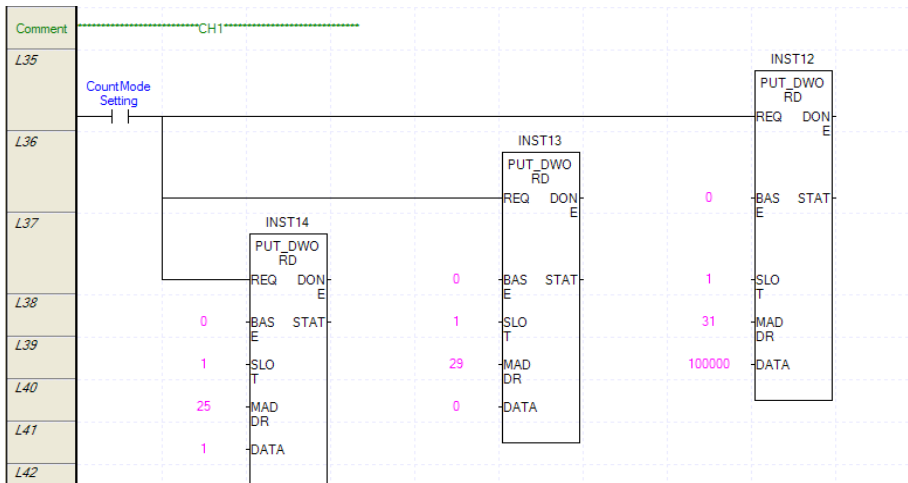
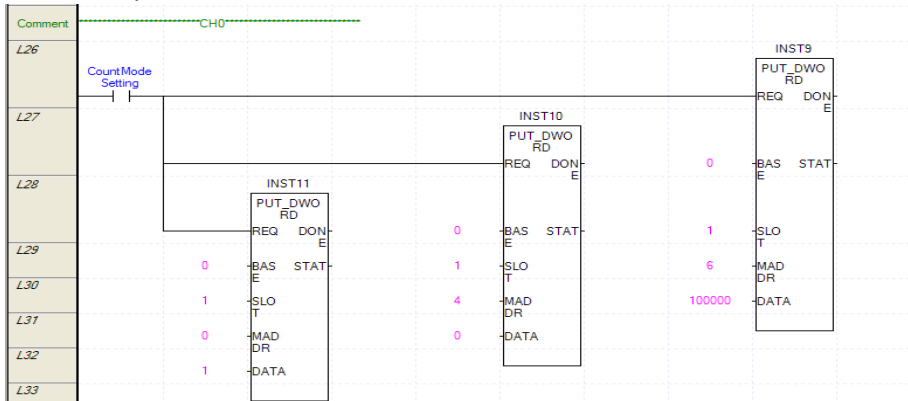


Remark

- (1) Since instruction PUT (Function Block PUT_DWORD) is used at scan program example of XBM/XBC (XEC) series, while input contact point is On, data is transmitted into HSC module. So, if data is changed, it is transmitted into HSC module automatically.
- (2) If you program as follows, its operation become different with program example.



- (a) If input contact point of function block is on and execution of function block is complete, 'DONE' becomes 1. Namely, front function block and back function block are not executed simultaneously and from left to right, they are executed sequentially.
- (b) If input variable of function block is set incorrectly and an error occurs, 'DONE' doesn't become 1. Namely, if an error occurs at the front function block, the back function block is not executed.
- (3) Integer can be inserted into 'MADDR' instead of a global constant. The operation of the following program is the same as that of the front example.



- (a) For integer corresponding to global constant, refer to Chapter 6.
- (b) On the next program example, scan program example using integer (constant) is omitted.

7.2.2 Pulse input mode setting

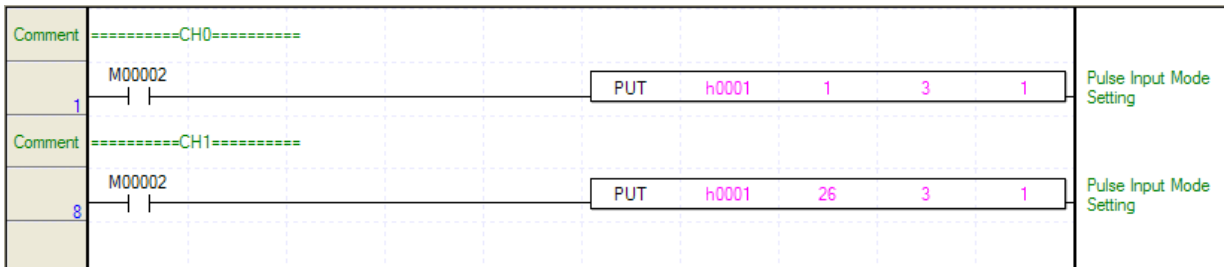
Program example setting pulse input mode

1. Setting contents

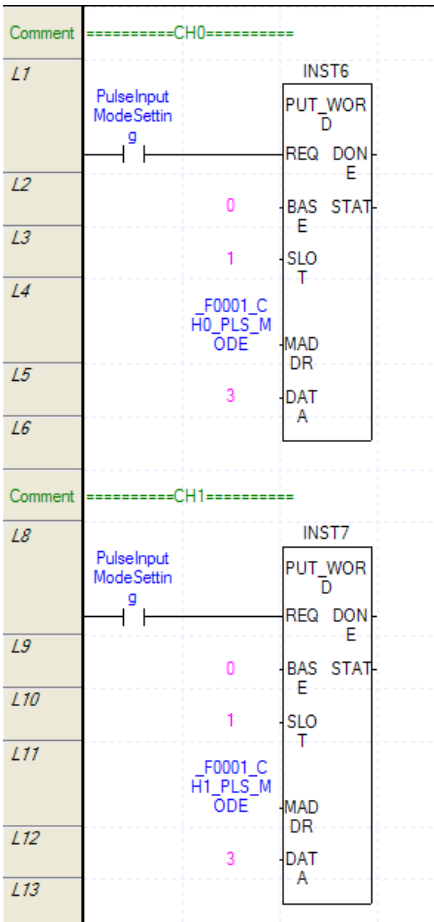
| Parameter | CH0 | CH1 |
|------------------|-----------|-----------|
| Pulse input mode | 3: CW/CCW | 3: CW/CCW |

2. Program

(1) Scan program of XBM/XBC series



(2) Scan program of XECseries

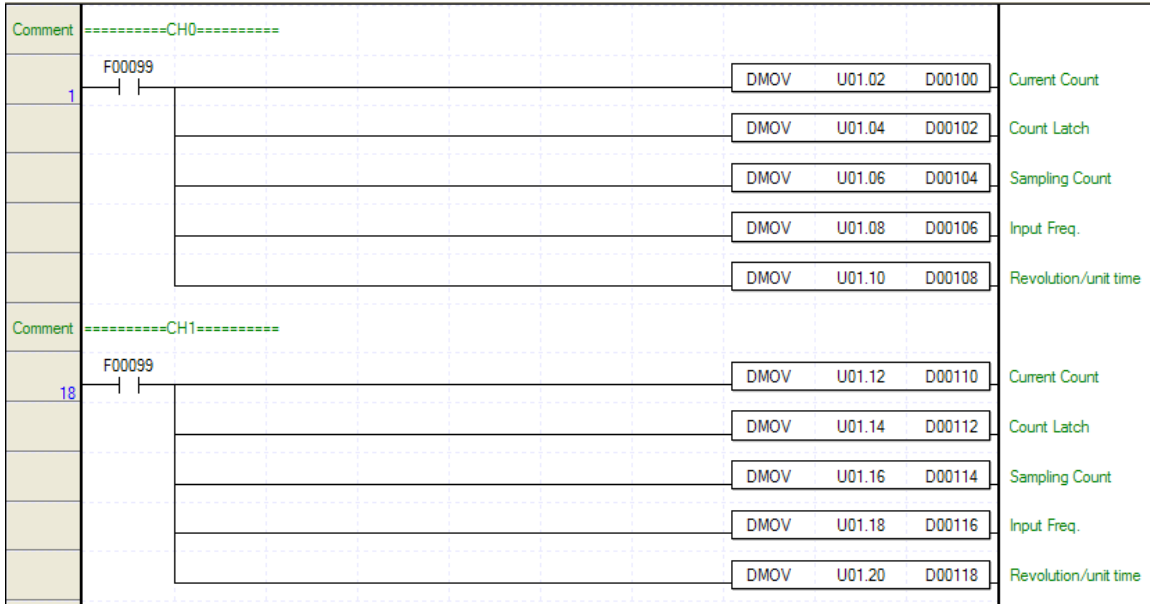


7.2.3 Counter check

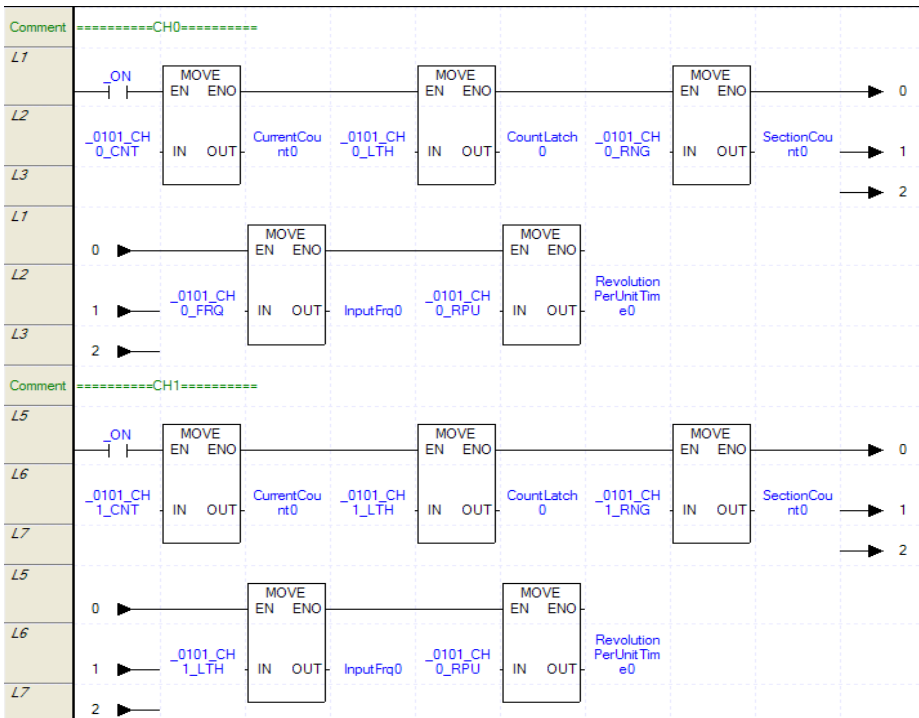
Program example checking current counter and operation by auxiliary function.

1. Program

(1) Scan program of XBM/XBC series



(2) Scan program of XECseries



Remark

In Scan program of XGI/XGR, the number of cell is changed by using icon or 'Change Columns' of 'View'

7.2.4 Preset value setting and enable preset

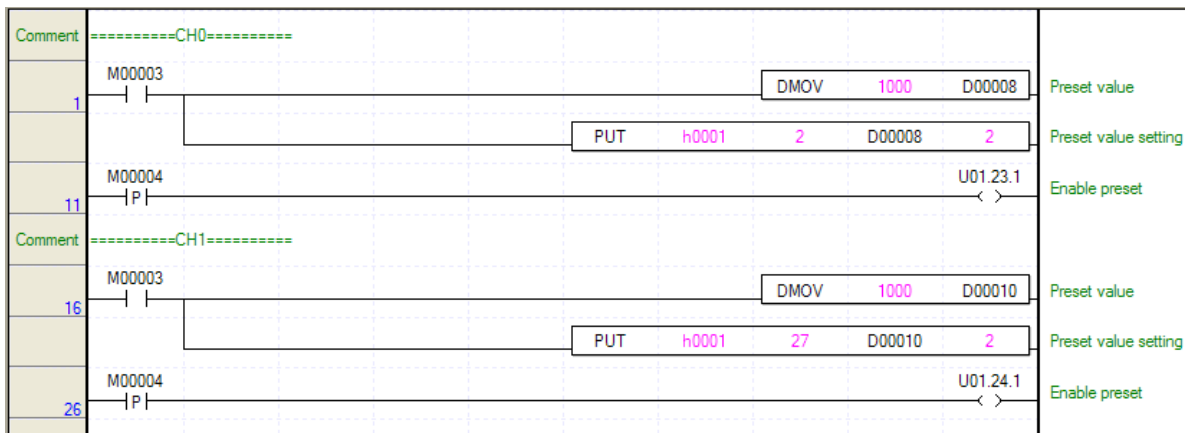
Program example about how to set preset value and enable preset

1. Setting content

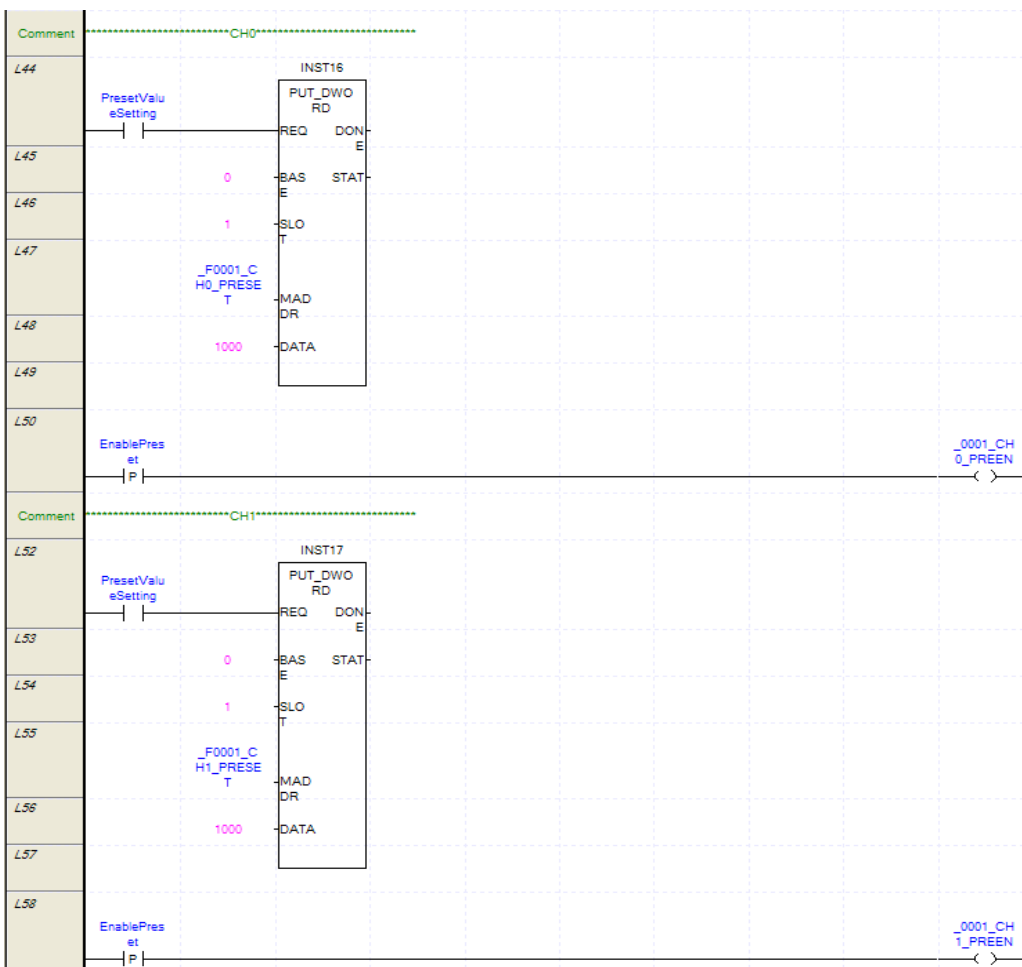
| Parameter | CH0 | CH1 |
|--------------|------|------|
| Preset value | 1000 | 1000 |

2. Program

(1) Scan program of XBM/XBC series



(2) Scan program of XEC

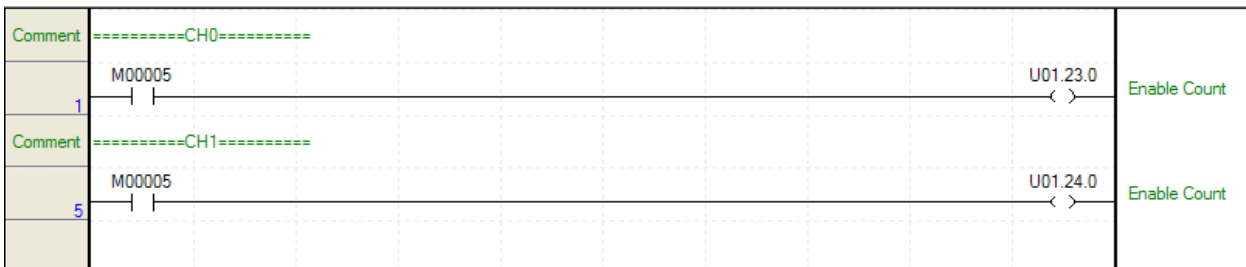


7.2.5 Enable counter

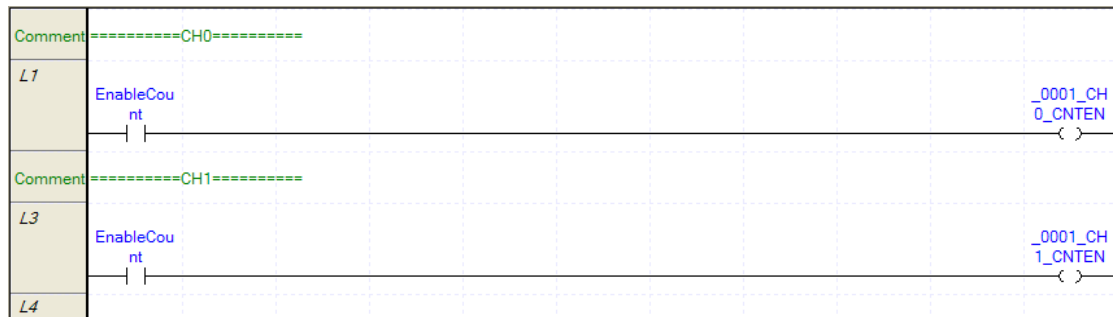
Program example executing Enable counter

1. Program

(1) Scan program of XBM/XBC series



(2) Scan program of XECseries

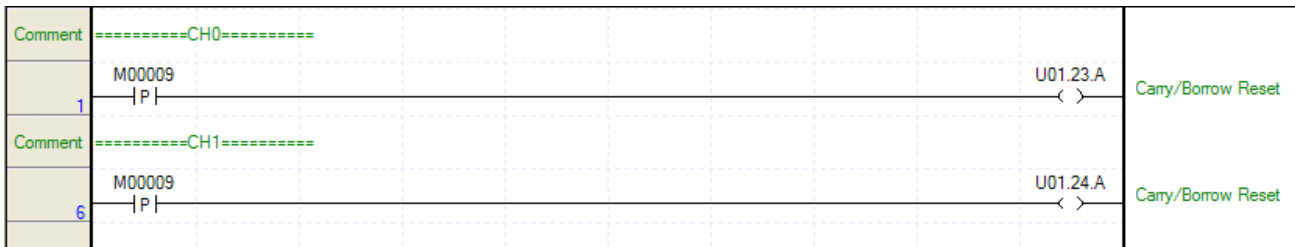


7.2.6 Carry/borrow detection reset

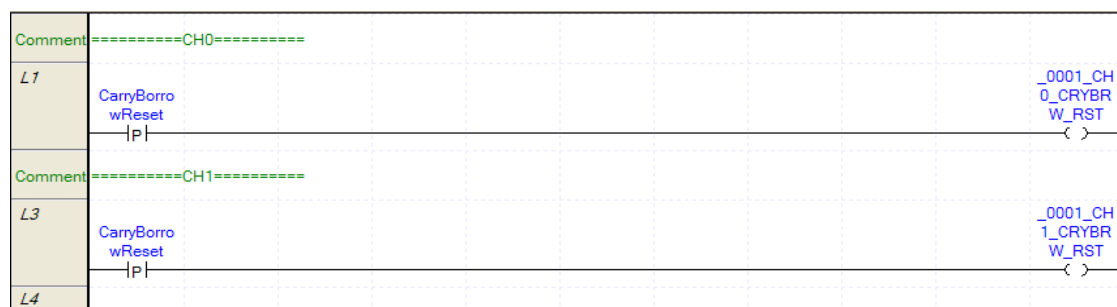
Program example resetting the detected carry/borrow signal

1. Program

(1) Scan program of XBM/XBC series



(2) Scan program of XECseries



7.2.7 Auxiliary mode setting and Enable auxiliary function

Program example setting auxiliary mode and executing Enable auxiliary function. You can check the operation result of auxiliary function at 7.2.3 Counter check.

1. Counter Clear

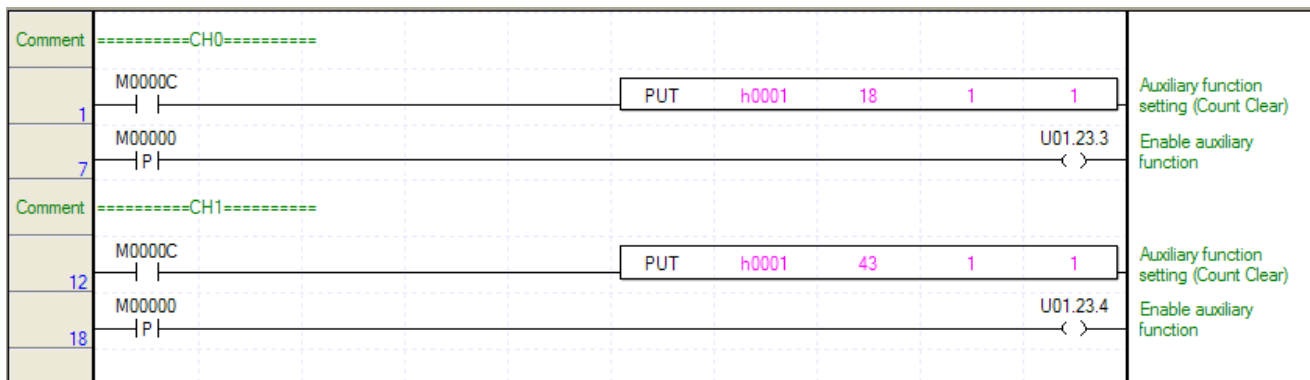
When auxiliary function is on, change current counter as 0.

(1) Setting contents

| Parameter | CH0 | CH1 |
|----------------|------------------|------------------|
| Auxiliary mode | 1: Counter Clear | 1: Counter Clear |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC



2. Counter latch

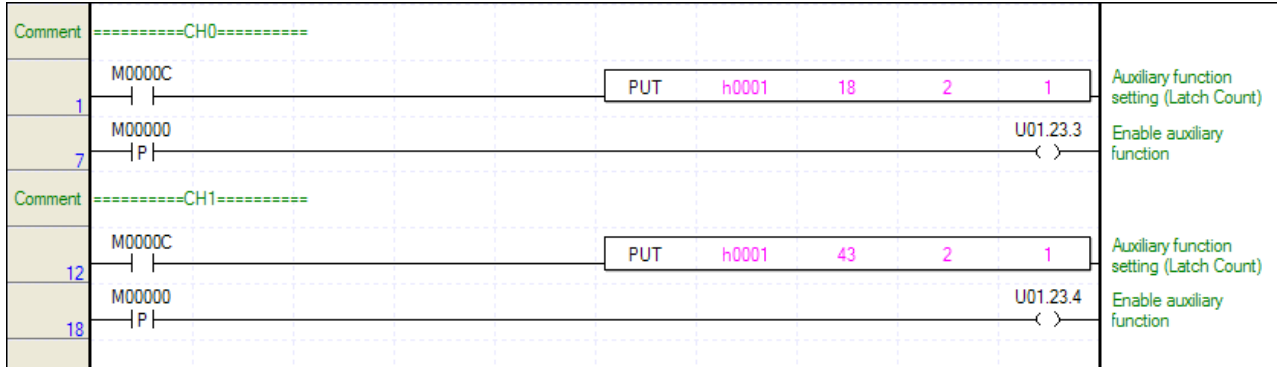
When Enable auxiliary is on, it indicates current counter at counter latch.

(1) Setting contents

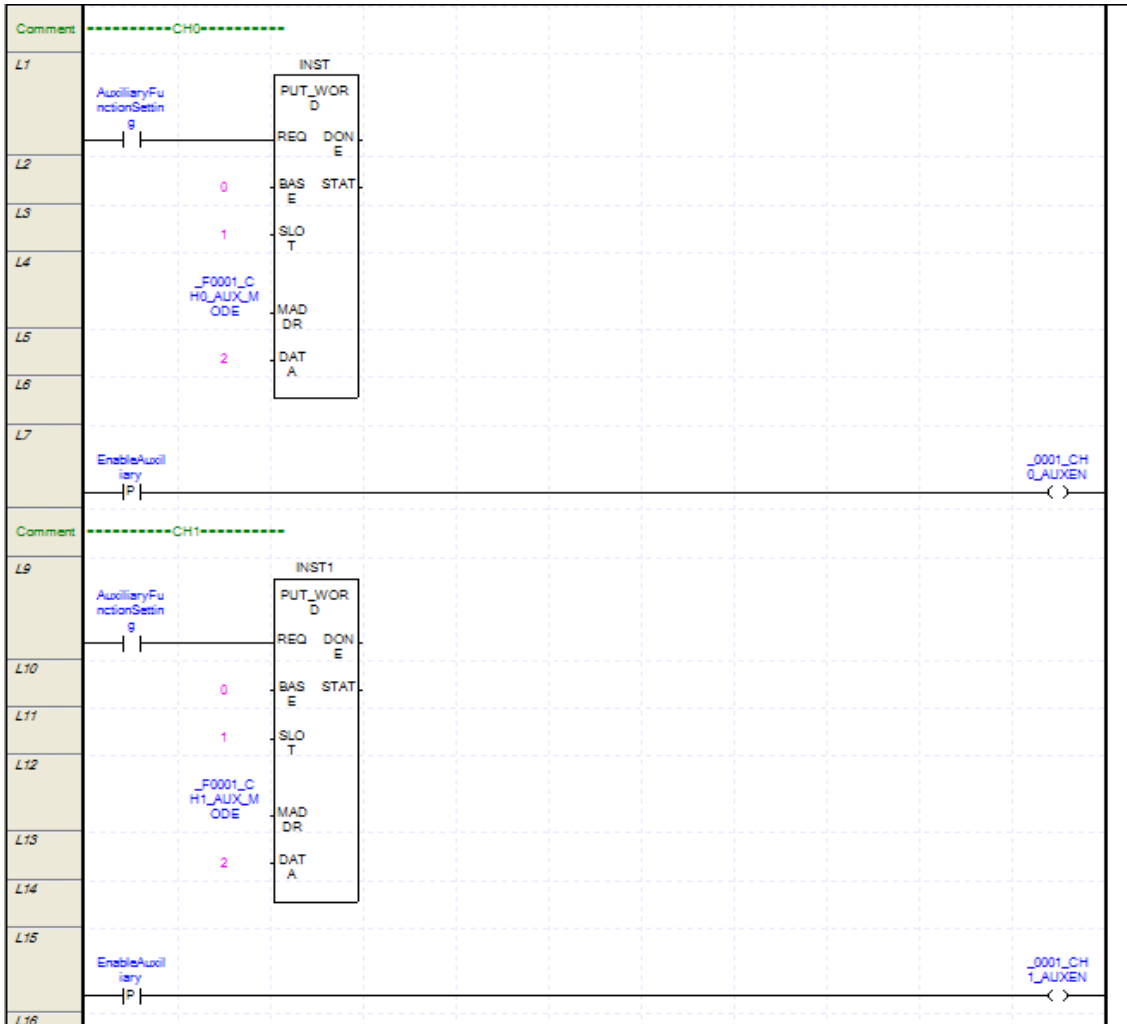
| Parameter | CH0 | CH1 |
|----------------|------------------|------------------|
| Auxiliary mode | 2: Counter latch | 2: Counter latch |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries



3. Sampling Count

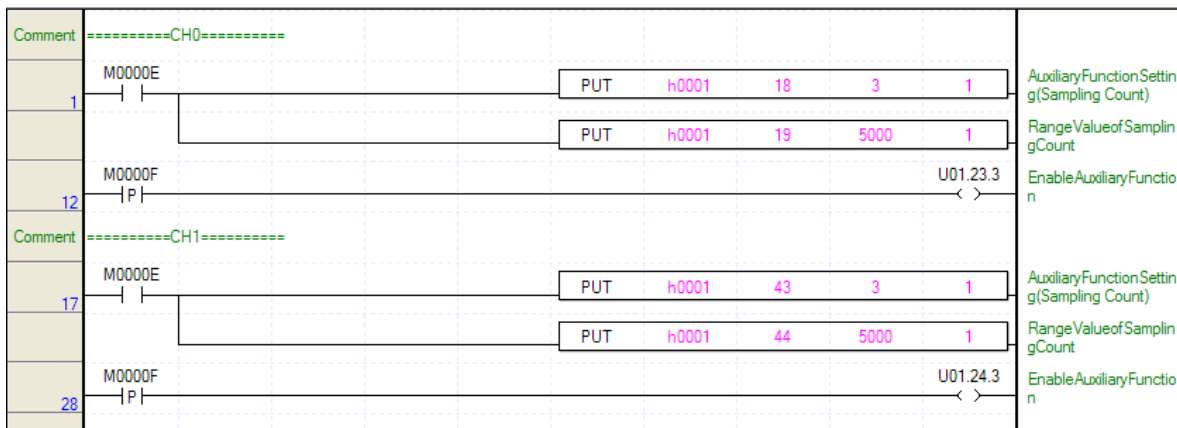
Counter from when Enable auxiliary is on to setting time is indicated at sampling counter.

(1) Setting content

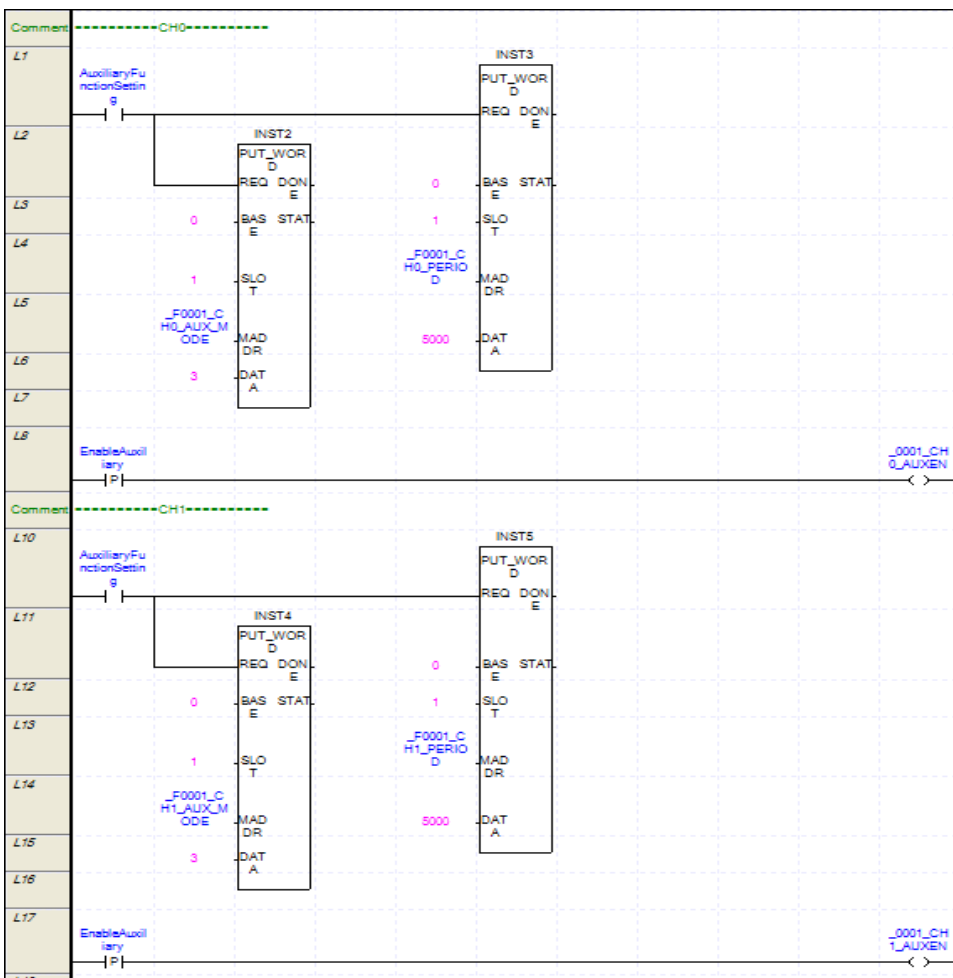
| Parameter | CH0 | CH1 |
|----------------|-------------------|-------------------|
| Auxiliary mode | 3: Sampling Count | 3: Sampling Count |
| Range value | 5000 | 5000 |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC series



4. Input Freq. Measure

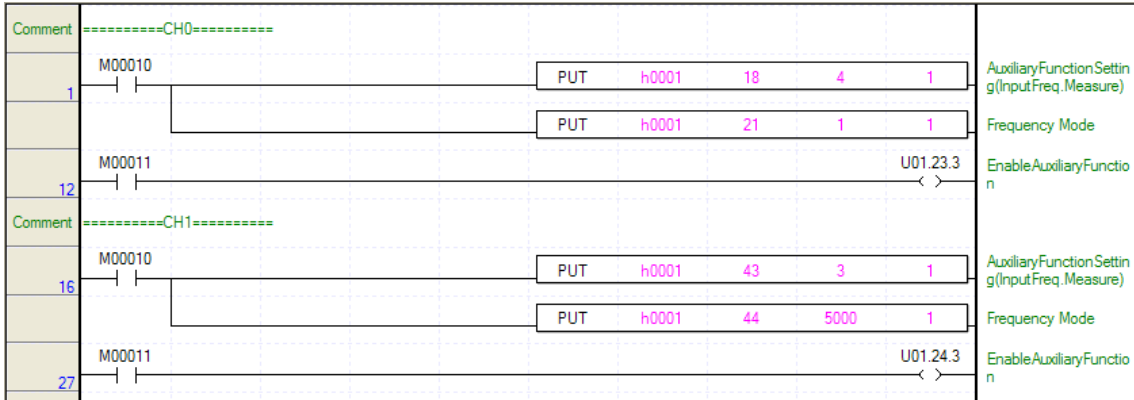
While Enable auxiliary function is on, input pulse is indicated at input frequency. Unit of input frequency is depending on setting of Frequency Mode.

(1) Setting content

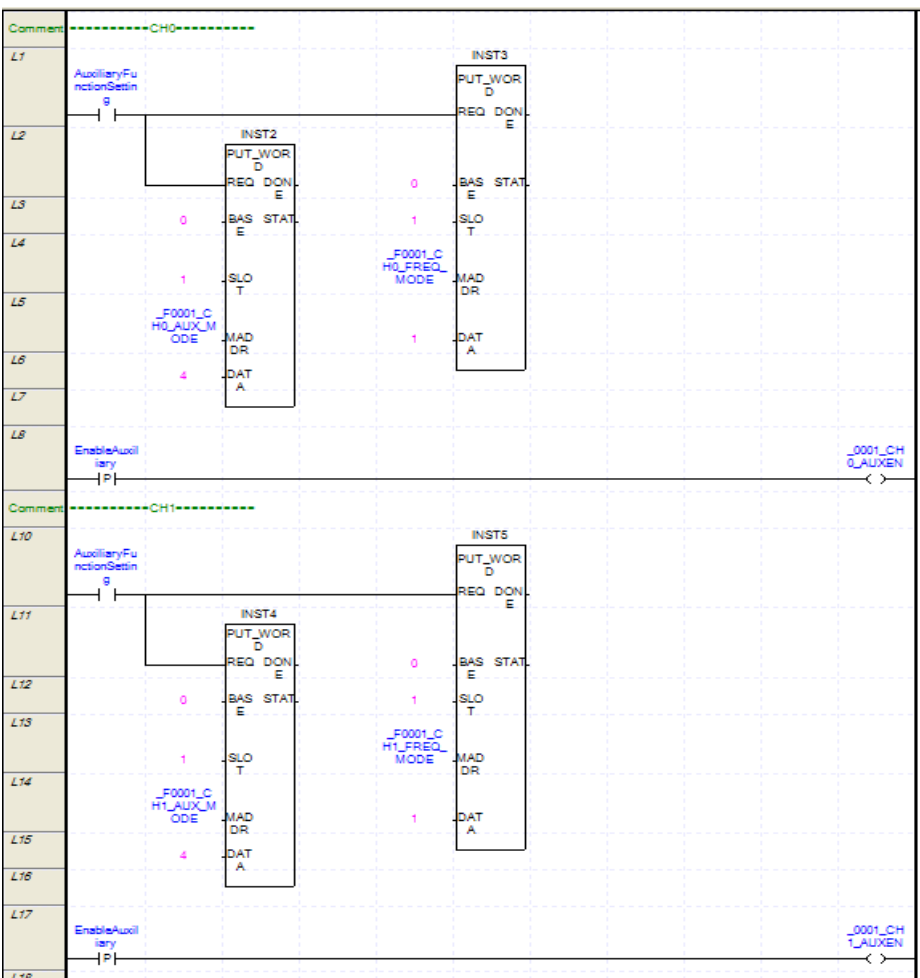
| Parameter | CH0 | CH1 |
|----------------|------------------------|------------------------|
| Auxiliary mode | 4: Input Freq. measure | 4: Input Freq. measure |
| Frequency Mode | 1: 10Hz | 1: 10Hz |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC series



5. Revolution/Unit time

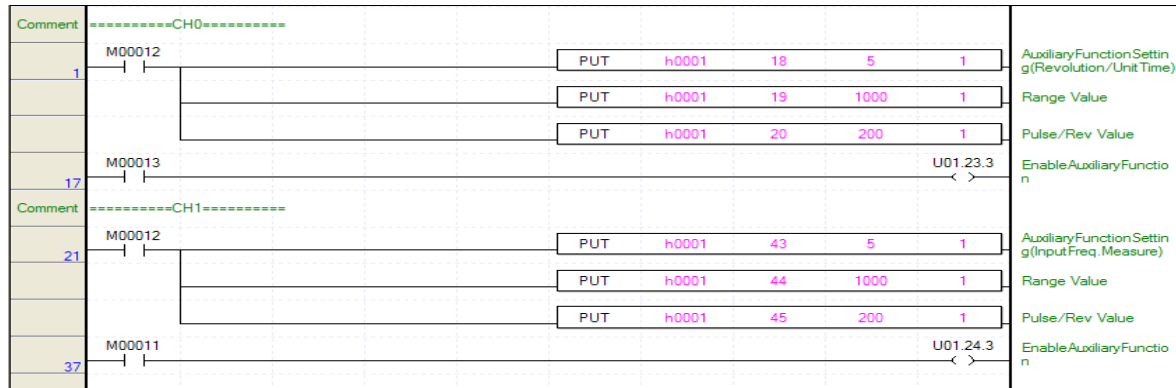
While Enable auxiliary mode is on, input pulse is calculated and indicated at revolution/unit time. For revolution/unit time, Range value and Pulse/Rev value should be set.

(1) Setting contents

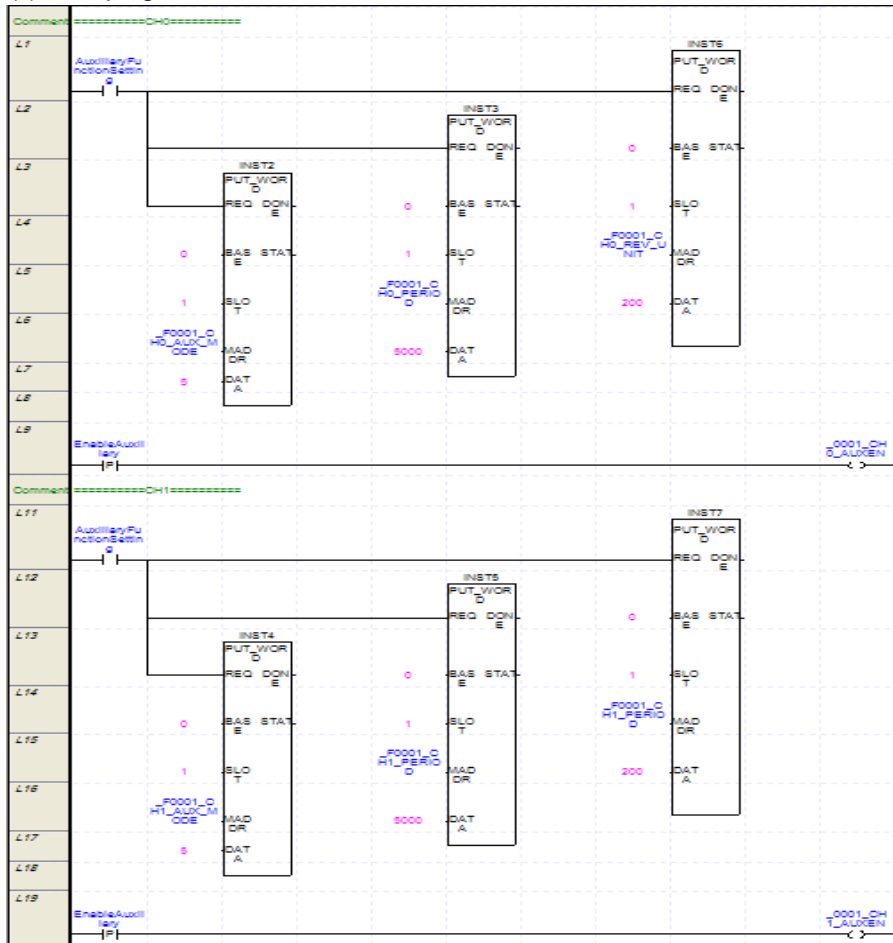
| Parameter | CH0 | CH1 |
|-----------------|-------------------------|-------------------------|
| Auxiliary mode | 5: Revolution/Unit time | 5: Revolution/Unit time |
| Range value | 1000 | 1000 |
| Pulse/Rev value | 200 | 200 |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries



6. Counter Disable

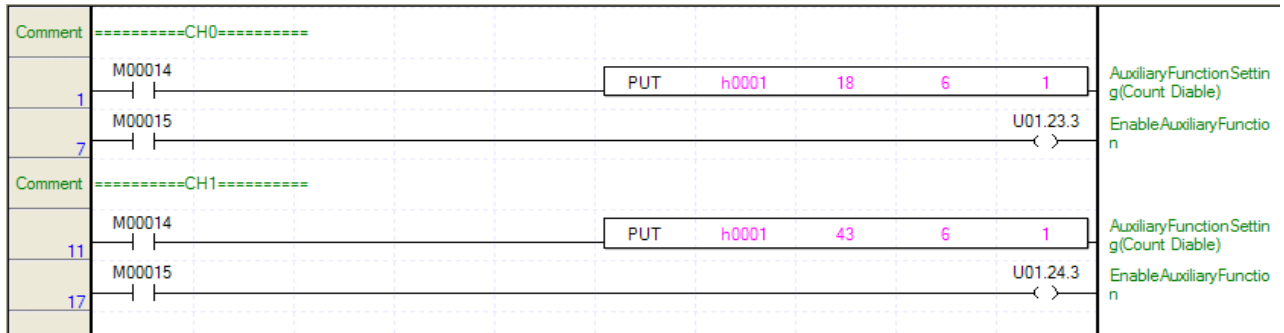
While Enable auxiliary is on, counting is not executed.

(1) Setting contents

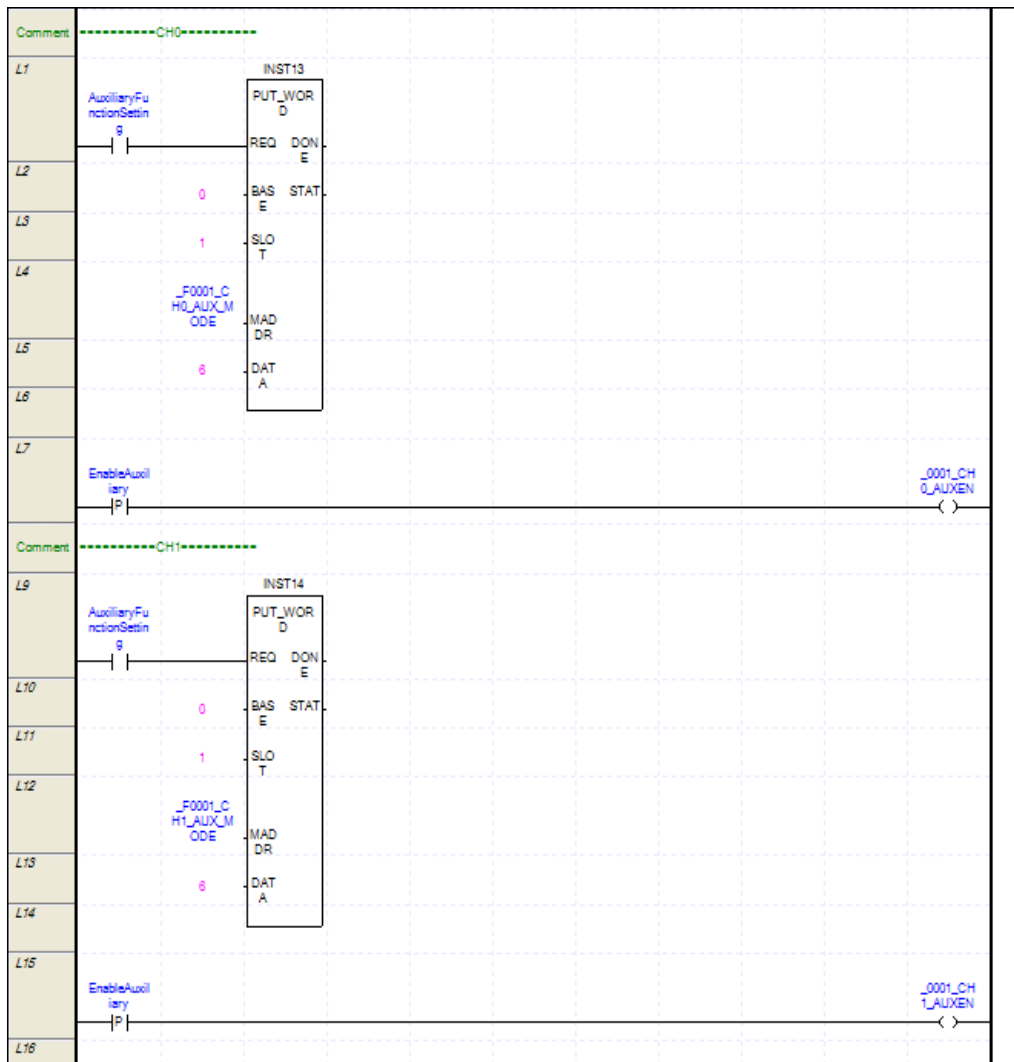
| Parameter | CH0 | CH1 |
|----------------|------------------|------------------|
| Auxiliary mode | 6: Count Disable | 6: Count Disable |

(2) Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries

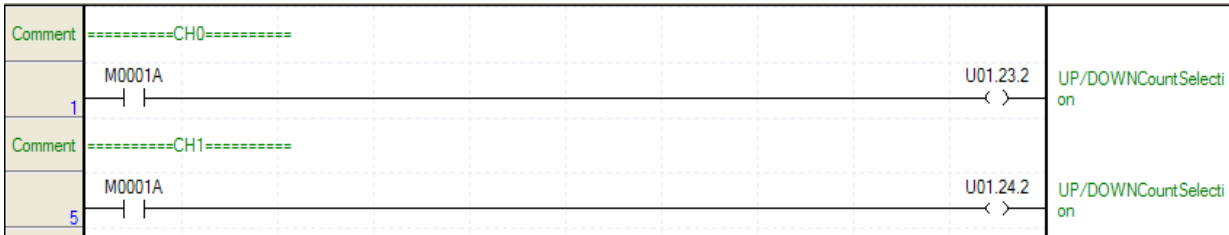


7.2.8 Up/down count selection

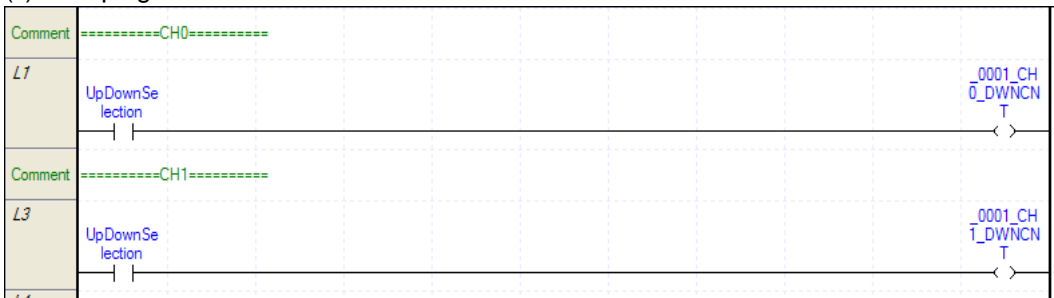
Program example selecting UP/Down count when input pulse is set as 1 phase 1 input 1 mutiplication/2 multiplication

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries

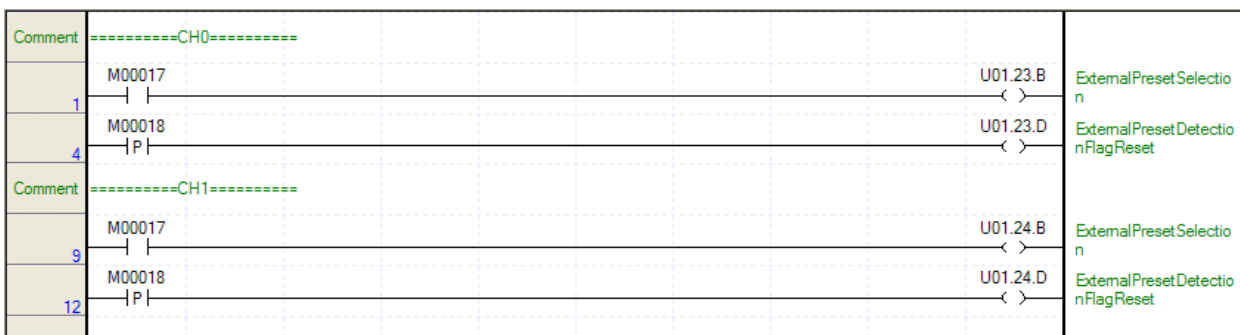


7.2.9 Use of external preset signal

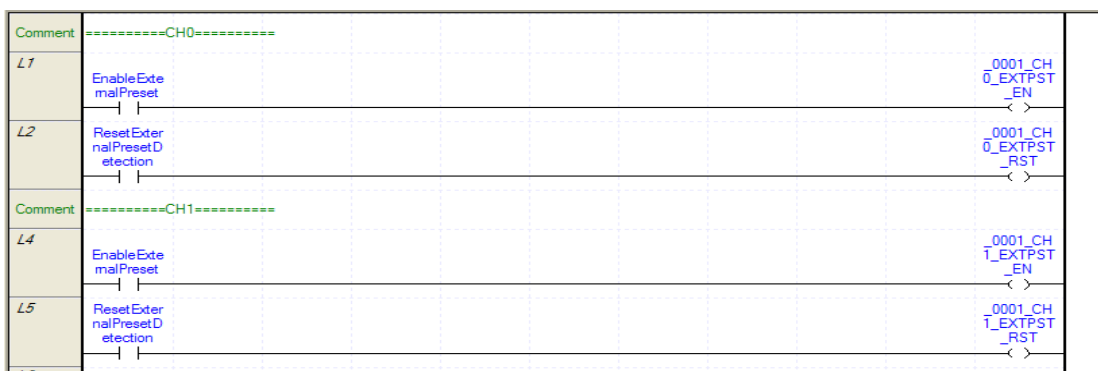
Program examples allowing Enable preset by external preset signal and executing reset when external preset signal is detected

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries

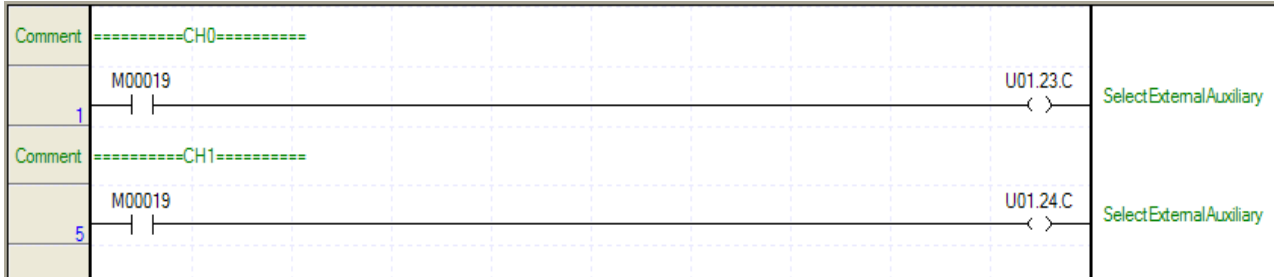


7.2.10 Use of external auxiliary function signal

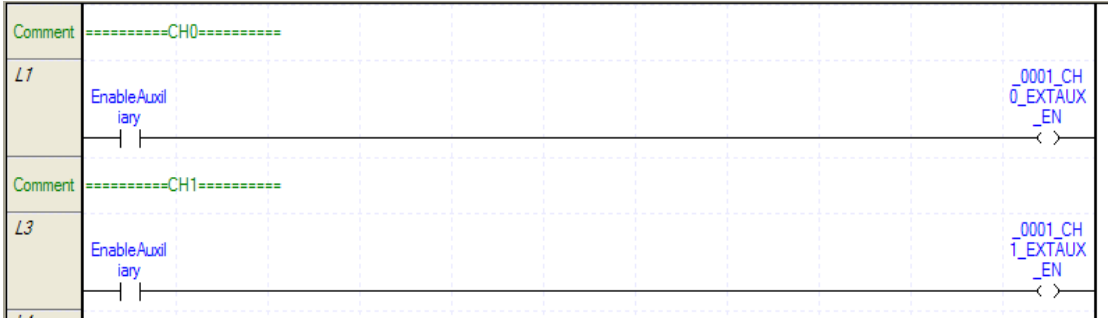
Program example allowing Enable auxiliary function by external auxiliary function signal

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries



7.2.11 Type of comparison and comparison value setting

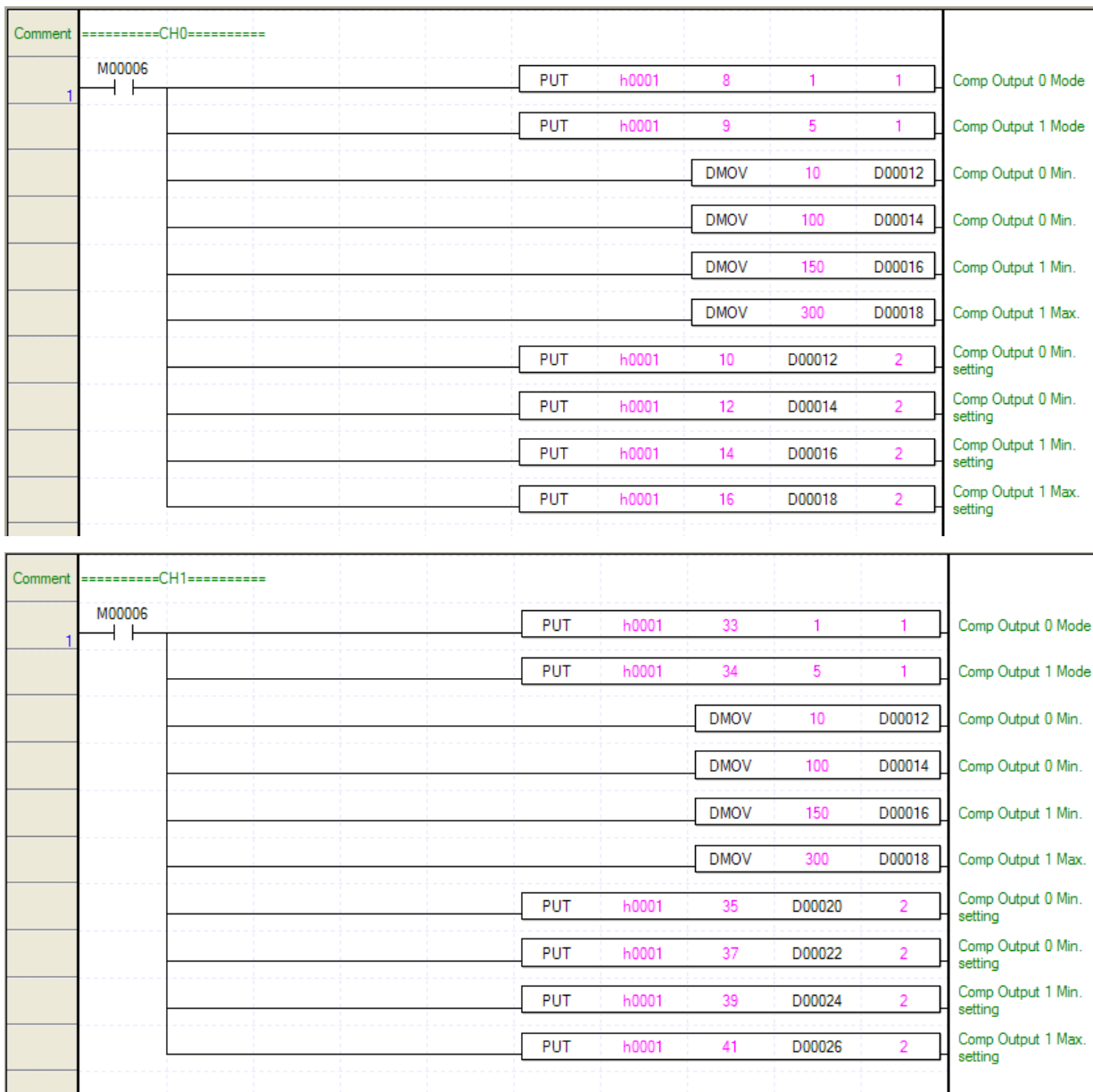
Program example explain type of comparison and comparison value setting

1. Setting content

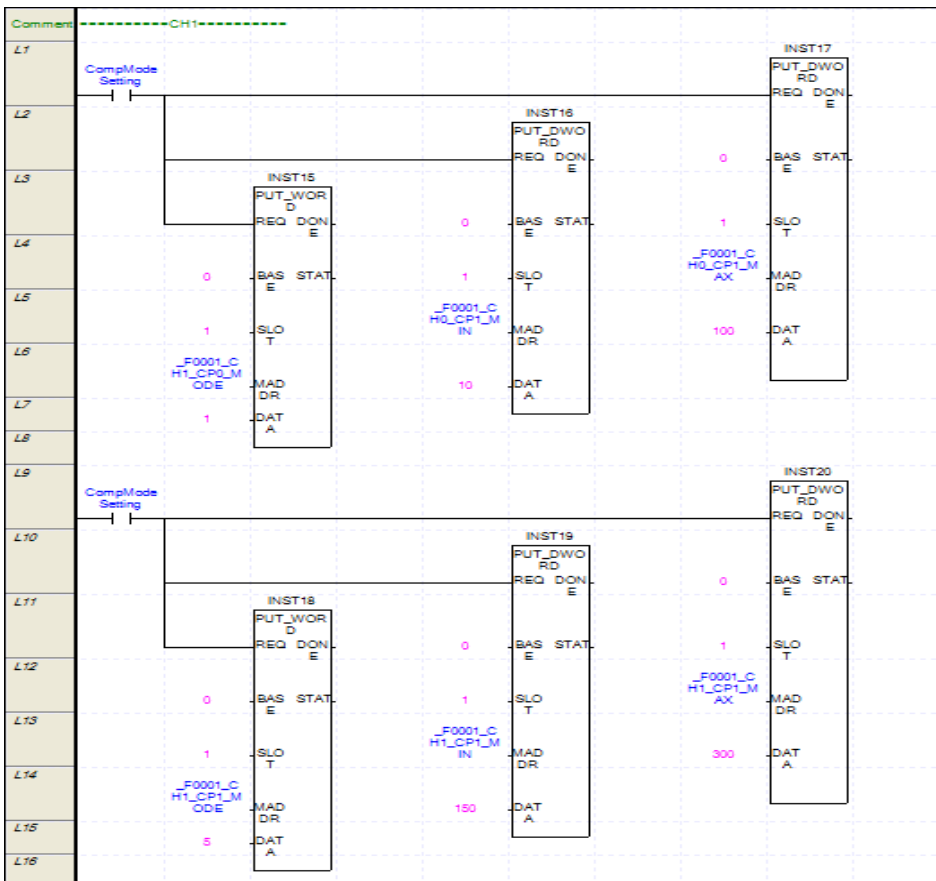
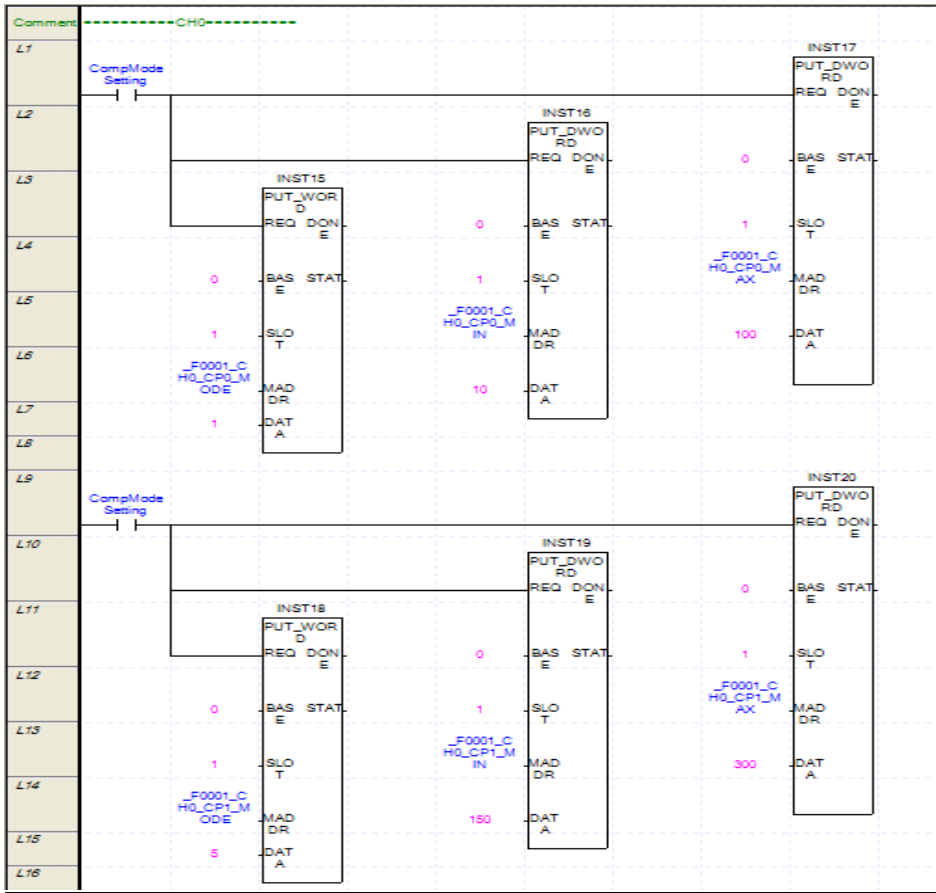
| Parameter | CH0 | | CH1 | |
|------------------|-----------------|---------------|-----------------|---------------|
| | Comp output 0 | Comp output 1 | Comp output 0 | Comp output 1 |
| Comp output mode | 1: ≤ | 5: ≤ ≤ | 1: ≤ | 5: ≤ ≤ |
| Comp output min. | 10 | 150 | 10 | 150 |
| Comp output max. | 150(No meaning) | 300 | 150(No meaning) | 300 |

2. Program

(a) Scan program of XBM/XBC seires



(b) Scan program of XECseries

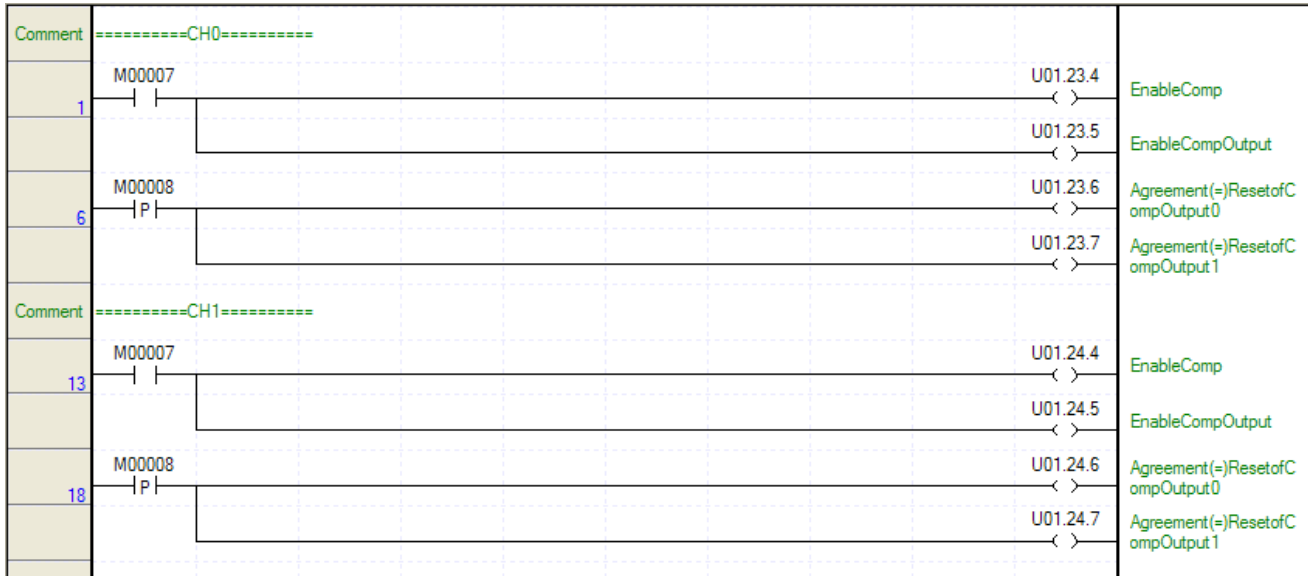


7.2.12 Enable comparison, Enable comparison output, Comparison agreement reset

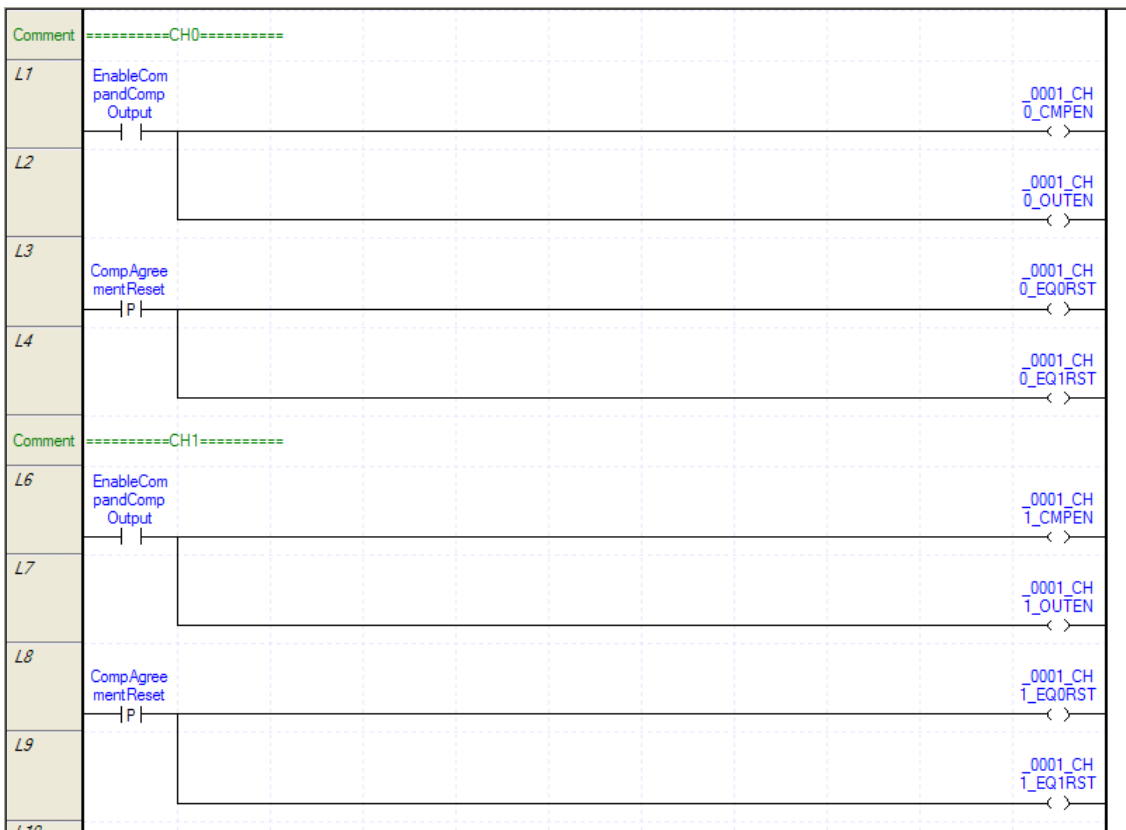
Program example executing Enable comparison, Enable comparison output, Comparison agreement reset

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XECseries



7.2.13 Comparison output status setting

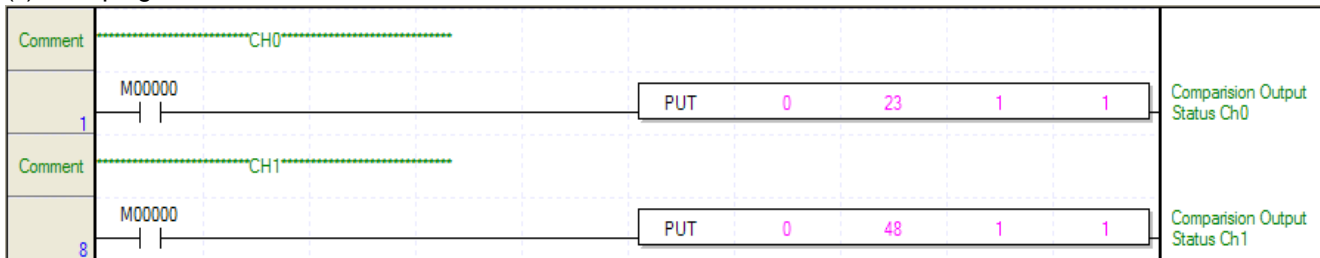
Program example setting status of comparison output when XGB (XBM/XBC/XEC) CPU module is STOP.

1. Setting content

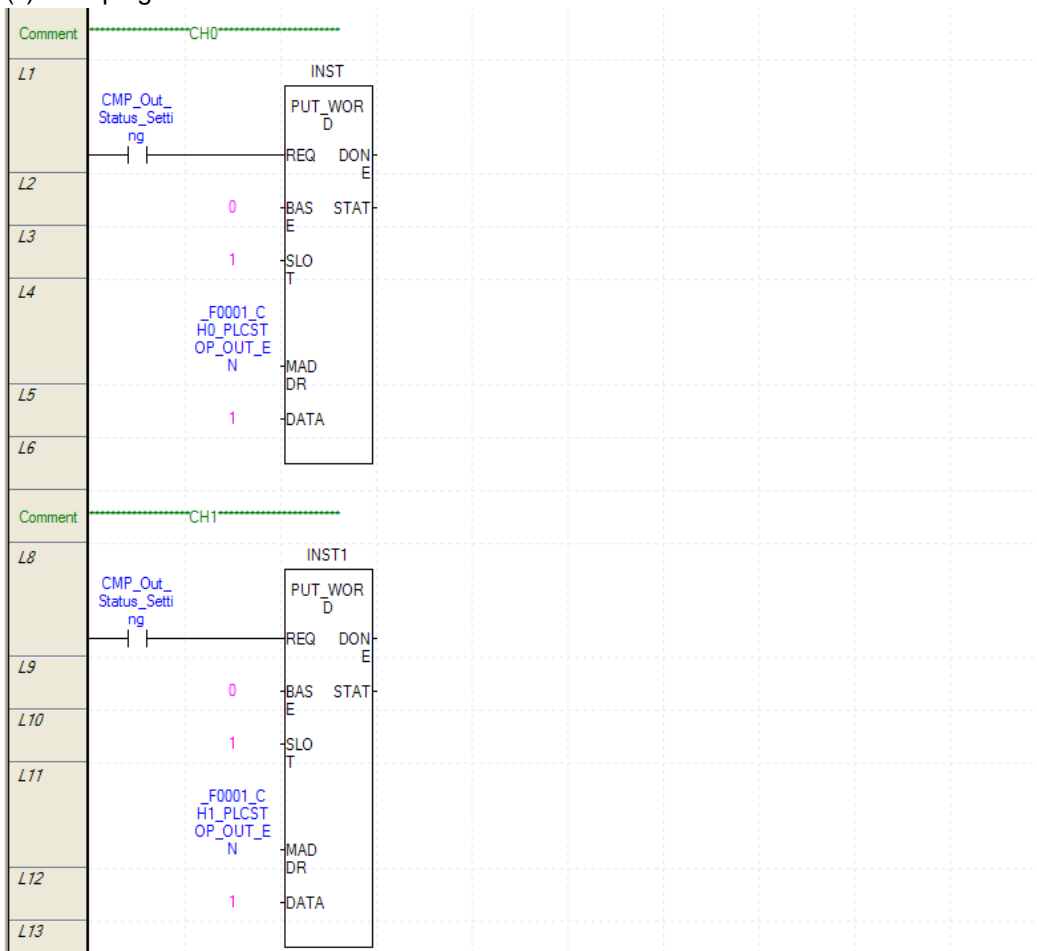
| Parameter | CH0, CH1 |
|--|---------------------------|
| Comparison output status when XGB CPU module is STOP | 1: Hold comparison output |

2. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC series



7.2.14 Input pulse Active level setting

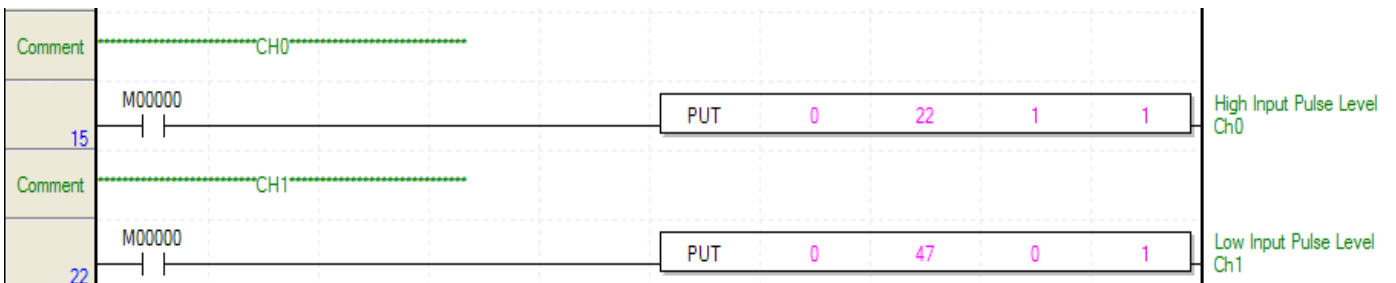
Program example input pulse active level setting of HSC module.

1. Setting content

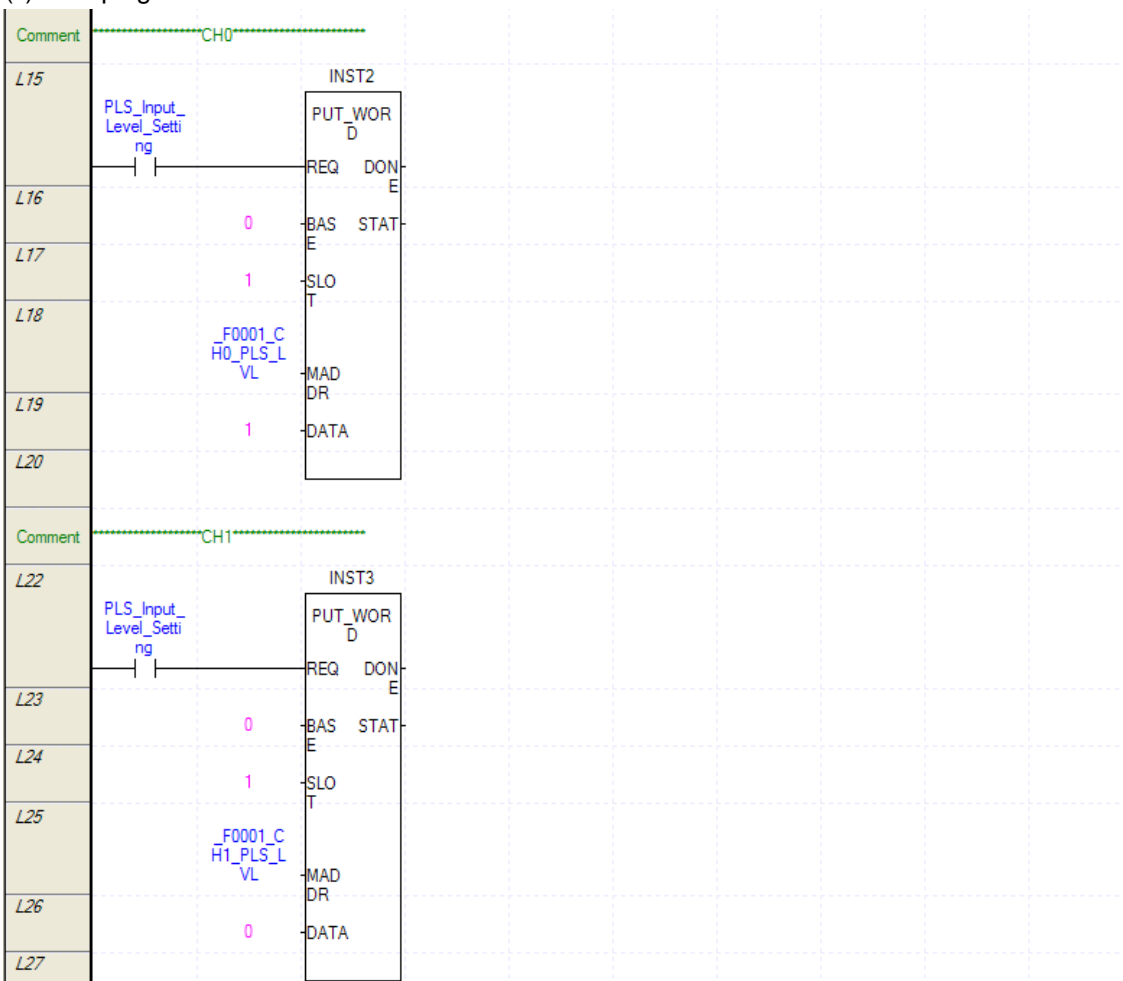
| Parameter | Active Level |
|------------------------------|--------------|
| CH0 Input pulse active level | High Active |
| CH1 Input pulse active level | Low Active |

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC series

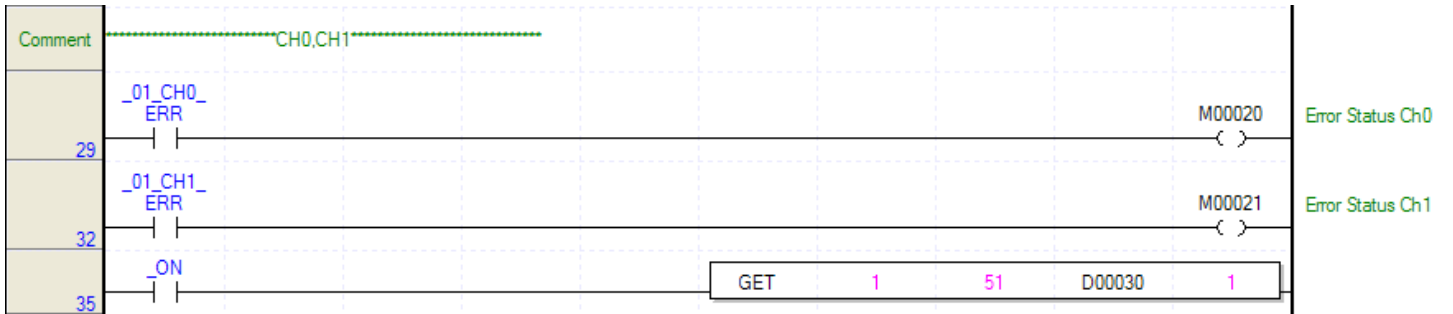


7.2.15 Error status and error code

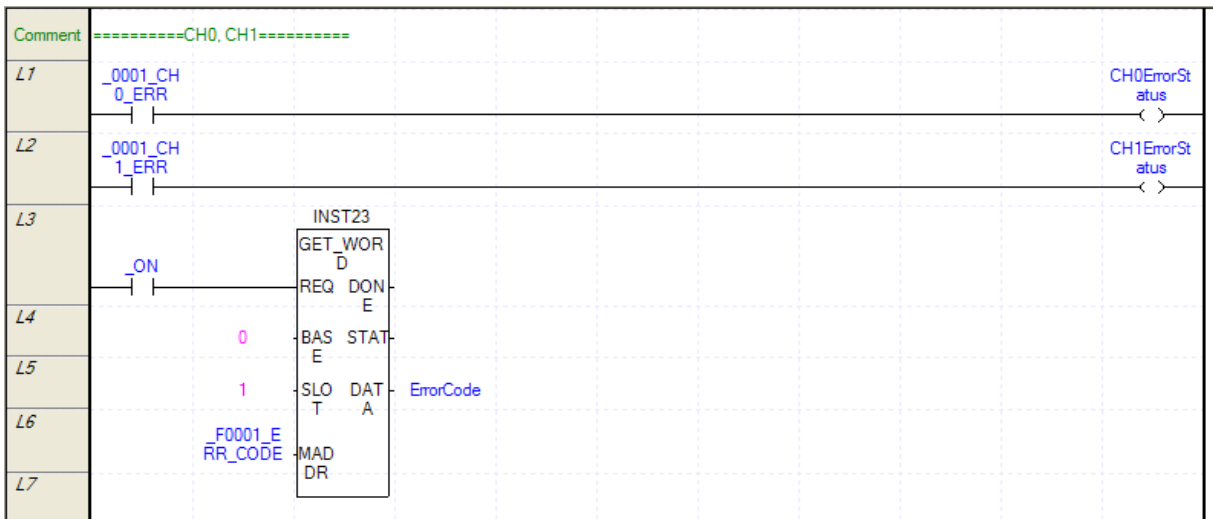
Program example checking error status and error code occurred at HSC module

1. Program

(a) Scan program of XBM/XBC series



(b) Scan program of XEC series



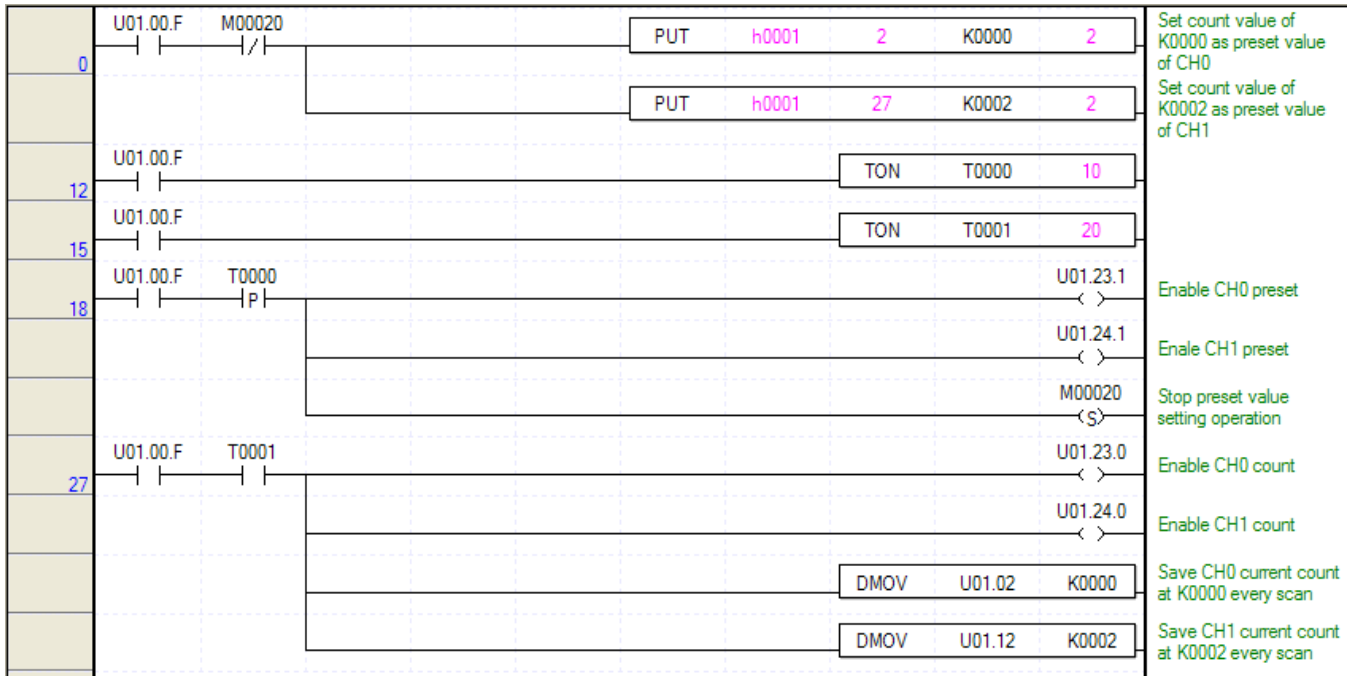
7.2.16 Hold count when power fails

Program example holding current count

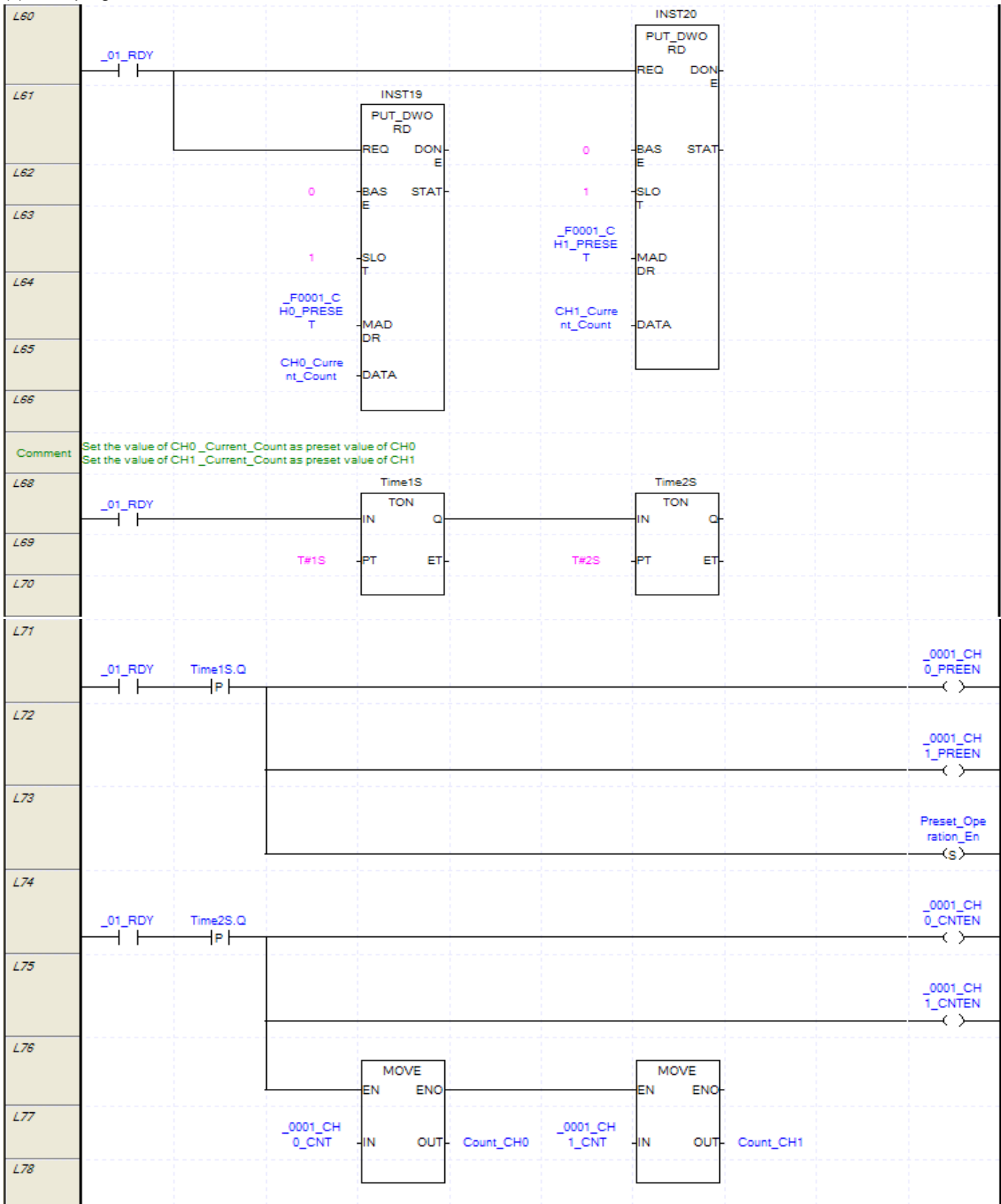
To prepare when PLC power is off, current count is saved every scan and if PLC power restart, preset operation is executed with the saved count.

1. Program

(a) Scan program of XBM/XBC series

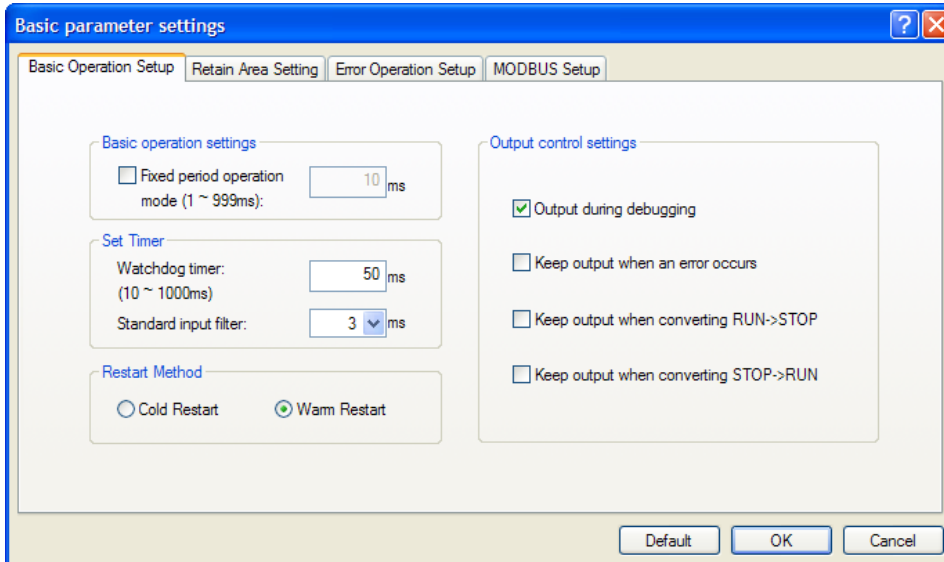


(b) Scan program of XEC series

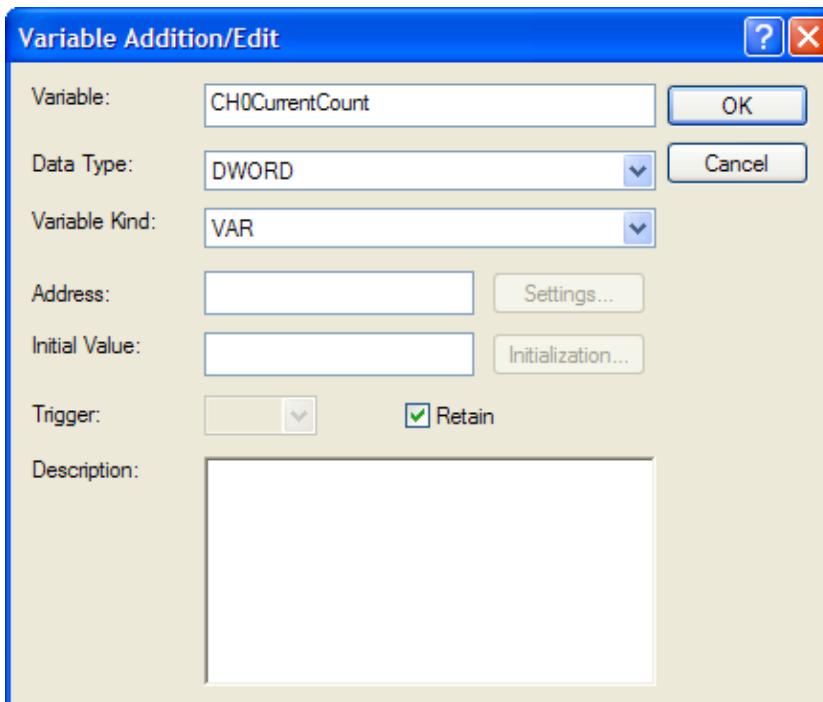


Remark

- (1) In the program, timer (TON) is used for safe operation of Preset value setting and preset allowance
- (2) In scan program of XEC series, to hold data of 'CH0 current count' and 'CH1 current count' when PLC power is off, the following setting is necessary.
- (a) On [Basic Parameter], set Restart Method as Warm Restart.



- (b) On scan program, set 'CH0 current count' and 'CH1 current count' as Retain variable.



Chapter 8 Troubleshooting

How to shoot the troubles on the high speed counter module will be described.

Description

8.1 Error code

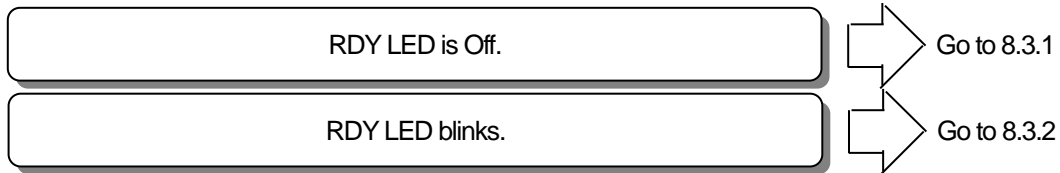
| CH0 | CH1 | Description | RDY LED |
|-----|-----|---|-----------------------|
| 10 | | Module error (ASIC Reset error) | Blinks every 0.2 sec. |
| 11 | | Module error (ASIC Memory error) | |
| 12 | | Module error (ASIC Register error) | |
| 20 | 120 | Counter type range exceeded | Blinks every 1 sec |
| 21 | 121 | Pulse input type range exceeded | |
| 22 | 122 | Auxiliary Mode type range exceeded | |
| 23 | 123 | Sampling Count value range exceeded | |
| 24 | 124 | Compared output0 type range exceeded | |
| 25 | 125 | Compared output1 type range exceeded | |
| 26 | 126 | Preset value exceeded counter range | |
| 27 | 127 | Ring counter minimum. value \geq Ring counter maximum value input | |
| 28 | 128 | Compared output 0 minimum value exceeded maximum input range | |
| 29 | 129 | Compared output 0 maximum value exceeded maximum input range | |
| 30 | 130 | Compared output 0 minimum value $>$ compared output 0 maximum value set | |
| 31 | 131 | Compared output 1 minimum value exceeded maximum input range | |
| 32 | 132 | Compared output 1 maximum value exceeded maximum input range | |
| 33 | 133 | Compared output 1 minimum value $>$ compared output1 maximum value set | |
| 34 | 134 | Pulses per revolution range exceeded | |
| 35 | 135 | Frequency input mode range exceeded | |
| 36 | 136 | Main unit stop Compared output retain parameter error | |

Notes

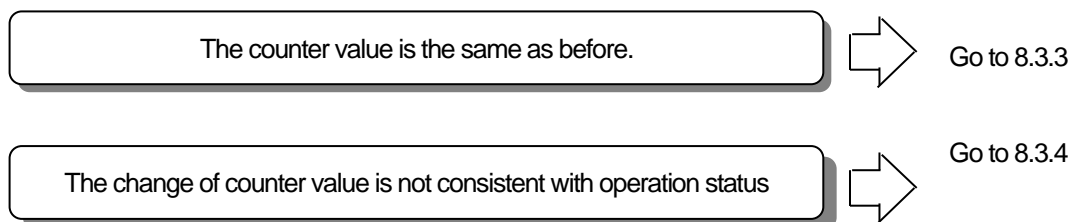
- (1) If the module is normal, RDY LED is On.
- (2) If 2 or more errors occur, the module will save the first error code generated, and the displayed error will be first deleted to let the next error deleted.
- (3) In case of serious error which makes RDY LED blinks every 0.2 sec., let power Off \rightarrow On to delete the error.
- (4) In case of slight error which makes RDY LED blinks every 1 sec., the error can be deleted without power Off \rightarrow On and the module can keep operating.
- (5) In case of slight error which makes RDY LED blinks every 1 sec, the parameter value causing the applicable error is not set on the module, with the existing parameter value kept as it is.

8.2 Troubleshooting

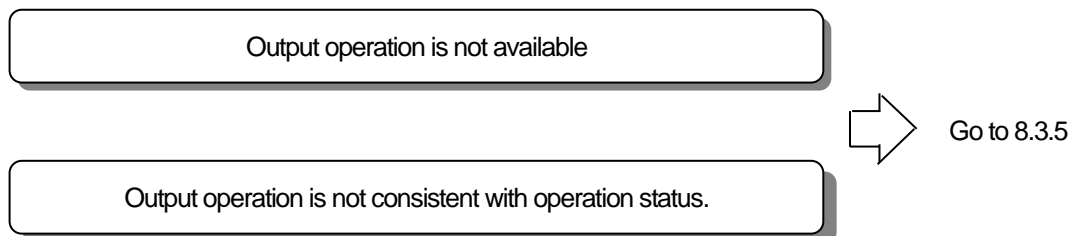
8.2.1 LED display status of the high speed counter module



8.2.2 Counter status of the high speed counter module

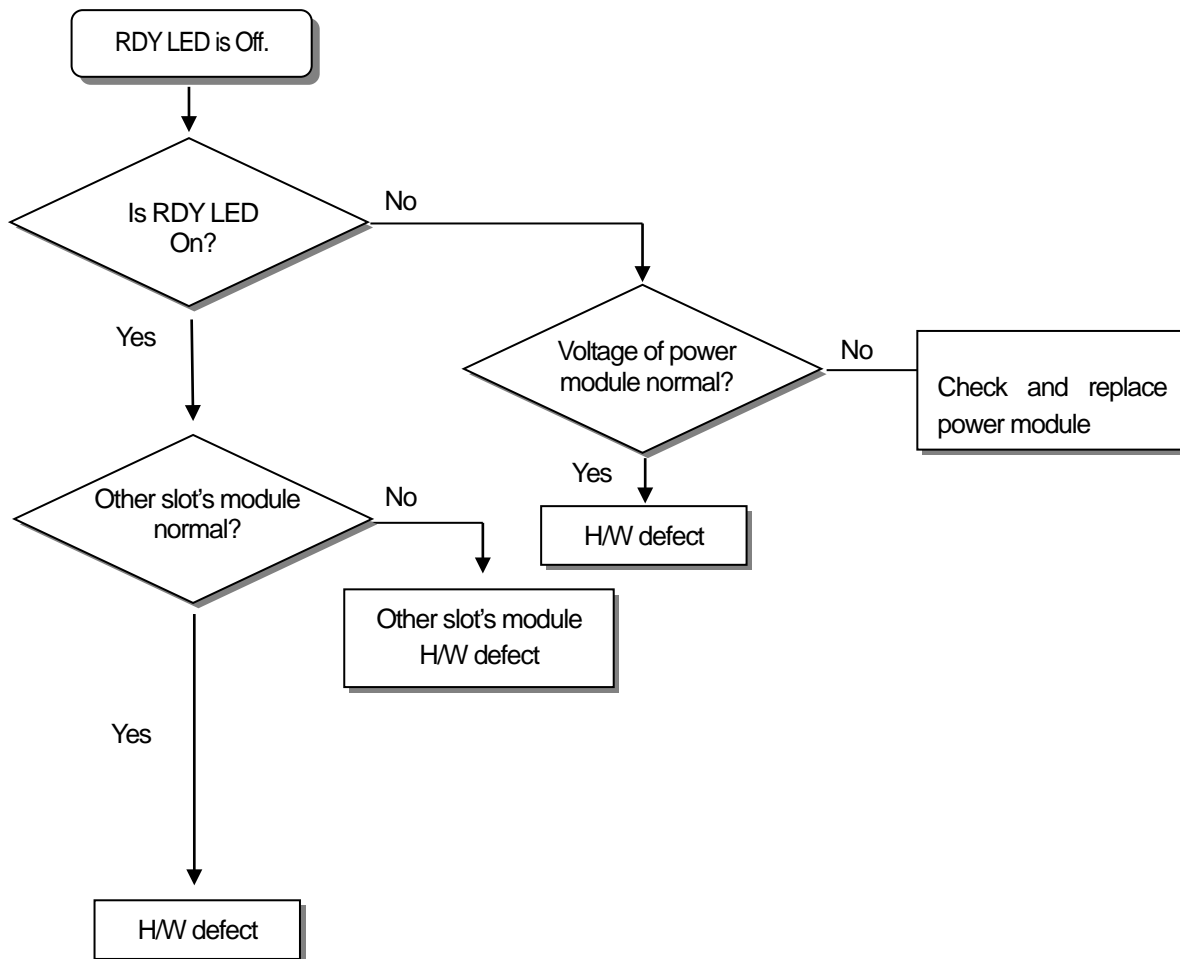


8.2.3 Output status of the high speed counter module

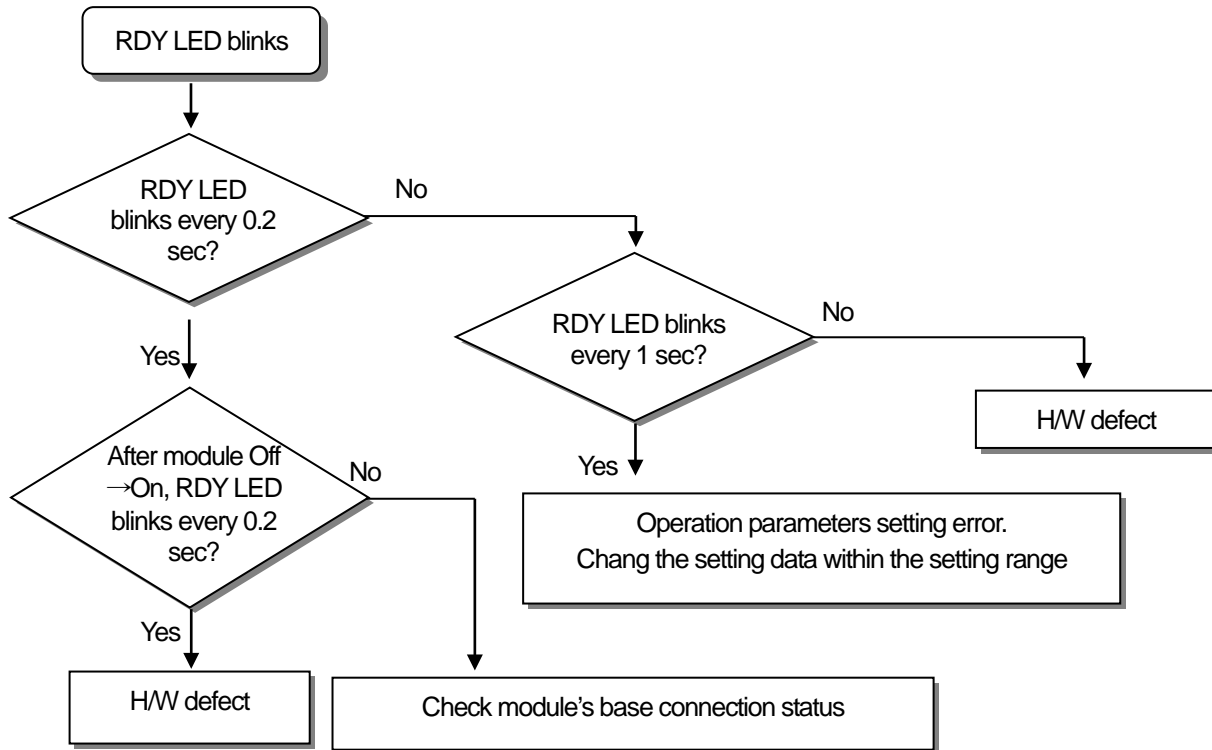


8.3 Troubleshooting sequence

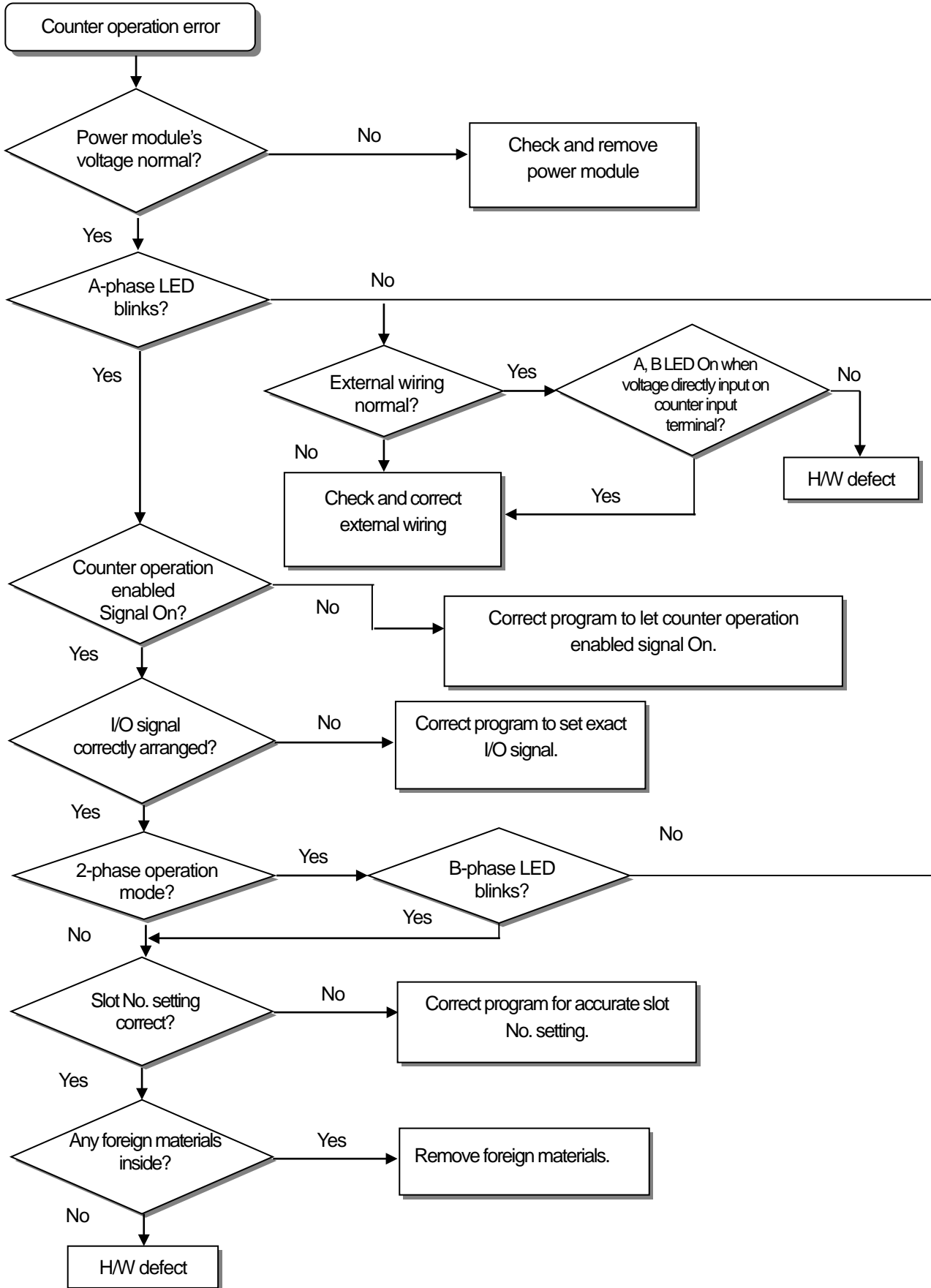
8.3.1 RDY LED Off



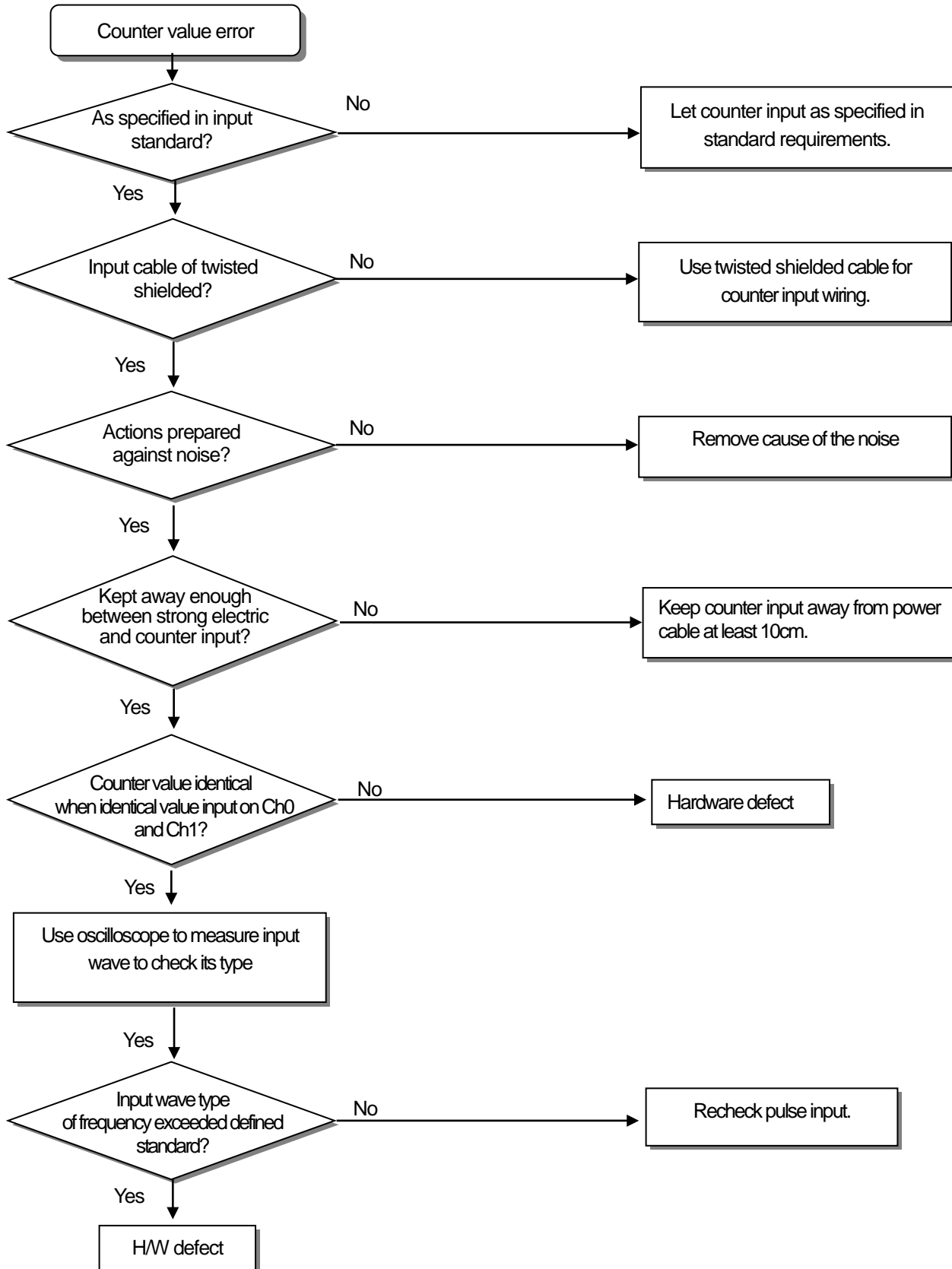
8.3.2 RDY LED Blinks



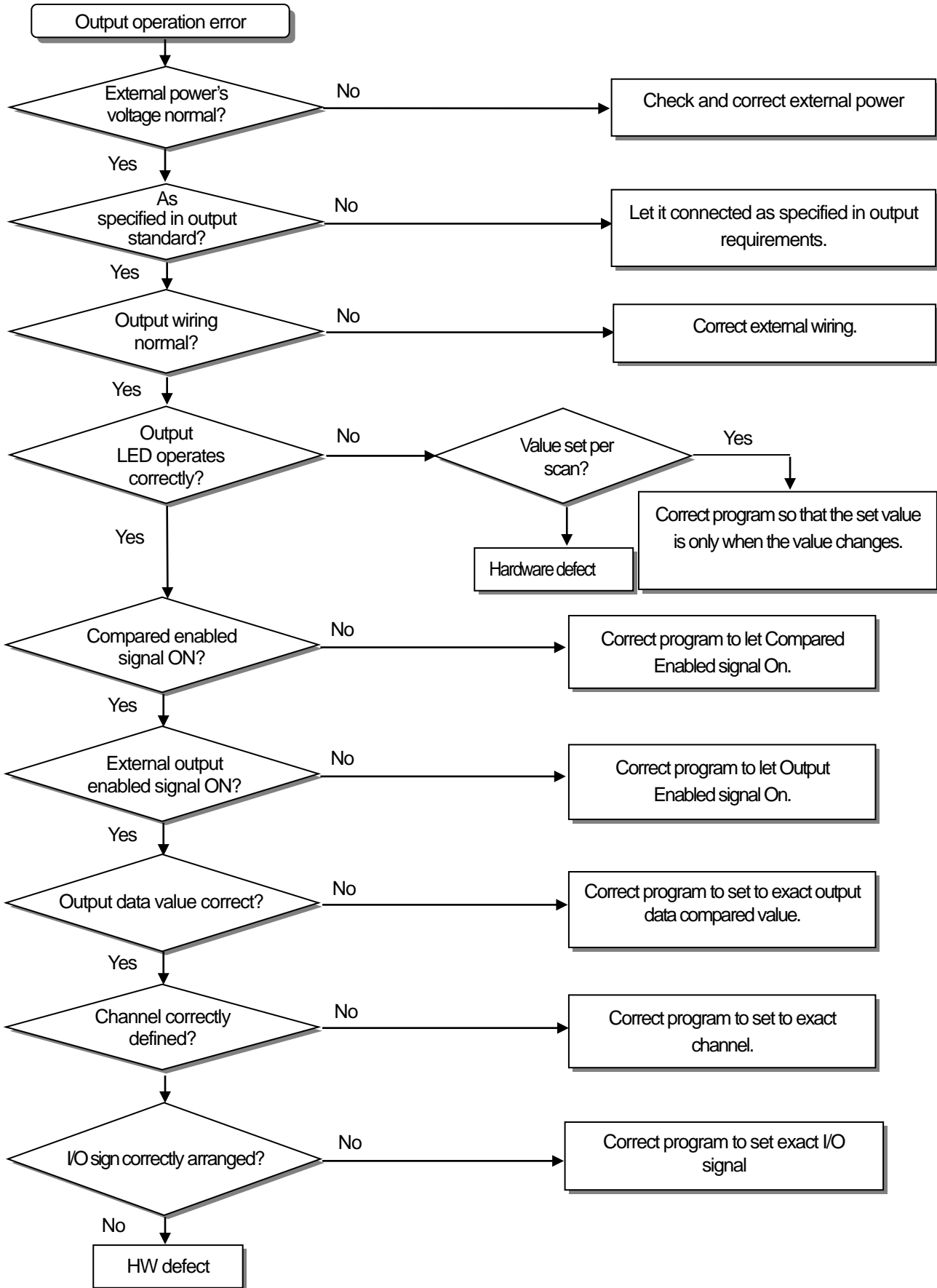
8.3.3 Counter operation error



8.3.4 Counter value error



8.3.5 Output operation error



8.4 Module status check through XG5000 system monitoring

Module type, module information, OS version and module status of HSC module can be checked through XG5000 system monitoring function.

8.4.1 Execution sequence

[Monitor] -> [System Monitoring] -> and on the module screen, click the right mouse button to display [Module Information].

8.4.2 Module information

1. Module Info: shows the information of the module presently installed.
2. OS version: shows the OS version information of the high speed counter module.
3. OS date: shows the OS prepared date of the high speed counter module.
4. Module status: shows the present error code.

8.4.3 System Monitoring

The screenshot displays the 'NewPLC - System Monitoring - [Base 0]' window. A 'Special Module Information' dialog box is open, showing the following data:

| Item | Information |
|----------------|-------------------------------|
| Module Name | XBF-HD02A (Line-Driver, 2-CH) |
| OS Ver | Ver. 0.09 |
| OS Update Date | 2011-12-14 |
| Module Status | Normal. (0) |

The background interface shows a rack of modules with the following configuration:

- Slot 0: Internal Cnet
- Slot 0: XBC-DR30S, Input
- Slot 0: XBC-DR30S, Output
- Slot 1: XBE-RY16A
- Slot 2: XBF-HD02A
- Slot 3: XBE-RY16A
- Slot 4: Empty slot

The status bar at the bottom indicates: Ready | XGB-XBCS | Online | L, USB, Warning

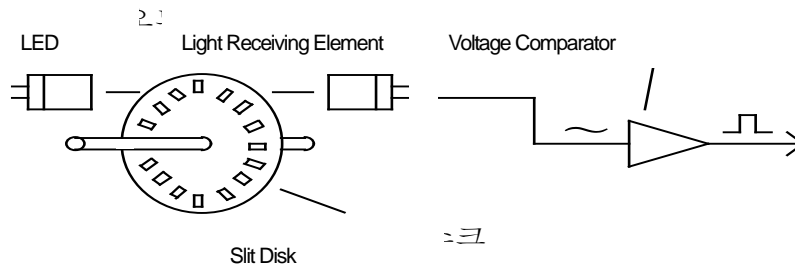
Appendix 1 Terminology

1. Pulse

Used to turn voltage (current) On/Off for a short time, and pulse line is of continuous pulses

2. Encoder

Used mainly in subo-detector in order to detect speed and position, whose basic principle is that if infrared ray from LED passes the slit disk and reaches the light receiving element, analog electric sign is output which will be converted by voltage comparator to digital sign to be output.



Encoder output

- (1) A phase: Basic output, signal of pulses is output as many as the number of resolutions for 1 revolution of shaft.
- (2) B phase: Signal with a specific phase difference from A phase, which can detect revolution direction of shaft
- (3) Z phase: 1 pulse is output for 1 revolution of shaft.

3. MPG(Manual Pulse Generator)

A device that handle can be rotated by hand to generate pulses. If rotated + direction, forward pulses are generated, and if rotated – direction, reverse pulses are generated.

4. Up Count

A counter value increases from -2,147,483,648 to 2,147,483,647 (for 32-bit counter).

5. Down Count

A counter value decreases from 2,147,483,647 to -2,147,483,648 (for 32-bit counter).

6. Ring Count

A counter that counter value increases/decreases between the maximum value and the minimum value of the Ring count that user has defined.

7. 1-Phase Operation Mode

Mode used to count 1-phase input pulse.

8. CW/CCW Operation Mode

Mode used to count another 1-phase if 1 phase is Low among 2-phase input pulses.

9. 2-Phase Operation Mode

Mode used to count 2-phase input pulse.

10. Preset

Mode used to set present counter value to discretionary value.

11. Gate

Signal used to enable additional function operation.

12. Compared Value

Basic value used to compare counters in size.

13. Carry

Signal displayed when Linear count changes from 2,147,483,646 to 2,147,483,647 and when Ring count changes from the maximum value to the minimum value with increasing counter operation.

14. Borrow

Signal displayed when Linear count changes from -2,147,483,647 → -2,147,483,648 and when Ring count changes from the minimum value to the maximum value with decreasing counter operation.

15. External Preset Signal

External signal used to change present counter value to discretionarily specified value.

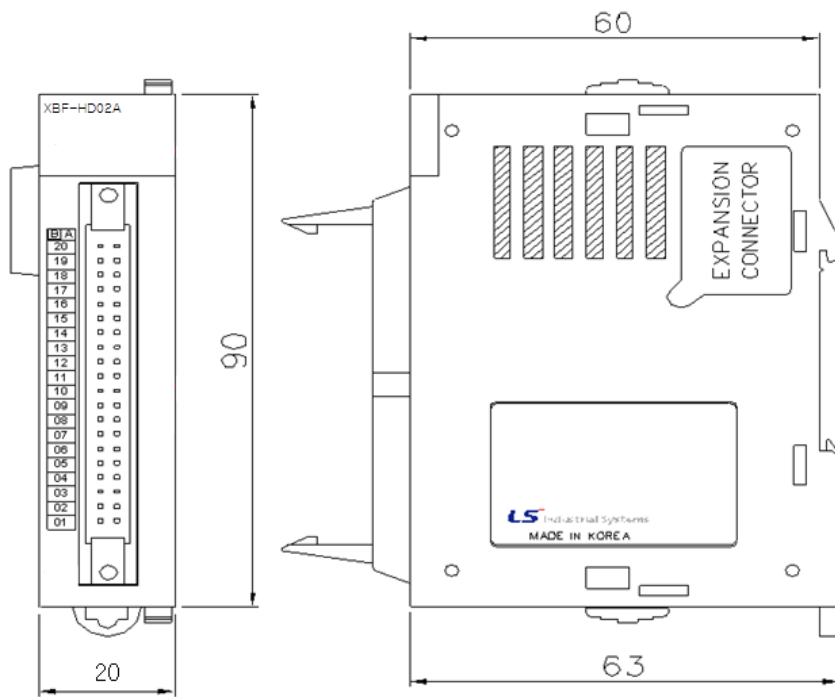
16. External Gate Signal

External signal used to enable the additional function operation.

Appendix 2 Dimensions

Appendix 2 Dimensions

Unit: mm



Remark

XBF-HO02A and XBF-HD02A are same size.

Warranty

1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

- (1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
- (2) Any trouble attributable to others' products,
- (3) If the product is modified or repaired in any other place not designated by the company,
- (4) Due to unintended purposes
- (5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
- (6) Not attributable to the company; for instance, natural disasters or fire

3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

Environmental Policy

LS ELECTRIC Co., Ltd supports and observes the environmental policy as below.

Environmental Management

LS ELECTRIC considers the environmental preservation as the preferential management subject and every staff of LS ELECTRIC use the reasonable endeavors for the pleasurable environmental preservation of the earth.

About Disposal

LS ELECTRIC PLC unit is designed to protect the environment. For the disposal, separate aluminum, iron and synthetic resin (cover) from the product as they are reusable.



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