Digital
Human Machine Interface

Pro-face®

Flex Network
High Speed Counter
Unit User Manual

Digital
Digital Electronics Corporation

Preface

Thank you for purchasing the Pro-face's Flex Network High-Speed Counter unit, hereafter referred to as "FN-HC unit" or "unit".

The unit is designed to be used with Pro-face's Graphical Logic Controller (GLC) Series, LT Series, and GP3000 Series FLEX NETWORK board type (hereafter referred to as "GLC") as a remote I/O system.

This manual explains the overall features and specifications of the unit, as well as its installation procedures.

Please be sure to read this manual thoroughly to understand the correct and safe usage of this product and its features.

< Note >

1. It is forbidden to copy the contents of this manual, in whole or in part, except for the user's personal use, without the express permission of the Digital Electronics Corporation.
2. The information provided in this manual is subject to change without notice.
3. This manual has been written with care and attention to detail; however, should you find any errors or omissions, please contact the Digital Electronics Corporation and inform us of your findings.
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Table of Contents

Essential Safety Precautions

This guide contains a variety of safety markings for safe and correct operation of the FN-HC unit. Please read this installation guide and any related manuals carefully to fully understand how to correctly use the FN-HC unit's functions.

■ Safety Symbols

Please pay attention to these symbols and follow all instructions given.
The safety symbols and their meanings are as follows:

DANGER	Indicates situations where severe bodily injury, death or major machine damage will definitely occur.
WARNING	Indicates situations where severe bodily injury, death or major machine damage can possibly occur.
CAUTION	Indicates situations where slight bodily injury or machine damage can occur.

DANGERS

- **An emergency stop circuit and an interlock circuit should be constructed outside of this unit. Constructing these circuits inside a system that uses this unit may cause a runaway situation, system failure, or an accident due to unit failure.**
- **Systems using this unit should be designed so that output signals which could cause a serious accident are monitored from outside the unit.**
- **This product is not appropriate for use with aircraft control devices, medical life-support equipment, central trunk data transmission (communication) devices, or nuclear power control devices, due to their inherent requirements of extremely high levels of safety and reliability.**
- **When using this product with transportation vehicles (trains, cars, and ships), disaster and crime-prevention devices, various types of safety equipment, and medical devices that are not life-support related, use redundant and/or failsafe system designs to ensure proper reliability and safety.**

⚠ WARNINGS

- **Prior to installing, removing, wiring, and conducting maintenance or inspections, be sure to disconnect power to this unit to prevent an electric shock or fire.**
- **Do not disassemble or remodel this unit, since it may lead to an electric shock or fire.**
- **Do not use this unit in an environment that contains flammable gases since an explosion may occur.**
- **Do not use this unit in an environment that is not specified in either the Installation Guide or User Manual. Otherwise, an electric shock, fire, malfunction or other failure may occur.**
- **Due to the possibility of an electric shock or malfunction, do not touch the unit's power terminals while it is operating.**

⚠ CAUTIONS

- **Communication cables or I/O signal lines must be wired separately from the main circuit (high-voltage, large-current) line, high-frequency lines such as inverter and power lines. Otherwise, a malfunction may occur due to noise.**
- **This unit must be installed according to directions given in its Installation Guide and User manual. Improper installation may cause the unit to malfunction or fail.**
- **This unit must be wired according to directions in the Installation Guide and User Manual. Improper wiring may cause a malfunction, failure or electric shock.**
- **Do not allow foreign substances, including chips, wire pieces, water, or liquids to enter inside this unit's case. Otherwise, a malfunction, failure, electric shock, or fire may occur.**
- **When disposing of this unit, it should be processed according to your country's industrial waste disposal laws.**

General Precautions

■ To Prevent Unit Damage

- Avoid storing or operating this unit in either direct sunlight or excessively dusty or dirty environments.
- Because this unit is a precision instrument, do not store or use it in locations where excessive shocks or vibration may occur.
- Avoid covering this unit's ventilation holes, or operating it in an environment that may cause it to overheat.
- Avoid operating this unit in locations where sudden temperature changes can cause condensation to form inside the unit.
- Do not use paint thinner or organic solvents to clean this unit.

Flex Network Unit Models

Flex Network units allow the GLC to communicate via a Flex Network system. The Flex Network unit model numbers are listed as follows:

Product Family	Unit Name	Model No.	Nodes Required	Manual
Flex Network	I/O Unit	FN-X16TS41	1	DIO Unit User Manual
		FN-X32TS41	2	
		FN-Y16SK41	1	
		FN-Y16SC41	1	
		FN-XY08TS41	1	
		FN-XY16SK41	1	
		FN-XY16SC41	1	
		FN-XY32SKS41	4	
		FN-Y08RL41	1	
	Analog Unit	FN-AD02AH41	1	2-Channel Analog Unit User Manual
		FN-DA02AH41	1	
		FN-AD04AH11	4	Analog Unit User Manual
		FN-DA04AH11	4	
	Single-Axis Positioning Unit	FN-PC10SK41	4	Single-Axis Positioning Unit User Manual
		FN-PC10LD41	-	
	High-Speed Counter Unit	FN-HC10SK41	8	This Manual

Compatible GLC Units

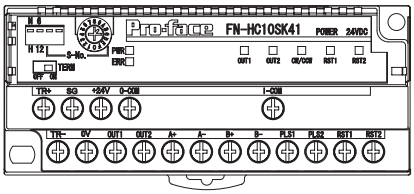
The following GLC units can be used with the Flex Network units. (GLC, LT , and GP are referred to collectively as the "GLC" in this manual.)

Product Family	Series Name		Unit Name	Model No.
GLC	GLC2000 Series	GLC2300 Series	GLC2300T	GLC2300-TC41-24V
			GLC2300L	GLC2300-LG41-24V
		GLC2400 Series	GLC2400T	GLC2400-TC41-24V
		GLC2500 Series	GLC2500T	GLC2500-TC41-24V
				GLC2500-TC41-200V
		GLC2600 Series	GLC2600T	GLC2600-TC41-24V
				GLC2600-TC41-200V
LT	LT Series		LT TypeB	GLC150-BG41-FLEX-24V
			LT Type B+	GLC150-BG41-XY32KF-24V
			LTC Type B+	GLC150-SC41-XY32KF-24V
			LT Type C	GLC150-BG41-RSFL-24V
GP	GP3000 Series	GP-3300 Series	AGP-3300L	AGP3300-L1-D24-FN1M
			AGP-3300T	AGP3300-T1-D24-FN1M
		GP-3400 Series	AGP-3400T	AGP3400-T1-D24-FN1M
		GP-3500 Series	AGP-3500T	AGP3500-T1-D24-FN1M
				AGP3500-T1-AF-FN1M
		GP-3600 Series	AGP-3600T	AGP3600-T1-D24-FN1M
				AGP3600-T1-AF-FN1M

Package Contents

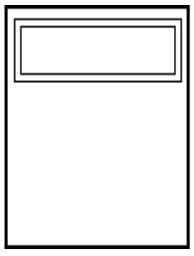
■ **Flex Network High-Speed Counter Unit (1)**

(FN-HC10SK41)



■ **Flex Network High-Speed Counter Unit Installation Guide – English/Japanese (1)**

The Flex Network High-Speed Counter Unit User Manual is sold separately.



Special care and attention have been given to the packaging of this unit. However, if any of the items are damaged or missing, please contact your local distributor immediately for prompt service.

Driver

The driver for the Flex Network Unit is required in order to use the unit.

For GLC2000 series and LT series,

You can select the Flex Network Driver via GP-PRO/PBIII C-Package (Pro-Control Editor) or LT Editor.

If the selection of the appropriate unit's name does not appear in the [I/O Configuration] - [I/O Unit Settings] area, you will need to update the driver file.

You can download the latest driver from Pro-face's web site.

URL :http://www.pro-face.com/

For GP3000 Series,

You can select the Flex Network Driver via GP-Pro EX as an I/O driver.

UL/c-UL (CSA) Application Notes

The FN-HC10SK41 is a UL/c-UL (CSA) listed product. (UL file No. E220851)

This unit conforms to the following standards:

■ UL 508 **Industrial Control Equipment**

■ CAN/CSA C22.2 No.1010-1 MEASUREMENT AND CONTROL EQUIPMENT (Safety requirements for electrical equipment for measurement and laboratory use)

FN-HC10SK41 **(UL Registration Model: 2980051-01)**

<Cautions>

• The FN-HC must be a built-in component of an end-use product.

• If the FN-HC is mounted so as to cool itself naturally, be sure to install the unit in a vertical (upright) panel, using either a DIN rail, or the installation screw holes.

• The power unit attached to the FN-HC should be a UL/c-UL (CSA) approved Class 2 power unit, or a Class 2 transformer. *1

If a single power supply is used to power the GLC, or multiple Flex Network units, design the wiring so the sum of the Flex Network unit's consumption current and the total load current does not exceed the Class 2 power unit or the Class 2 transformer's rating.

CE Marking Notes

The FN-HC10SK41 is a CE marked product that conform to EMC directives EN55011 class A and EN61000-6-2. For detailed CE Marking information, please contact your Flex Network distributor.

*1 *A Class 2 power supply unit or Class 2 power supply transformer is defined by NEC as being 30V and, at 8A or less output, at less than 100VA.*

Documentation Conventions

The list below describes the documentation conventions used in this manual.

Symbol	Meaning
	Indicates important information or procedures that must be followed for correct and risk-free software/device operation.
	Provides useful or important supplemental information.
*1	Provides useful or important supplemental information.
Reference	Cross-references useful or important supplemental information.
GLC	Generic name for the "GLC Series" of Graphic Logic Controllers made by Pro-face. In this manual, it also indicates "LT Series" and "GP3000 Series FLEX NETWORK board type".

Memo

Chapter 1 Introduction

This high-speed counter unit can be connected to a Flex Network.

There are three types of counting operations. Select the type of counting that fits your application needs. Reference *See **4.2 Functions***

- DC input/16-bit up counter (at 10kpps/1 multiplication)
- DC input/32-bit up counter (at 10kpps/1 multiplication)
- Differential input/32-bit up/down counter (at 200kpps/1 multiplication) and DC input (at 3kpps/1 multiplication)

1.1 System Design

When connecting to the Flex Network, two channels are available – CH1 and CH2. Each channel outputs the same data and either can be used for data transmission.

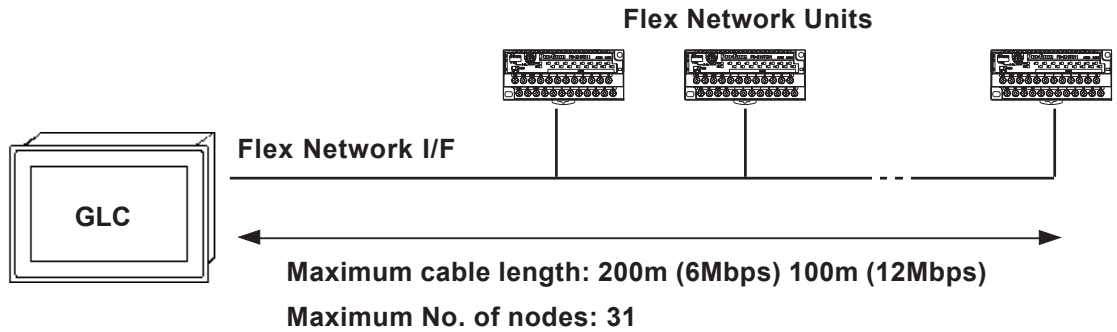
No software setup is required.

The maximum number of connectable nodes when using a single channel is 31, and when using a second channel, the number increases by 32 to a total of 63.

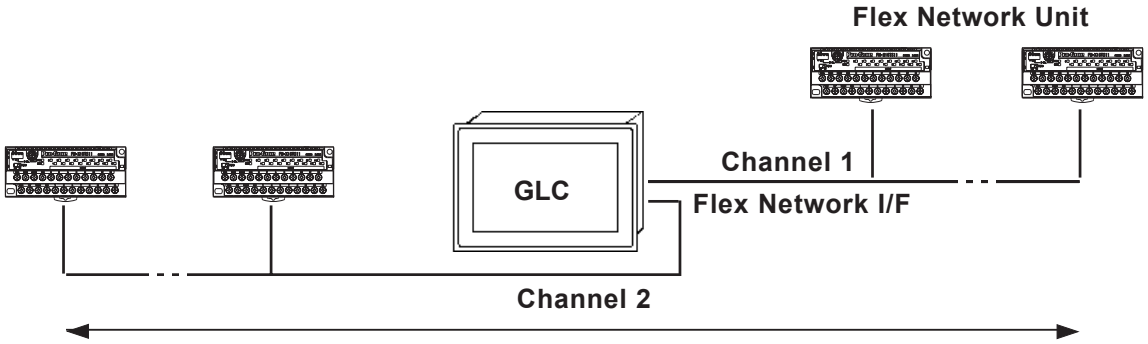
Important

- **When conecting the FN-HC to the Flex Network, each unit connected will use 128 bits of GLC memory, equivalent to 8 I/O nodes. The maximum number of connectable nodes (see above) therefore differs from the maximum number of connectable units.**
- **The Flex Network uses high-speed data-transfer technology, and if a cable used for data transfer is not the same as that specified in this document, network data-transfer performance cannot be guaranteed. Thus, be sure to use only the cable(s) recommended.**

■ With One (1) Channel



■ With Two (2) Channels

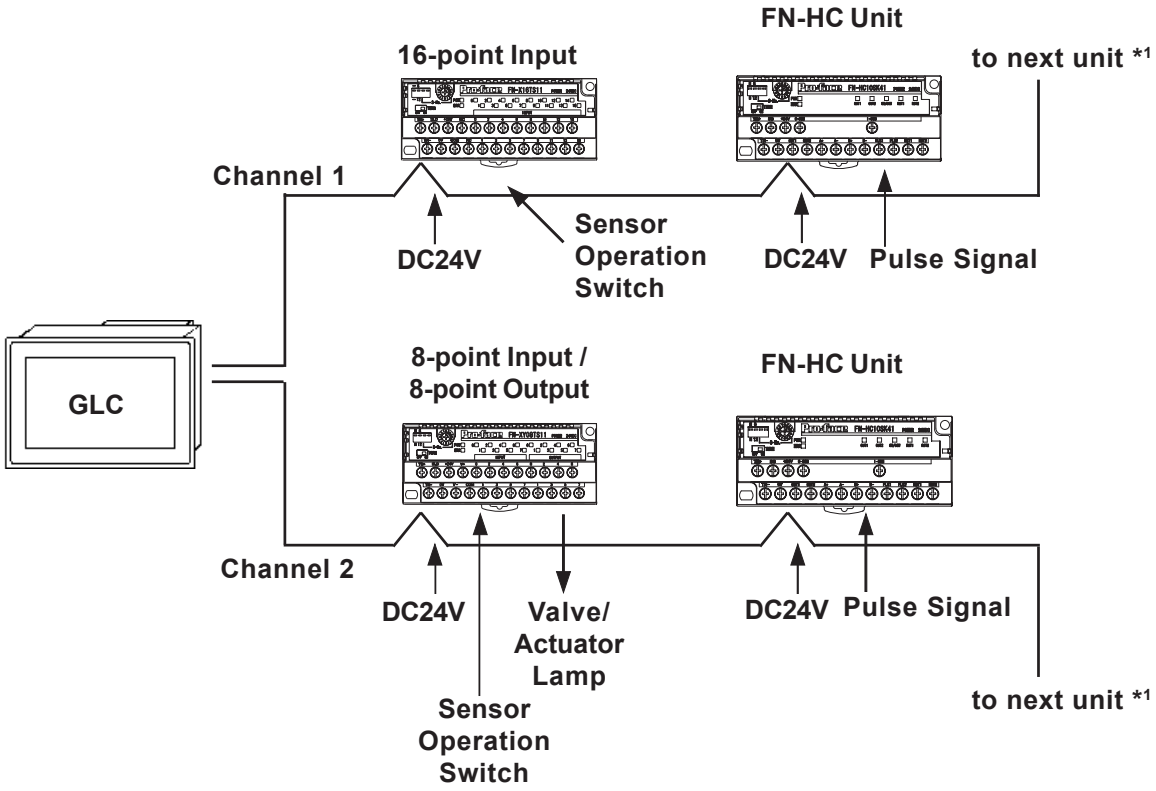


Maximum cable length: 400m (6Mbps), 200m (12Mbps)

Maximum No. of nodes: 63 (31 + 32)

Note: When using two channels, up to 32 nodes can be connected to either channel.

■ Standard System Design



Note: 6Mbps is the recommended speed.

**1.Be sure the Terminal Switch (TERM) at each end of the network's last unit is ON.*

1.2 Accessories

All optional equipment listed here is sold separately.

◆ Optional Items

Item	Model No.	Description
Flex Network Communication Cable	FN-CABLE 2010-31-MS (10m)	Connect GLC units with Flex Network units.
	FN-CABLE 2050-31-MS (50m)	
	FN-CABLE 2200-31-MS (200m)	

Memo

Chapter 2 Specifications

2.1 General Specifications

2.1.1 Electrical

Rated Voltage	DC24V
Rated Voltage Range	DC20.4V to DC28.8V
Allowable Voltage Drop	10 ms or less (Power Voltage DC24V)
Power Consumption	2.5W or less
In-rush Current	15A or less
Voltage Endurance	AC500V 20mA for 1 min. (between I/O and earth terminals)
Insulation Resistance	DC500V at 10MΩ or higher (between I/O and earth terminals)

2.1.2 Environmental

Ambient Operating Temperature	0^{o}C to 55^{o}C
Storage Temp.	-25^{o}C to $+70^{o}$C
Ambient Humidity	30%RH to 95%RH (no condensation) Level RH-1
Storage Humidity	30%RH to 95%RH (no condensation) Level RH-1
Air Purity (Dust)	0.1mg/m^3 or less (non-conductive levels)
Corrosive Gasses	Free of corrosive gasses
Atmospheric Pressure	800 hPa to 1114 hPa (2,000 meters or lower)
Vibration Resistance	IEC61131-2 (JIS B 3501) compliant When vibration IS NOT continuous: 10Hz to 57Hz 0.075mm, 57Hz to 150 Hz 9.8m/s^2 When vibration IS continuous: 10Hz to 57Hz 0.035mm, 57Hz to 150 Hz 4.9m/s^2 X,Y, Z directions for 10 times (80 min.)
Shock Endurance	IEC61131-2 (JIS B 3501) compliant 147m/s^2 (for 11ms in X,Y, Z directions - 2 times each)
Noise Immunity (via noise simulator)	Noise Voltage: 1000Vp-p Pulse Duration: 1μs Arise Time: 1ns
Electrostatic Discharge Immunity	Contact discharge of 6kV (IEC61000-4-2, Level 3)

2.1.3 Structural

Protection	Protection: Equivalent to IP20 Installation method: 35mm [1.38 in.] DIN railing or screw installation
Cooling Method	Natural air circulation
Weight	150g or less
External Dimensions	W 108mm [4.25 in.] x H 45mm [1.77 in.] x D 49mm [1.93 in.]

2.2 Performance Specifications

2.2.1 Performance Specifications

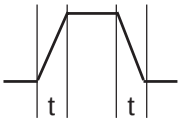
Counter Type	Input Type	Pulse Count Method (up/down counter)	Calculated Speed	No. of Counters	Calculation Range	Compare Output Mode
16-bit up counter	DC Input (DC24V Open Collector)		10kpps / 1kpps	2	0 to FFFF 0 to 65535 (16 bits)	Comparator Output x2 (=)
32-bit up counter			10kpps / 1kpps	1	0 to FFFFFFFF 0 to 4,294,967,295 (32 bits)	Comparator Output x 2 (=)
32-bit up/ down counter	Differ-ential Input (Line Driver)	1-phase 1-multiplication / 2-phase 1-multiplication*1	200kpps / 50kpps	1 (Encoder A, B differential input)	80000000h to 7FFFFFFFh (32-bit signed binary) -2,147,483,648 to +2,147,483,647	Cam Switch Simultaneous Output x 2
		2-phase 2-multiplication*1	100kpps / 25kpps			
		2-phase 4-multiplication*1	50kpps / 12.5kpps			
	DC Input (DC24V Open Collector)	1-phase 1-multiplication / 2-phase 1-multiplication*1	3kpps / 1kpps	1 (DC input)	80000000h to 7FFFFFFFh (32-bit signed binary) -2,147,483,648 to +2,147,483,647	Cam Switch Simultaneous Output x 2
		2-phase 2-multiplication*1	1.5kpps / 0.5kpps			
		2-phase 4-multiplication*1	0.75kpps/ 0.25kpps			

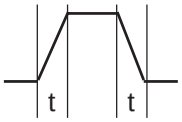
1. Refer to page 4–4 for the measurement speed of each counter .

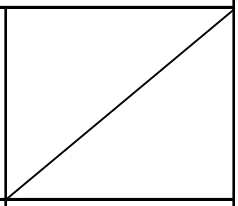
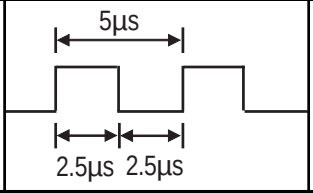
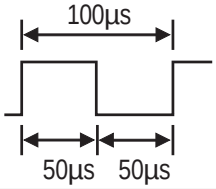
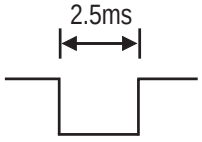
2.2.2 Data Transfer Settings (Flex Network Specifications)

	GLC2000/LT Series	GP3000 Series
Communication Configuration	1:N	
Connection Method	Multi-Drop Connection	
Maximum Distance	200m/channel at 6 Mbps 100m/channel at 12 Mbps	
Communication Method	Cyclic Time Division, half-duplex	
Communication Speed	6Mbps, 12Mbps	
Communication Interface	Differential, pulse-transformer isolation	
Error Check	Format detection, bit detection, CRC-12 detection	
Number of Connectable Nodes	63 (max.), 1008 I/O points (depending on type of units used.)	63 stations max., Bit variable input: 256 points, Bit variable output: 256 points, Integer variable input: 64 points, Integer variable output: 64 points (depending on type of units used.)
Number of Occupied Nodes	8	

2.2.3 Input / Output Specifications

<table>
<tr><td rowspan="11">INPUT</td><td colspan="2">Input Type</td><td>Differential Input (line driver)</td><td colspan="2">DC Input (DC24V Open collector)</td></tr>
<tr><td colspan="2"></td><td></td><td>Pulse Input (PLS 1/2)</td><td>External Reset Input (RST 1/2)</td></tr>
<tr><td colspan="2">Rated Input Voltage</td><td>DC5V</td><td colspan="2">DC24V</td></tr>
<tr><td colspan="2">Max. Input Voltage</td><td>DC4.5V to DC5.5V</td><td colspan="2">DC26.4 V</td></tr>
<tr><td colspan="2">Calculated Speed (Rise and Fall time)</td><td> 

t = 0.5µs or less
(200kpps)</td><td> 

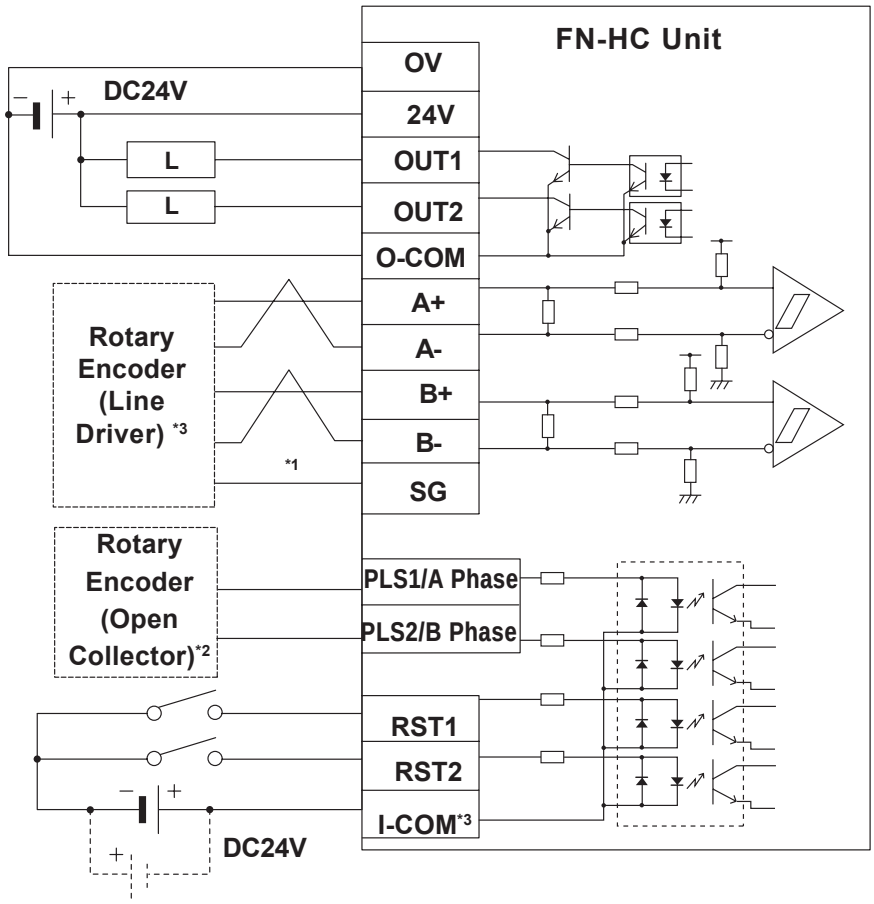
t = 10µs or less
(10kpps)</td><td>  </td></tr>
<tr><td colspan="2">Min. Pulse Width</td><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td rowspan="2">Input Signal</td><td>Level</td><td colspan="3">Square wave 0/24V signal</td></tr>
<tr><td>Phase</td><td colspan="3">90° phase differential 2-phase signal, 1 phase + directional signal,
1 phase addition signal</td></tr>
<tr><td colspan="2">Input Impedence</td><td>470Ω</td><td colspan="2">4.9kΩ</td></tr>
<tr><td colspan="2">Input ON Voltage</td><td rowspan="4">EIA Standard RS-422-A
Differential Driver
(Equivalent to Texas
Instruments SN75157)</td><td colspan="2">DC19V or higher</td></tr>
<tr><td colspan="2">Input OFF Voltage</td><td colspan="2">DC5V or lower</td></tr>
<tr><td rowspan="2">Input Delay</td><td>OFF-ON</td><td rowspan="2"></td><td>Maximum: 1.5ms</td></tr>
<tr><td>ON-OFF</td><td>Maximum: 1.5ms</td></tr>
<tr><td rowspan="8">OUTPUT</td><td colspan="2">Rated Output Voltage</td><td colspan="3">DC24V</td></tr>
<tr><td colspan="2">Rated Output Voltage Range</td><td colspan="3">DC24V (+/-10%)</td></tr>
<tr><td colspan="2">Output Voltage Drop</td><td colspan="3">DC1.5V or lower</td></tr>
<tr><td colspan="2">Output Current</td><td colspan="3">50mA or lower</td></tr>
<tr><td rowspan="2">Output Delay</td><td>OFF-ON</td><td colspan="3">Maximum: 1ms</td></tr>
<tr><td>ON-OFF</td><td colspan="3">Maximum: 1ms</td></tr>
<tr><td colspan="2">Short-circuit Protection</td><td colspan="3">None</td></tr>
<tr><td colspan="2">Leakage Current</td><td colspan="3">0.1mA or lower</td></tr>
</table>

2.3 Input / Output Circuit

This section explains the I/O connection (see circuit diagram, below) for the FN-HC unit.

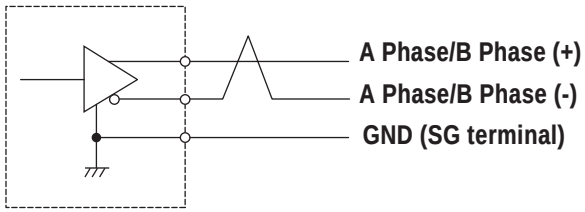
Note: If the FN-HC unit's power lines and output lines, and the sensor power lines seem to be receiving excessive levels of field noise, be sure to separate the power and signal lines.

■ FN-HC Unit Connection Diagram (from Rotary Encoder)

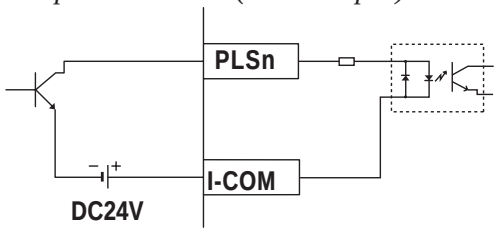


1. *The FN-HC unit's input line is not isolated. When connecting this unit to a line driver that is not isolated, be sure to connect the signal ground (SG) terminal.*

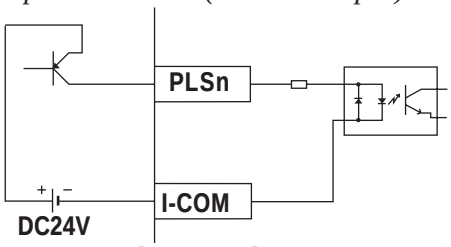
2. *Line Driver*



3. *Open Collector (Sink Output)*



Open Collector (Source Output)



4. *The Input Common (I-COM) shown here is connected to a Sink Output type. (The dotted line shows the connection with a Source Output type.)*

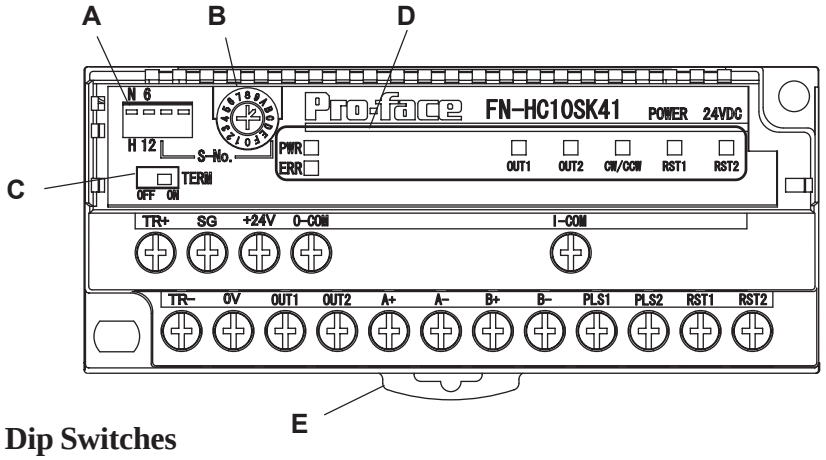
◆ Input/Output Signal

Terminal Name	Feature	
TR+	Flex Network Communication	Communication Channel
TR-	Flex Network Communication	
+24V	Unit Power (DC24V)	Power
OV	Unit Power (DC0V)	
OUT1	Comparator Output (Counter 1) / Cam Switch 1 Output	Control Output (DC24V Open Collector Output)
OUT2	Comparator Output (Counter 2) / Cam Switch 2 Output	
O-COM	Output Common	
+A	A Phase Line Driver DC5V Differential Input +	Differential Line Driver Input
-A	A Phase Line Driver DC5V Differential Input -	
+B	B Phase Line Driver DC5V Differential Input +	
-B	B Phase Line Driver DC5V Differential Input -	
SG	Signal Ground	
PLS1	Counter 1 DC Input	DC24V Input
PLS2	Counter 2 DC Input[*1]	
RST1	External Reset Signal (Counter 1)	
RST2	External Reset Signal (Counter 2) [*1]	
I-COM	Input Common DC24V (with Source Output type connection: 0V)	

1. PLS2 and RST2 Input are available only with Input Mode 1 (Mode 1).

2.4 Part Names and Features

2.4.1 Flex Network High-Speed Counter Unit

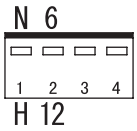


A: Dip Switches

Designates, from left to right, the Output Hold setting, Communication Speed setting, and first (hex) digit of the FN-HC unit's S-No.

Factory Settings

Communication Speed:	6 Mbps
Station Number (S-No):	0
Output Hold:	Non-Hold



B: Station No. Switch

Designates the second (hex) digit of the FN-HC unit's S-No.

C: Terminator

Turns the termination resistance feature ON or OFF.

D: Status LED

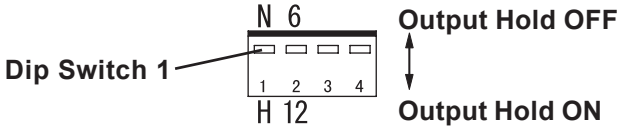
Indicates the following conditions.

PWR	Green	Power	ON when power is turned ON.
ERR	Red	Error	ON when communication error occurs; OFF when communication is normal.
OUT1	Green	Cam Switch 1 / Counter 1 Comparator Output	ON when Cam Switch 1 Output is ON; ON when Counter 1 Comparator outputs.
OUT2	Green	Cam Switch 2 / Counter 2 Comparator Output	ON when Cam Switch 2 Output is ON; ON when Counter 2 Comparator outputs.
CW/CCW	Green	Rotating Direction	ON during CW (forward rotation); OFF during CCW (reverse rotation).
RST1	Orange	External Reset 1 (Counter 1)	ON when Reset 1 input is ON.
RST2	Orange	External Reset 2 (Counter 2)	OFF when Reset 2 input is ON.

E: DIN Rail Attachment Hook

Use to attach the FN-HC Unit to the DIN rail.

■ Output Hold Settings (Dip Switch 1)



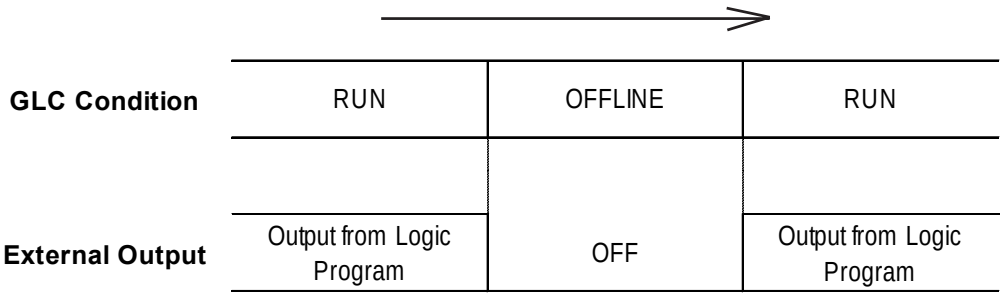
◆ Output Hold ON (Hold)

When a communication error occurs, the unit will HOLD the previously-received cam and comparator outputs, and the current value of the counter. When the next cycle is performed and the next command is successfully received, the output will then be changed.

◆ Output Hold OFF (Non Hold)

When a communication error occurs, the current value in the counter, the comparator output, and the cam switch output are reset to 0 (OFF). When normal communication is restored, the output is also restored. This is the default setting.

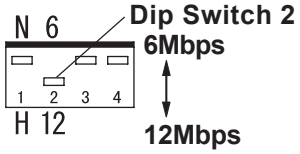
- **The output hold setting status is read when the FN-HC unit is turned ON. To change this setting, turn the FN-HC unit OFF, change the setting and then turn the unit ON again.**
- **When the Output Hold setting is used, the external output received before an error occurs is retained when a communication error occurs. Therefore, be sure to design a failsafe system to ensure safety when operating the system.**
- **When the Logic Program changes from the RUN condition to either the OFFLINE or RESET mode, the GLC or external outputs will be performed as follows, regardless of the Output Hold Setting. Be sure to consider this when changing to either the OFFLINE or RESET mode.**



When using the RESET command, the timing of the external output OFF timing is not fixed and can vary.

■ Communication Speed Settings (Dip Swtich 2)

Dip Switch No. 2 controls the communication speed (6Mbps or 12Mbps). The recommended factory setting is 6Mbps.



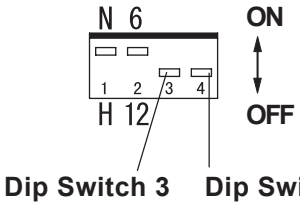
Important

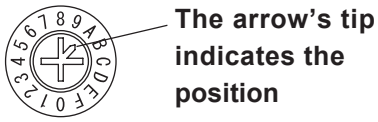
The Communication Speed setting status is read when the FN-HC unit is turned ON. To change this setting, turn the FN-HC unit OFF, change the setting and then turn the unit ON again.

■ S-No. (Station Number) Setting (Dip Switches 3, 4)

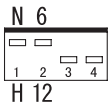
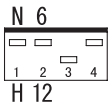
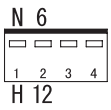
Station numbers from 1 to 63 are set in hexadecimal (01h to 3Fh). The factory setting is 0.

The hex upper digit is controlled by the ON/OFF settings of Dip switch 3 and 4, and the lower digit is set via the S-No. 0 to F setting.





S-No. Setting Example

S-No. (Station No.)	Dip Switch		S-No. (Station No.) Switch
	SW3	SW4	
S-No. 1 (01h)	OFF	OFF	1
			
S-No. 16 (10h)	OFF	ON	0
			
S-No. 63 (3Fh)	ON	ON	F
			

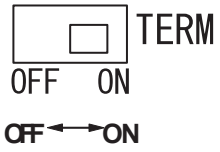
Important

The S-No. setting status is read when the FN-HC unit is turned ON. To change this setting, turn the FN-HC unit OFF, change the setting and then turn the unit ON again.

■ Termination Settings

This setting helps prevent reflections (echoes) from the terminating unit (adjusts the termination impedance).

Be sure that this termination setting for each channel in your system's final unit is set to ON.



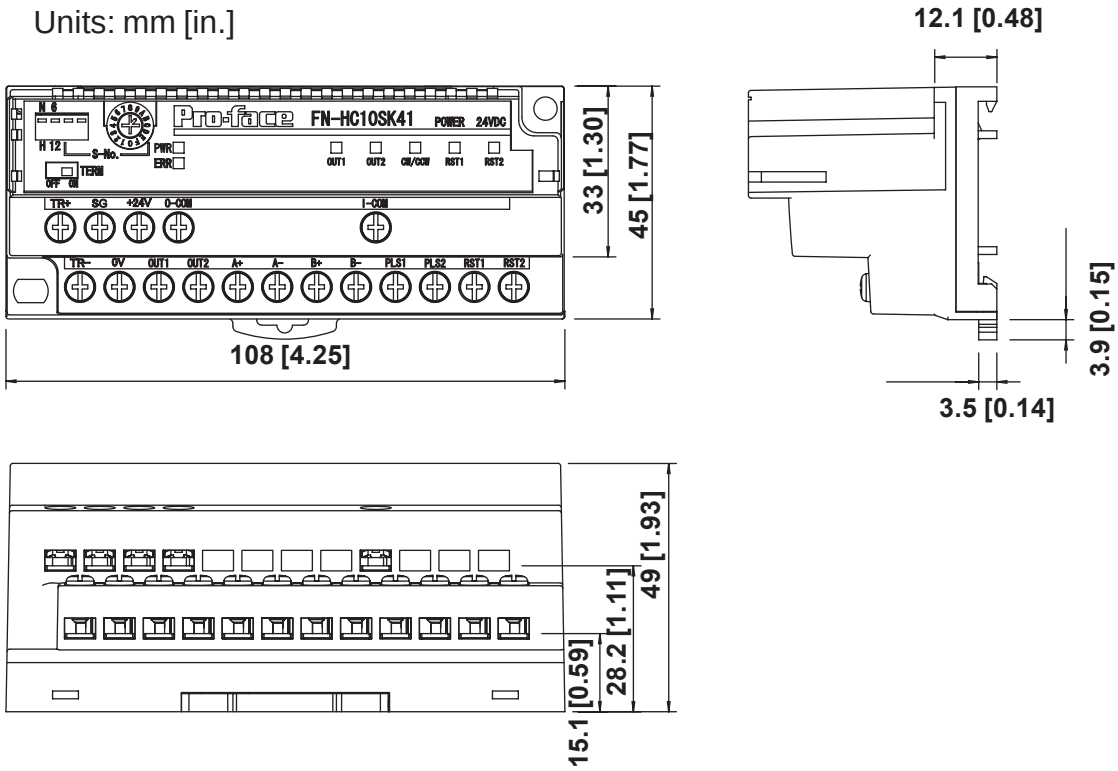
Important

The Termination Resistance setting status is read when the FN-HC unit is turned ON. To change this setting, turn the FN-HC unit OFF, change the setting and then turn the unit ON again.

2.5 Dimensions

2.5.1 Flex Network High-Speed Counter Unit

Units: mm [in.]



Chapter 3 Installation and Wiring

3.1 Installation

⚠ WARNING

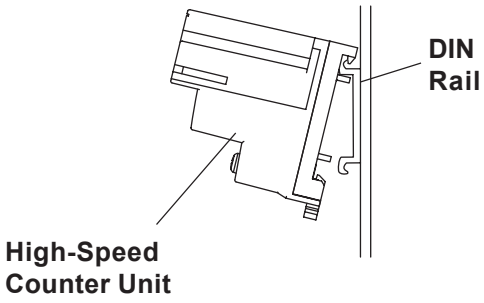
Prior to installing the FN-HC Unit, be sure that the main power supply is turned completely OFF.

3.1.1 Flex Network High-Speed Counter Unit Installation / Removal

■ Attaching the Unit to a 35 mm DIN Rail

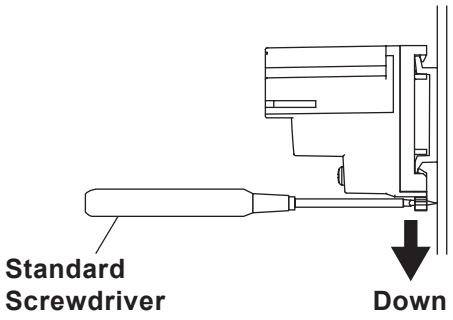
◆ **Attachment**

Place the unit's curved, top lip over the top of the DIN rail, and then tilt the unit down until the bottom face attachment clip clicks into place.



◆ **Removal**

Use a standard screwdriver to force the unit's attachment clip down until the bottom of the unit is freed from the rail. Next, tilt the unit up and remove.



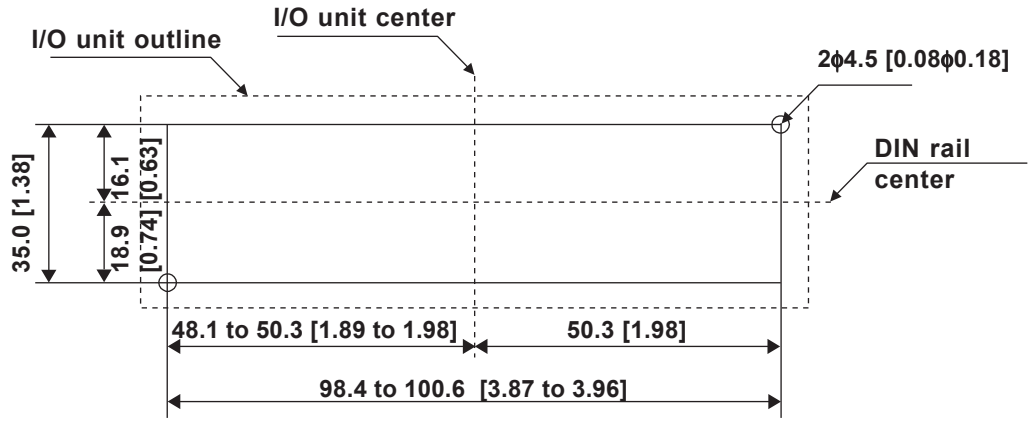
Important

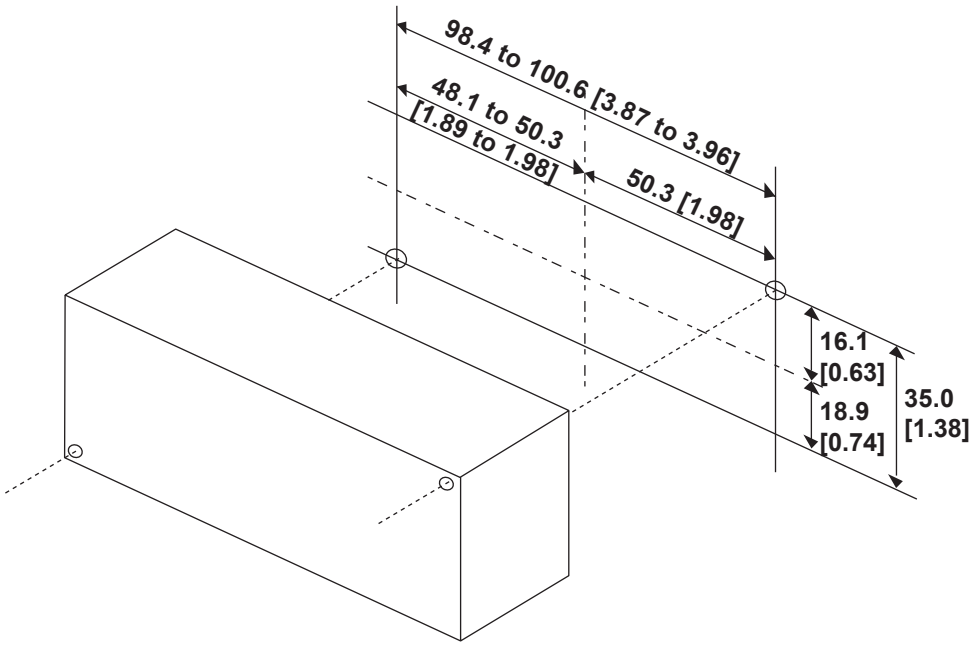
Check that the FN-HC unit is installed horizontally. If it is not correctly installed, it may overheat and cause a malfunction.

■ When Installing the Unit in a Panel

Drill installation holes in the panel according to the dimensions given below and use M4 screws to attach the unit. A torque of only 1.0 to 1.3N•m is sufficient.

Unit: mm [in.]





Check that the FN-HC unit is installed horizontally. If it is not correctly installed, it may overheat and cause a malfunction.

3.2 Wiring

⚠ WARNING

To prevent an electric shock, prior to wiring the FN-HC unit, be sure that the main power supply is turned OFF.

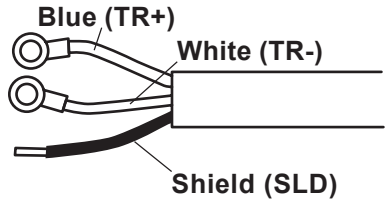
3.2.1 Connecting the Flex Network Communication Cable

Use jumper wiring between the distributed Flex Network units (T-type connections are not possible).

Pro-face recommends that the following cables be used:

Manufacturer	Model No.	Length
Digital Electronics Corporation	FN-CABLE2010-31-MS	10m
	FN-CABLE2050-31-MS	50m
	FN-CABLE2200-31-MS	200m

The cable should be made as shown below:

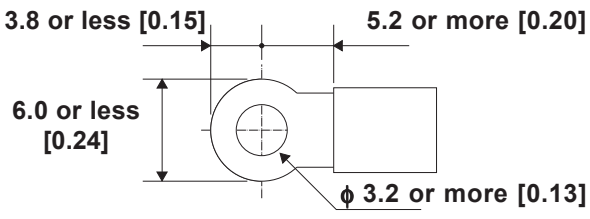


Important

The shield line should either be taped or covered with a plastic tube. Also, since the FN-HC unit has no shield (SLD) line, be sure to connect this line to an insulated or closed terminal connector.

Use the following type of crimp terminals.

Unit: mm [in.]



Important

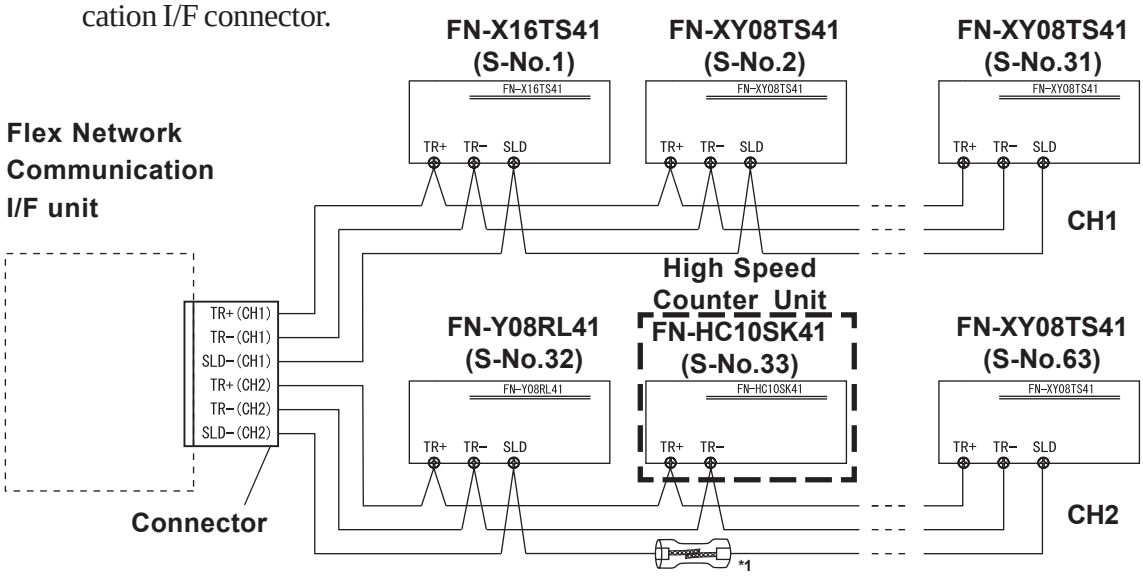
Crimp terminals should be either taped or covered with a plastic tube.

Note:

- The required torque for securing ring terminals is 0.6 to 1.0 N•m.
- Up to 2 terminals can be connected.

■ Flex Network System Wiring Layout

The following diagram illustrates the wiring layout used for the Flex Network Communication I/F connector.



1 *The FN-HC unit has no shield terminal (SLD). Be sure to connect an external insulated intermediate terminal.*

Note:

The number of nodes used by the FN-HC unit is 8. Thus, a regular FN unit connected after the FN-HC unit must use a number that is 8 higher than the FN-HC unit's.

For example, if the node number of the High-Speed Counter is 20H, the number of the next FN unit connected will be 28H.

To ensure correct Flex Network operation, be sure to check that all node numbers are set correctly.

3.2.2 Connecting the Power Cord

⚠ WARNINGS

- **Be sure that the main power supply is turned completely OFF before wiring the unit's power cord.**
- **The FN-HC unit uses only DC24V power. Using either the incorrect voltage or AC power could result in damage to both the power supply and the unit.**
- **Since this unit has no ON/OFF switch, be sure to install a breaker device to switch the power ON or OFF.**

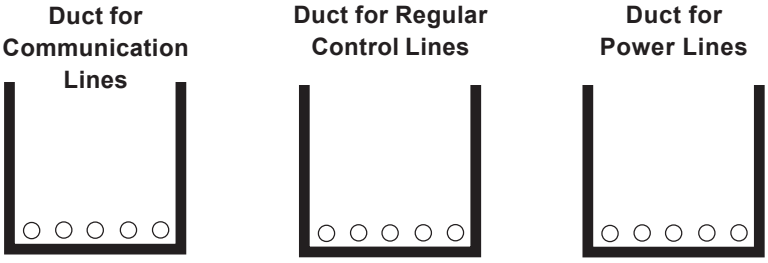
Note:

- Wherever possible, use thick wires (max. 1.25mm^2 [0.05in^2]), and be sure to twist the wires' ends to reduce noise.
- Use the same type of crimp terminals used for the Flex Network Communication Cable.

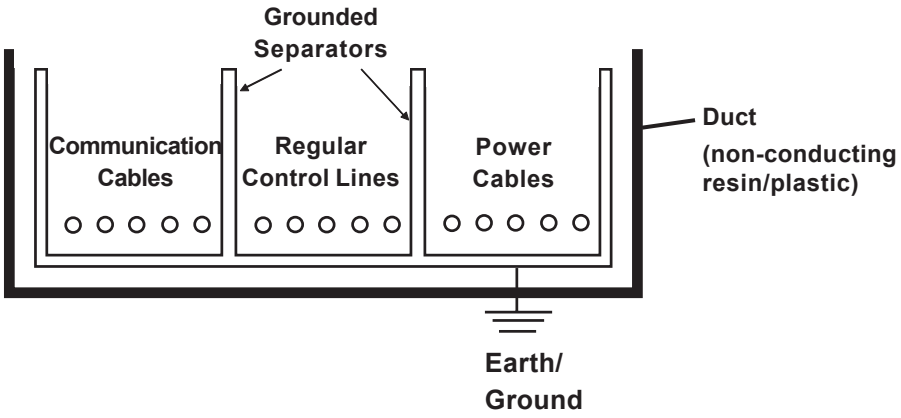
Reference *3.2.1 – "Connecting the Flex Network Communication Cable"*

3.2.3 General Cautions

To help prevent noise and interference problems, separate all communication lines from power lines by placing them in a separate duct.



If the wires must be placed in the same duct, separate them via an earthed/grounded divider.



Note: If the cables cannot be separated, use shielded cables and ground the shield line.

Important

- **Use noice-reducing external wiring methods to increase overall system reliability.**
- **To prevent power surges or noise interference, use ducts to separate all DC I/O or current circuit wires from communication cables.**
- **To prevent malfunctions due to noise, communication cables must be wired separately from high-frequency lines and power lines such as high-voltage lines, high-current lines, and inverters.**

Memo

Chapter 4 Functional Specifications

4.1 Operation Mode

There are two operation modes — RUN Mode and Setting Mode — which can be switched using bit 14 and bit 15 of the Control (CTL) register. If two 16-bit up counters are used, the modes in each counter can be changed.

■ RUN Mode

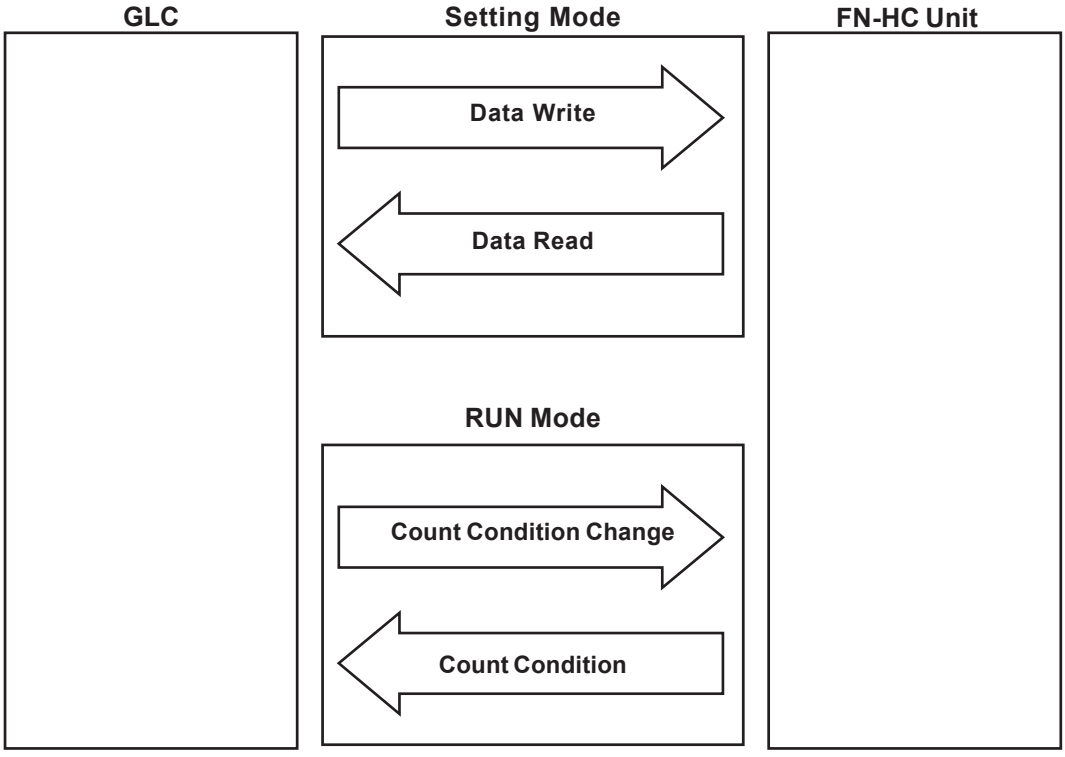
The current value of the counter can be read. Commands cannot be used, however, to send read/write data to the FN-HC unit.

■ Setting Mode

In this mode, commands can be used to read/write data to the FN-HC unit. While in Setting Mode, FN-HC unit count input is not changed, however, output control is performed based on this count data.

Important

When performing data Write in RUN mode, both the GLC unit and the FN-HC unit must be set to the same mode. If they are not, a malfunction can occur.



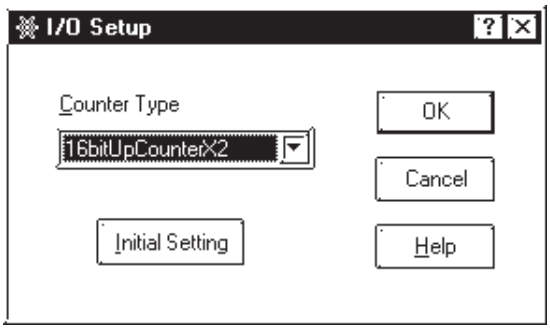
Important

- **Even in Setting Mode, the output produced will depend on the current setting value. for example, if the Current Value is equal to the Comparator Output Value, the Comparator Output turns ON. Also, When the Current Value is inside the Dog Setting Range, the Cam Switch Output will turn ON.**
- **After turning the FN-HC unit's power OFF, all write data is reset to its initial values. In this case, be sure to reset all write data.**

4.2 Functions

The following settings are performed via the following dialog box.

For Flex Network Driver settings information, refer to the Pro-Control Editor or LT Editor On-line Help.



No.	Counter Types	Mode 1	Mode 2	Modes 3 & 4
		16-bit up counter x 2	32-bit up counter x 1	32-bit up/down counter x 1
1	Counter Functions	O	O	O
2	Pulse Count Method	X	X	O
3	Measurement Speed	O	O	O
4	Input Type	X	X	O
5	Simultaneous Comparator Output	O	O	X
6	Cam Switch Output	X	X	O
7	Preset	O	O	O
8	Reset	O	O	O
9	Overflow Alarm	O	O	O
10	Count Disable	O	O	O
11	Current Value Read	O	O	O

■ Counter Types

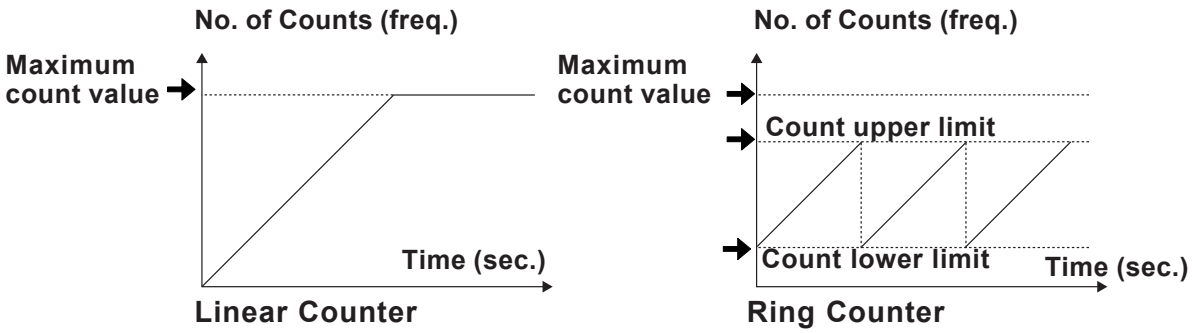
You can choose one of the following three types of counters:

- 16-bit Up Counter – counts in ascending order within a 16-bit range. These two counters operate independently.
- 32-bit up counter – counts in ascending order within a 32-bit range.
- 32-bit up/down counter – counts in both ascending and descending order within a 32-bit range.

■ Counter Functions

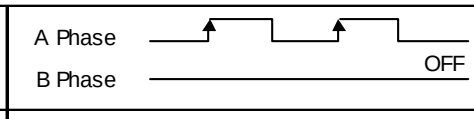
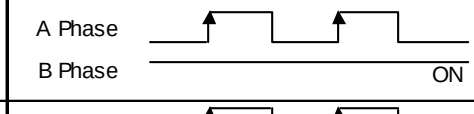
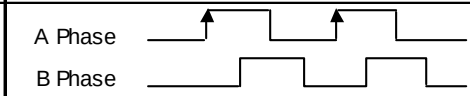
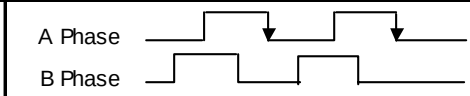
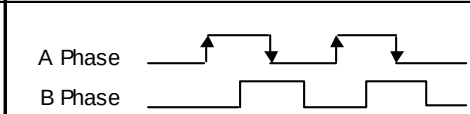
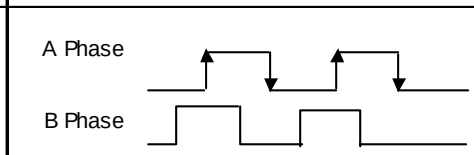
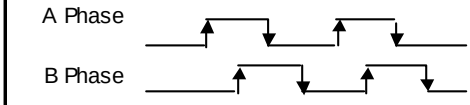
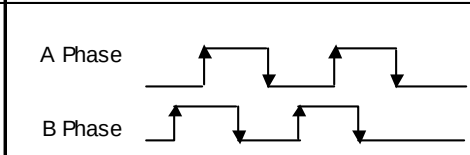
You can choose one of the following three types of functions. When using the 16-bit up counter X 2, you can select a counter function for each of the two independent counters.

- Linear counter – counts up to and maintains the maximum counting value.
- Ring counter – counts between the Ring Counter's upper and lower limit values. After counting from the lower limit value to the upper limit value, the counter returns to the lower limit value and begins to count again.
- Frequency counter – continuously displays the frequency.



■ Pulse Count Method (for both Linear and Ring Counters)

You can select one of four pulse count methods: 1-Phase 1-Multiplication; 2-Phase 1-Multiplication; 2-Phase 2-Multiplication; and 2-Phase 4-Multiplication. The Pulse Count Method function is available only when using a 32-bit up/down counter.

Pulse Count Method	Count Timing		Description
1-Phase 1-multiplication	Count Up		When B phase is OFF, counts up.
	Count Down		When B phase is ON, counts down.
2-Phase 1-Multiplication	Count Up		Counts up only when B phase occurs before A. Counts only while A phase bit is rising.
	Count Down		Counts down only when B phase occurs after A. Counts only while A phase bit is falling.
2-Phase 2-Multiplication	Count Up		Counts up only when B phase occurs before A. Counts only while A phase bit is rising or falling. Performs 2-phase multiplication at 2 times resolution.
	Count Down		Counts down only when B phase occurs after A. Counts only while A phase bit is rising or falling. Performs 2-phase multiplication at 2 times resolution.
2-Phase 4-Multiplication	Count Up		Counts up only when B phase occurs before A. Counts only while A phase bit is rising or falling. Performs 2-phase multiplication at 4 times resolution.
	Count Down		Counts down only when B phase occurs after A. Counts only while A phase bit is rising or falling. Performs 2-phase multiplication at 4 times resolution.

Important

When the 16-bit up counter X 2 or the 32-bit up counter X 1 is selected, the count increases only when the input pulse is rising.

■ Measurement Speed

When the 16-bit up counter X 2 or the 32-bit up counter X 1 is selected, 1kpps or 10kpps can be selected. When the 32-bit up/down counter is selected, the speed selected depends on the pulse count method. The speed selections are as follows:

Pulse Count Method	Input Type	
	Differential Input (Line Drivers)	DC Input (Open Collector)
1-Phase 1-Multiplication	50kpps or 200kpps	1kpps or 3kpps
2-Phase 1-Multiplilcation	50kpps or 200kpps	1kpps or 3kpps
2-Phase 2-Multiplication	25kpps or 100kpps	0.5kpps or 1.5kpps
2-Phase 4-Multiplication	12.5kpps or 50kpps	0.25kpps or 0.75kpps

Note: When using the 16-bit up counter X 2, the measurement speed must be the same for both counters.

■ Input Type

You can select an input type from either the line driver or the open collector. This feature is available only when a 32-bit up/down counter is selected.

■ Ring Counter Function

The Ring Counter function counts repeatedly between the lower limit value and the upper limit value. These limits are set in the Command setting.

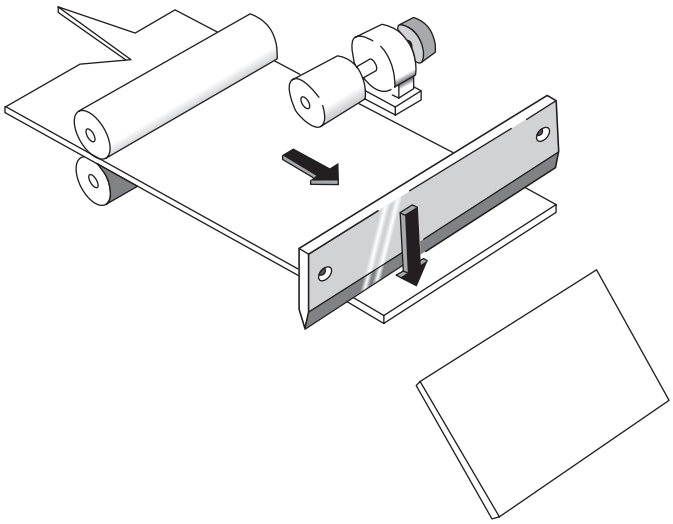
The ring counter can be used to control conditions, such as constant feed.

Ring Counter Function – Example

A ring counter can be used in a system designed to cut a continuously-fed sheet, from the roller, at a value set by the ring counter.

The Ring Counter functions as follows:

1. The upper limit value and the lower limit value are set.
2. The motor turns ON and the roller rotates.
3. When the roller rolls out a specified length of sheet, the simultaneous ring counter output causes the motor to turn OFF.
4. The blade cuts the sheet.
5. Steps 2 to 4 are repeated.



Because the Comparator Output and the Cam Switch Output functions are set in and processed by the FN-HC unit, regardless of the GLC unit's sequence program scan time, these functions can process at high speeds (max. 1ms).

■ Comparator Output Function (for both Linear and Ring Counters)

When the current count value of the FN-HC unit equals the previously set Comparator Output setting, the FN-HC unit can perform simultaneous external output. Once the external output is produced, the unit will latch (will retain the output) until the Reset or Preset command is used.

The Comparator Output setting must be entered in the Write Data register.

Explanation

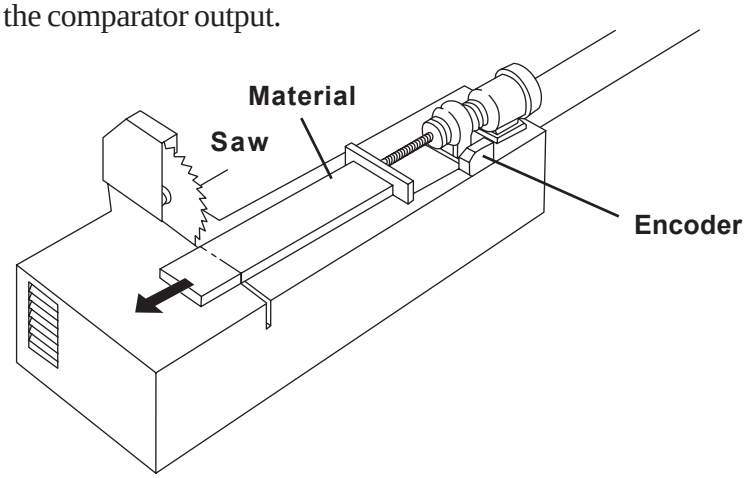
When the FN-HC unit's current value matches the FN-HC unit's user-specified previously set count value, Comparator Output is produced. Since there is no effect from the GLC's scan time, high-precision high-speed times as small as 1msec. can be used.

Using the Comparator Output function requires that bit 8 and bit 9 of the Control (CTL) register be turned ON.

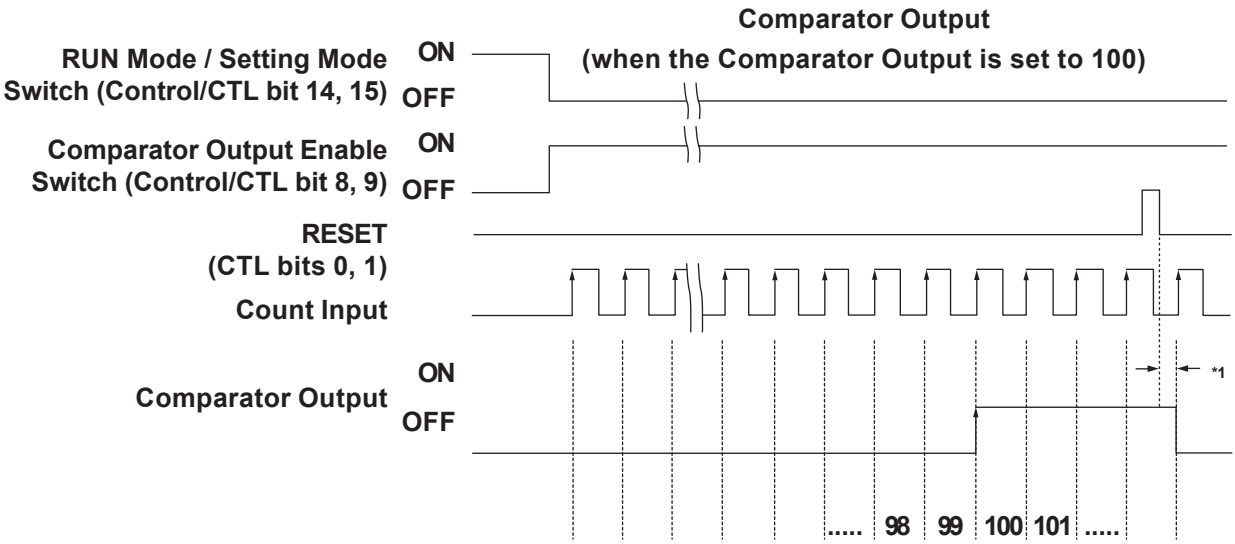
Comparator Output Function – Example

In a factory-processing system, the manufacture of a product corresponds to the comparator output in each processing operation.

1. Material is moved via the motor.
2. The encoder gives the current value of the pulse, which corresponds to the current position of the material.
3. When the material moves into its specified position, the High-Speed Counter unit produces the comparator output.



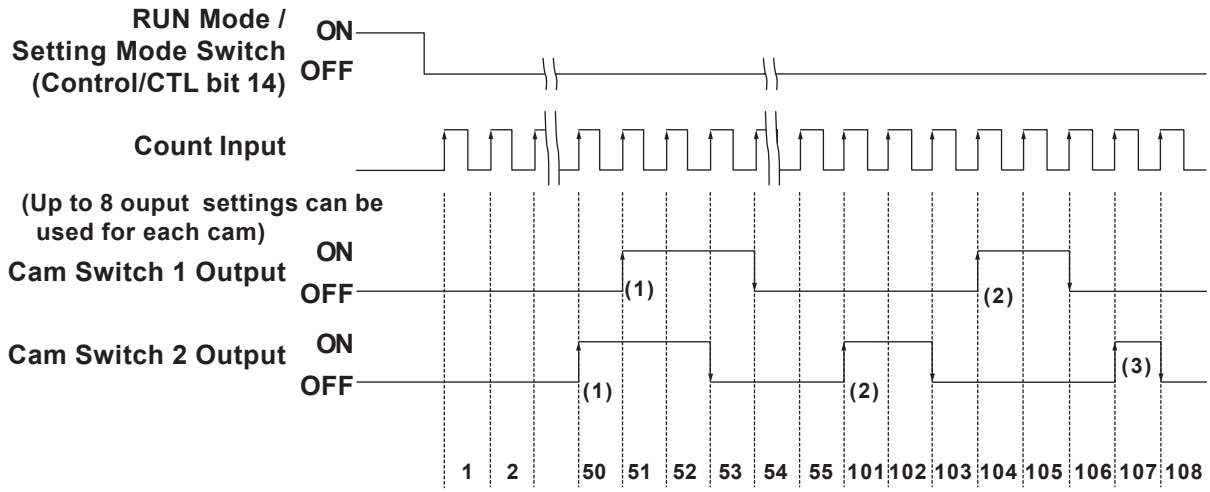
Operation of Comparator Output Function



1 *At a communication speed of 6Mbps with 63 nodes (Stations), allow at least 6ms for RESET to turn all comparator outputs OFF. 8 nodes would be approx. 2ms. (Comm. + Output delay)*

■ Cam Switch Output Function (both Linear and Ring Counters)

The High-Speed Counter unit performs external output only when its count value is set within the range of a cam switch's dog. Two (2) imaginary cam switches operating via software can be used. Each switch can set up to eight (8) dogs.



Cam Switch 1 Setting Example	Output Range	
1) Cam switch 1 Output Dog 1	Lower limit: 51	Upper limit: 54
2) Cam Swtich 1 Output Dog 2	Lower limit: 104	Upper limit: 106

Cam Switch 2 Setting Example	Output Range	
1) Cam switch 2 Output Dog 1	Lower limit: 50	Upper limit: 53
2) Cam Swtich 2 Output Dog 2	Lower limit: 101	Upper limit: 103
3) Cam Swtich 2 Output Dog 3	Lower limit: 107	Upper limit: 108

Note:

- When counting up (during reverse movement), reaching the upper limit turns the Switch ON, and the lower limit turns it OFF.
- Set start and end points to zero for unused dogs.

Because the Comparator Output and the Cam Switch Output functions are set in and processed by the High-Speed Counter unit, regardless of the GLC unit's sequence program scan time, these functions can process at high speeds (max. 1msec).

Important

- **Set the Cam Switch Output Range so that the dog's lower limit and upper limit values have at least three (3) seconds gap between them.**
- **Set the Cam switch Output Range from -2147483392 (0x80000100) to 2147483391 (0x7FFFFEFF).**
- **Set the Cam Switch Ouput Range so that the Dog upper and lower limit value range is less than 2147483647 (0x7FFFFFFF).**

■ Preset Function (both Linear and Ring Counters)

By turning the Preset command ON, you can change the High-Speed Counter unit's current count values to preset values.

Important

- **Preset values must be entered in the Write Data register before using the Preset Function.**
- **When using Setting Mode, the Preset feature cannot be used.**

Explanation

The Preset Function enters a user-specified numeric value (preset value) from the current counter value.

The Preset Function is used when the pulse count starts from a user-specified value.

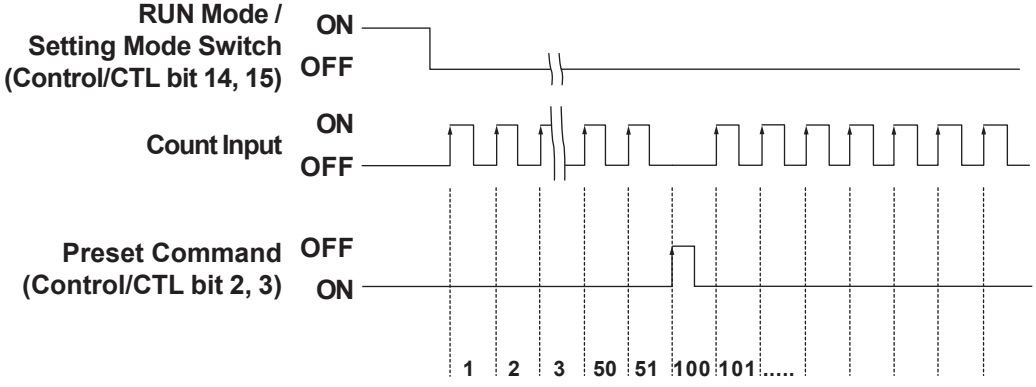
Another feature of the Preset Function is that it can also be set with a Logic Program.

Preset Function Usage – Example

Using the Preset Function allows a product-counting system to continue from the previous day's production count.

1. Products are carried by a loader.
2. An encoder gives the current value of the pulse, which corresponds to the number of products and the distance each product is carried.
3. At the end of the day's production, the buffer memory for that day's last successful current count value is stored in the retentive variable.

Operation of Preset Function
(Preset to 100)



■ Reset Function (both Linear and Ring Counters)

You can reset the unit's current count value to its initial value. The comparator output and the cam switch output are reset to 0 (OFF). The initial value for a Linear Counter is zero, and the initial value for a Ring Counter is minimum value.

During Setting Mode, the Reset Feature cannot be used.

■ Overflow Alarm Function (Ring Counter only)

When a counter reaches the maximum value, the overflow flag turns ON. To turn OFF the overflow flag, use either the Preset command or Reset function. The Overflow Alarm Function feature is available only when the counter function is set as a Linear Counter.

■ Count Disable Function (both Linear and Ring Counters)

When the Setting Mode is selected, the High-Speed Counter unit's count function can be temporarily stopped. After reselecting RUN Mode, the count value resumes from the time the count stopped — when the Setting Mode was selected. Only while the Setting Mode is selected can each setting be entered with the Write Data register.

■ Current Value Read Function (both Linear and Ring Counters)

The current value output by a High-Speed Counter unit can be read at every scan.

Type of Counter	Initial Value	Minimum Value	Maximum Value
16-bit up counter x 2	0 (decimal)	0 (decimal)	65535 (decimal)
	0h (hexadecimal)	0h (hexadecimal)	FFFFh (hexadecimal)
32-bit up counter	0 (decimal)	0 (decimal)	-1 (decimal)*1
	0h (hexadecimal)	0h (hexadecimal)	FFFFh (hexadecimal)
32-bit up/down counter	0 (decimal)	-2147483648 (decimal)	2147483647 (decimal)
	0h (hexadecimal)	80000000h (hexadecimal)	7FFFFFFFh (hexadecimal)

1. When a GLC unit's 32-bit up counter uses a decimal format setting, and because the MSB of the 32-bit variable is a sign bit, the number that follows +2147483647 is –2147483648.

When the Setting Mode is selected, the current value is not updated, but is retained until the RUN Mode resumes.

Chapter 5 Data Settings

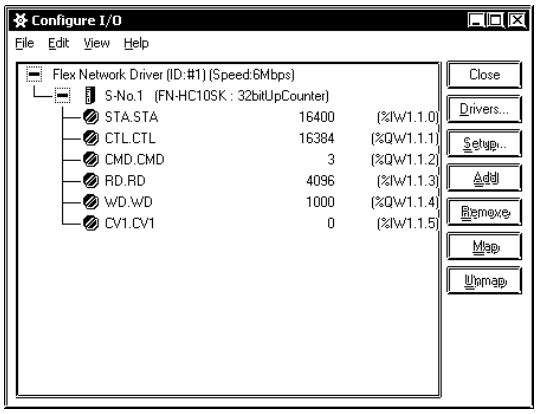
5.1 Flex Network Driver Settings

The use of integer variables depends on the integer variable allocated to each tree structure terminal in the Flex Network Driver.

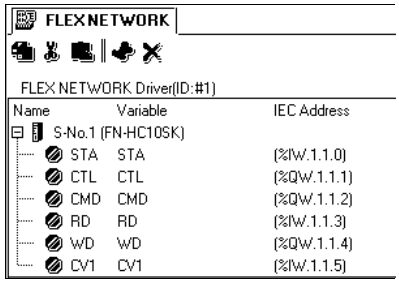
When using GLC2000 series/LT series, integer variables can be allocated in GP-PRO/PBIII C-Package (Pro-Control Editor) or LT Editor. For details of each setup method, refer to each Editor's online Help.

When using GP3000 series, refer to GP-Pro EX Reference Manual.

<GLC2000/LT Series>



<GP3000 Series>



Important

When setting up the I/O configuration, prior to starting the Logic Program, or while the program is being executed, when the I/O configuration is used to change the type of counter or function, depending on the command used, the written data may be reset to its initial value. When the FN-HC unit's power is turned ON, this data is written to the FN-HC unit.

The use of integer variables allocated to each terminal are as follows:

STA : Status register
CTL : Control register
CMD : Command register
RD : Read Data register
WD : Write Data register
CV1 : Current Value (Counter 1)
CV2 : Current Value (Counter 2)

Note:

- CV2 is displayed only when the setting is the 16-bit up counter X 2.
- If variables are not allocated to all terminals, an error message will occur at the time of error check or download.
- The above-listed variable/registers are examples of program variables.

■ Status Register (STA)

Stores bit information, such as the High-Speed Counter unit's status.

Each bit is used as follows:

Bit Position	Description	16-bit up counter X 2	32-bit up counter	32-bit up/down counter	Note
0	Comparator Output (Counter 1) 0: No Output; 1: Output	O	O	X	Reads out Comparator Output 1's status to the Logic Program.
	Cam Switch Output 1 0: No Output; 1: Output	X	X	O	Reads out Cam Switch 1's status to the Logic Program.
1	Comparator Output (Counter 2) 0: No Output; 1: Output	O	O	X	Reads out Comparator Output 2's status to the Logic Program.
	Cam Switch Output 2 0: No Output; 1: Output	X	X	O	Reads out Cam Switch 2's status to the Logic Program.
2	Overflow Flag (Counter 1) 0: OFF; 1: ON	O	O	O	Reads out Counter 1's overflow status to the Logic Program.
3	Overflow Flag (Counter 2) 0: OFF; 1: ON	O	X	X	Reads out Counter 2's overflow status to the Logic Program.
4	CW/CCW Rotate Notification 0: CCW; 1: CW	O	O	O	Reads out Count Up direction (CW, Count Down direction (CCW) to the Logic Program.
5	Reserved	–	–	–	–
6	Reserved	–	–	–	–
7	Reserved	–	–	–	–
8	Comparator Output Check (Counter 1) 0: Disable; 1: Enable	O	O	X	Reads out Counter 1's Comparator Output Use/Not Use status to the Logic Program.
	CW Rotate Check (Cam Switch 1) 0: Disable; 1: Enable	X	X	O	When Cam SW1 is used, reads out CW Output Use/Not Use status to the Logic Program.
9	Comparator Output Check (Counter 2) 0: Disable; 1: Enable	O	X	X	Reads out Counter 2's Comparator Output Use/Not Use status to the Logic Program.
	CCW Rotate Check (Cam Switch 1) 0: Disable; 1: Enable	X	X	O	When Cam SW1 is used, reads out CCW Output Use/Not Use status to the Logic Program.
10	CW Rotate Check (Cam Switch 2) 0: Disable; 1: Enable	X	X	O	When Cam SW2 is used, reads out CW Output Use/Not Use status to the Logic Program.
11	CCW Rotate Check (Cam Switch 2) 0: Disable; 1: Enable	X	X	O	When Cam SW2 is used, reads out CCW Output Use/Not Use status to the Logic Program.
12	Reserved	–	–	–	–
13	Command Completion Flag	O	O	O	Confirms sending of CMD is completed.
14	RUN Mode / Setting Mode Switch (Counter 1) 0: RUN Mode; 1: Setting Mode	O	O	O	Reads out Counter 1's mode selection to the Logic Program.
15	RUN Mode / Setting Mode Switch (Counter 2) 0: RUN Mode; 1: Setting Mode	O	X	X	Reads out Counter 2's mode selection to the Logic Program.

Reserved locations cannot be used.

■ Control Register (CTL)

Used to control the High-Speed Counter unit's operation.

Each bit is used as follows:

Modes Available	Bit Location	Description	16-bit up counter X 2	32-bit up counter	32-bit up/down counter	Note
Enabled in RUN or Setting Mode	0	Reset (Counter 1)	O	O	O	Requests Counter 1 Reset
	1	Reset (Counter 2)	O	X	X	Requests Counter 2 Reset
	2	Preset Command (Counter 1)	O	O	O	Requests Counter 1 Preset
	3	Preset Command (Counter 2)	O	X	X	Requests Counter 2 Preset
–	4	Reserved	–	–	–	–
	5	Reserved	–	–	–	
	6	Reserved	–	–	–	
	7	Reserved	–	–	–	
Enabled only during Setting Mode	8	Comparator Output (Counter 1) 0: Disable; 1: Enable	O	O	X	Requests Comparator Output Enable/Disable for Counter 1
		CW Direction (Cam Switch 1) 0: Disable; 1: Enable	X	X	O	Requests CW Enable setting for Cam SW 1. CCW can also be set simultaneously.
	9	Comparator Output (Counter 2) 0: Disable; 1: Enable	O	X	X	Requests Comparator Output Enable/Disable for Counter 2
		CCW Rotate (Cam Switch 1) 0: Disable; 1: Enable	X	X	O	Requests CCW Enable setting for Cam SW 1. CW can also be set simultaneously.
	10	CW Rotate (Cam Switch 2) 0: Disable; 1: Enable	X	X	O	Requests CW Enable setting for Cam SW 2. CCW can also be set simultaneously.
	11	CCW Rotate (Cam Switch 2) 0: Disable; 1: Enable	X	X	O	Requests CCW Enable setting for Cam SW 2. CW can also be set simultaneously.
–	12	Reserved	–	–	–	–
	13	Reserved	–	–	–	
Enabled in RUN or Setting Mode	14	RUN Mode / Setting Mode Switch (Counter 1) 0: RUN Mode; 1: Setting Mode	O	O	O	Requests RUN Mode or Setting Mode for Counter 1.
	15	RUN Mode / Setting Mode Switch (Counter 2) 0: RUN Mode; 1: Setting Mode	O	X	X	Requests RUN Mode or Setting Mode for Counter 2.

- When the process has completed, the Reset and Preset commands will turn OFF.
- Bits 8 to 11 are available only while the unit is operating in Setting Mode.
- Reserved locations cannot be used.

Even when bits 8 to 11 are disabled in setting mode, output is not turned OFF. The Reset and Preset commands will turn output OFF.

■ Command Register (CMD)

Used when data is written to the High-Speed Counter unit or when the unit's data is read. This register is used together with either a WD or RD register.

Prior to using a command, be sure to confirm that the FN-HC is in Setting Mode. Each command is requested once. If a command needs to be repeated, repeat the command's request for the desired number of times.

◆ Example

When writing a Preset value, enter "1" as the "CMD".

When reading a Preset value, enter "129" as the "CMD".

The following commands are use in the same way.

Write Command	Read Command	Description	Initial Value
1 (01h)	129 (81h)	Preset Value (Counter 1)	0
2 (02h)	130 (82h)	Preset Value (Counter 2)*1	0
3 (03h)	131 (83h)	Ring Counter Lower Limit (Counter 1)*2	Cntr. Min. value.
4 (04h)	132 (84h)	Ring Counter Upper Limit (Counter 1)*2	Cntr. Max. value.
5 (05h)	133 (85h)	Ring Counter Lower Limit (Counter 2)*1,*2	Cntr. Min. value.
6 (06h)	134 (86h)	Ring Counter Upper Limit (Counter 2)*1,*2	Cntr. Max. value.
7 (07h)	135 (87h)	Comparator Output Value (Counter 1)*3	0
8 (08h)	136 (88h)	Comparator Output Value (Counter 2)*1	0
9 (09h)	137 (89h)	Dog 1 Lower Limit of Cam Switch 1*4	0
10 (0Ah)	138 (8Ah)	Dog 1 Upper Limit of Cam Switch 1*4	0
11 (0Bh)	139 (8Bh)	Dog 2 Lower Limit of Cam Switch 1*4	0
12 (0Ch)	140 (8Ch)	Dog 2 Upper Limit of Cam Switch 1*4	0
13 (0Dh)	141 (8Dh)	Dog 3 Lower Limit of Cam Switch 1*4	0
14 (0Eh)	142 (8Eh)	Dog 3 Upper Limit of Cam Switch 1*4	0
15 (0Fh)	143 (8Fh)	Dog 4 Lower Limit of Cam Switch 1*4	0
16 (10h)	144 (90h)	Dog 4 Upper Limit of Cam Switch 1*4	0
17 (11h)	145 (91h)	Dog 5 Lower Limit of Cam Switch 1*4	0
18 (12h)	146 (92h)	Dog 5 Upper Limit of Cam Switch 1*4	0
19 (13h)	147 (93h)	Dog 6 Lower Limit of Cam Switch 1*4	0
20 (14h)	148 (94h)	Dog 6 Upper Limit of Cam Switch 1*4	0
21 (15h)	149 (95h)	Dog 7 Lower Limit of Cam Switch 1*4	0
22 (16h)	150 (96h)	Dog 7 Upper Limit of Cam Switch 1*4	0
23 (17h)	151 (97h)	Dog 8 Lower Limit of Cam Switch 1*4	0
24 (18h)	152 (98h)	Dog 8 Upper Limit of Cam Switch 1*4	0

1. *Available only with the 16-bit up counter X 2.*

2. *Available only with the ring counter function.*

3. *Available only with the 16-bit up counter X 2 or the 32-bit up counter.*

4. *Available only with the 32-bit up/down counter.*

Be sure to set the Cam Switch Output Range so that the dog's lower limit and upper limit values have at least three (3) seconds gap between them.

Command List (cont.)

Write Command	Read Command	Description	Initial Value
25 (19h)	153 (99h)	Dog 1 Lower Limit of Cam Switch 2*1	0
26 (1Ah)	154 (9Ah)	Dog 1 Upper Limit of Cam Switch 2*1	0
27 (1Bh)	155 (9Bh)	Dog 2 Lower Limit of Cam Switch 2*1	0
28 (1Ch)	156 (9Ch)	Dog 2 Upper Limit of Cam Switch 2*1	0
29 (1Dh)	157 (9Dh)	Dog 3 Lower Limit of Cam Switch 2*1	0
30 (1Eh)	158 (9Eh)	Dog 3 Upper Limit of Cam Switch 2*1	0
31 (1Fh)	159 (9Fh)	Dog 4 Lower Limit of Cam Switch 2*1	0
32 (20h)	160 (A0h)	Dog 4 Upper Limit of Cam Switch 2*1	0
33 (21h)	161 (A1h)	Dog 5 Lower Limit of Cam Switch 2*1	0
34 (22h)	162 (A2h)	Dog 5 Upper Limit of Cam Switch 2*1	0
35 (23h)	163 (A3h)	Dog 6 Lower Limit of Cam Switch 2*1	0
36 (24h)	164 (A4h)	Dog 6 Upper Limit of Cam Switch 2*1	0
37 (25h)	165 (A5h)	Dog 7 Lower Limit of Cam Switch 2*1	0
38 (26h)	166 (A6h)	Dog 7 Upper Limit of Cam Switch 2*1	0
39 (27h)	167 (A7h)	Dog 8 Lower Limit of Cam Switch 2*1	0
40 (28h)	168 (A8h)	Dog 8 Upper Limit of Cam Switch 2*1	0
	254 (FEh)	Error Code Read	
	255 (FFh)	Version Read	

1. *Available only with the 32-bit up/down counter.*

- **After turning the FN-HC unit's power OFF, all write data is reset to its initial values. In this case, be sure to reset all write data.**
- **Be sure to set the Cam Switch Output Range so that the dog's lower limit and upper limit values have at least three (3) seconds gap between them.**

■ Read Data Register/RD (Enabled in Setting Mode)

Stores data when the command to read data from the High-Speed Counter unit is entered. Also, stores data written after the command to write data to the High-Speed Counter unit is entered.

■ Write Data Register/WD (Enabled in Setting Mode)

Stores data before the command to write data to the High-Speed Counter unit is entered.

■ Current Value/CV1

Normally used to store the current count value of Counter 1.

■ Current Value/CV2

Normally used to store the current count value of Counter 2.

5.2 Data Settings

Data settings are performed in the Setting Mode. Mode changes are controlled via the Control (CTL) bits 14 and 15. Reference 4.1 – "Operation Mode"

When performing data Write in RUN mode, both the GLC unit and the FN-HC unit must be set to the same mode. If they are not, a malfunction can occur.

■ Data Write

Values written to the FN-HC unit are set in the Write Data (WD) register.

If the WD register contains a value that is outside the allowable Write command range, and the CMD register has been set to a Write command, the maximum or minimum value will be written to the High-Speed Counter unit.

When you enter a Write command value in the Command (CMD) register, the WD value is written as data to the High-Speed Counter unit.

- **When data containing more than 16 bits is written to data designated as 16-bit, the 16-bit data will be overwritten.**
- **After turning the FN-HC unit's power OFF, all write data is reset to its initial values. In this case, be sure to reset all write data.**

- When an incorrect value is entered to the command (SMD) setting, that value will remain unchanged, in the register.
- When commands can be accepted, Bit 13 (Command Completed Flag) and the command value input will both be cleared (set to "0").

Values written to the FN-HC unit will be reflected in the RD command.

Also, when command write is completed, it can be confirmed via the status area's bit 13 (Command Completed Flag), which will turn ON.

■ Data Read

If a Read command is set in the Command (CMD) register, values that are read from the High-Speed Counter unit are stored in the Read Data (RD) register.

- When an incorrect value is entered to the command (SMD) setting, that value will remain unchanged, in the register.
- When commands can be accepted, Bit 13 (Command Completed Flag) and the command value input will both be cleared (set to "0").

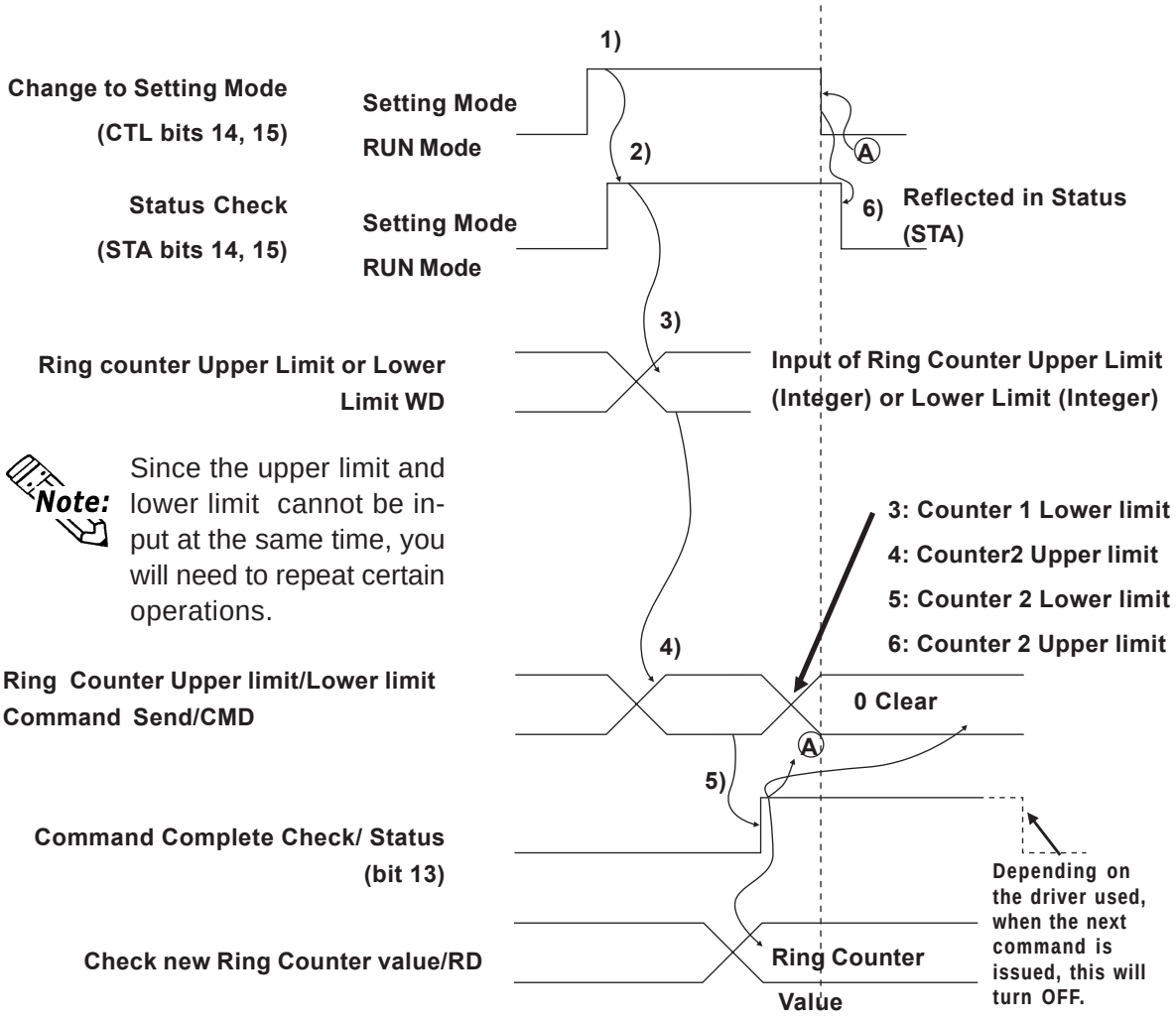
Also, when command read is completed, it can be confirmed via the status area's bit 13 (Command Completed Flag), which will turn ON.

■ Data Setting Procedures

Write	Read
1. Set WD register to a value. 2. Enter a Write command in the CMD register. ↓ Data is written to the High-speed Counter unit.	1. Enter a Read command in the CMD register. ↓ Data is read from the High-speed Counter unit to the RD register.

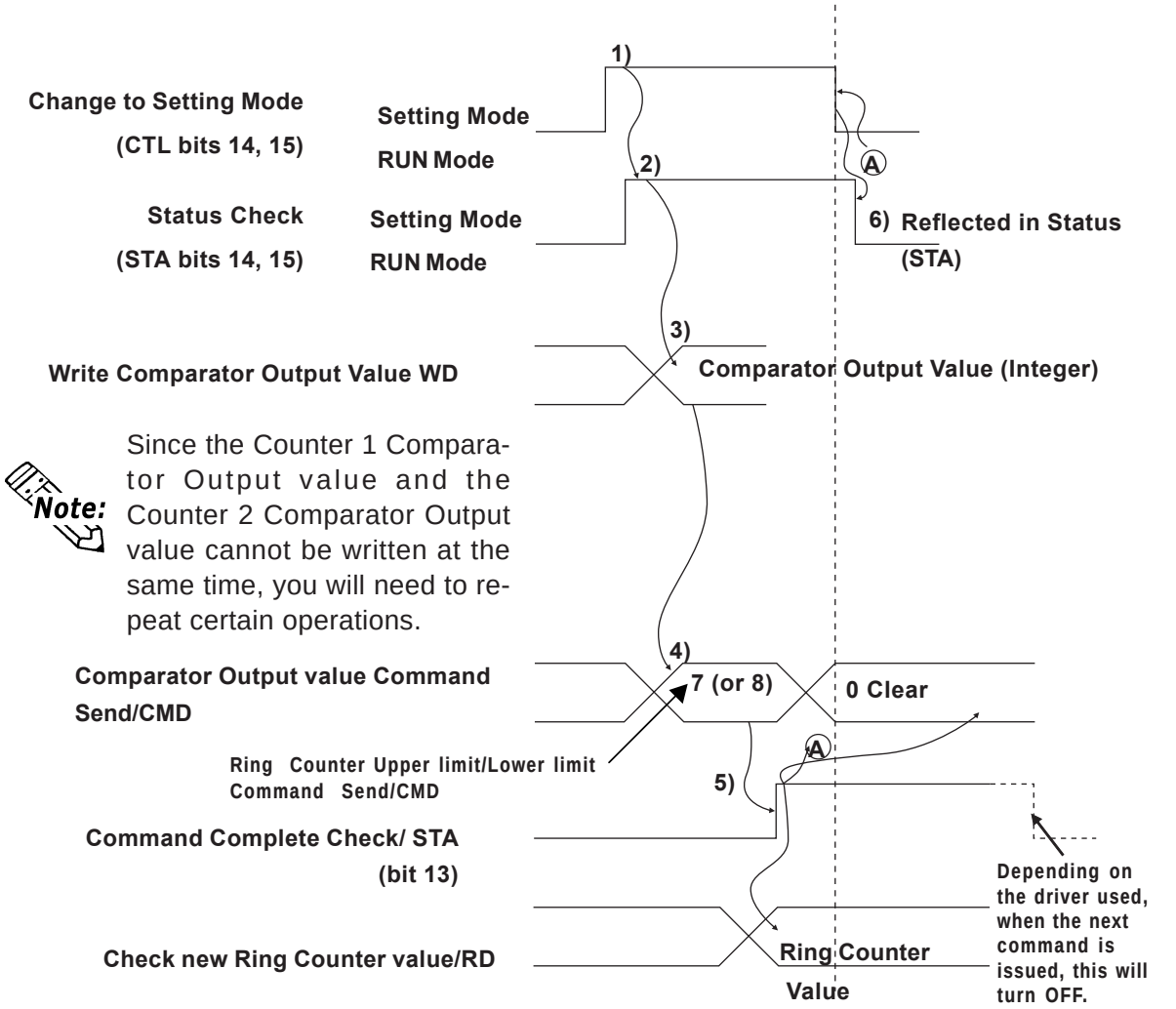
■ High Speed Counter Command Flow

◆ Data Write to Ring Counter Upper/Lower Limit Values



Important **The Flex Network Driver contains the RESET signal. All setting and resetting of all other signals is performed via the user's software.**

◆ Comparator Output Value/Enable & Disable Changeover Settings

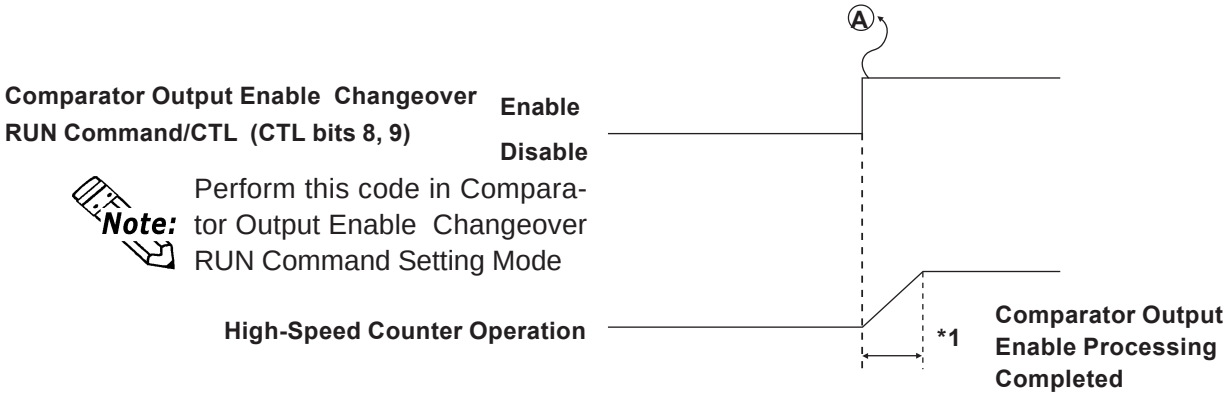


Note: Since the Counter 1 Comparator Output value and the Counter 2 Comparator Output value cannot be written at the same time, you will need to repeat certain operations.

Important **The Flex Network Driver contains the RESET signal. All setting and resetting of all other signals is performed via the user's software.**

The above procedures describe writing a Comparator Ouput Value to the FN-HC unit. However, while entering the above data is possible, it does not provide functionality for this feature.

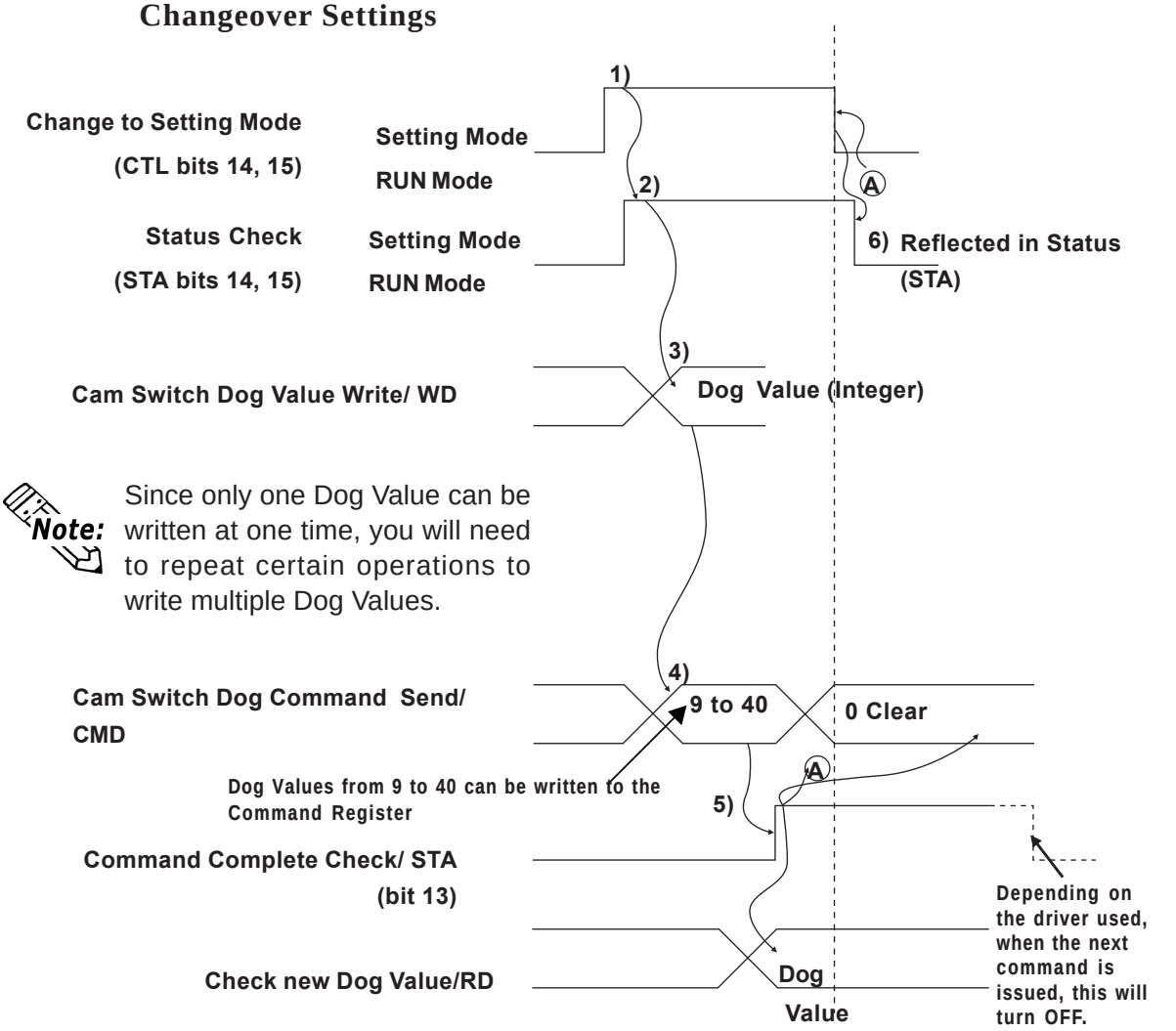
To use the above data for the Comparator Value Count Up Output, use the following Comparator Output Enable Changeover to enable output.



Note: Perform this code in Comparator Output Enable Changeover RUN Command Setting Mode

1 *At a communication speed of 6Mbps with 63 nodes (Stations), allow at least 5ms for RESET to turn all Comparator Outputs OFF. 8 nodes would be approx. 1ms.*

◆ Cam Switch Dog Value Write & Direction Change and Enable/Disable Changeover Settings

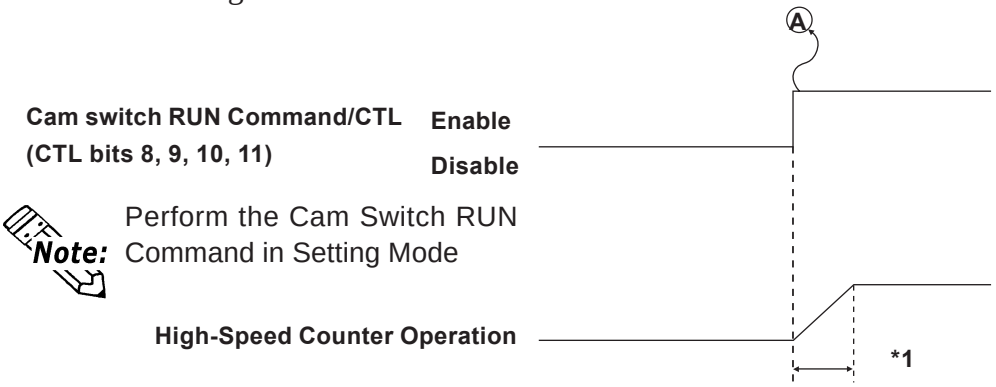


Note: Since only one Dog Value can be written at one time, you will need to repeat certain operations to write multiple Dog Values.

Important **The Flex Network Driver contains the RESET signal. All setting and resetting of all other signals is performed via the user's software.**

The above procedures describe writing a Dog Value to the FN-HC unit. However, while entering the above data is possible, it does not provide functionality for the Cam Switch Output feature.

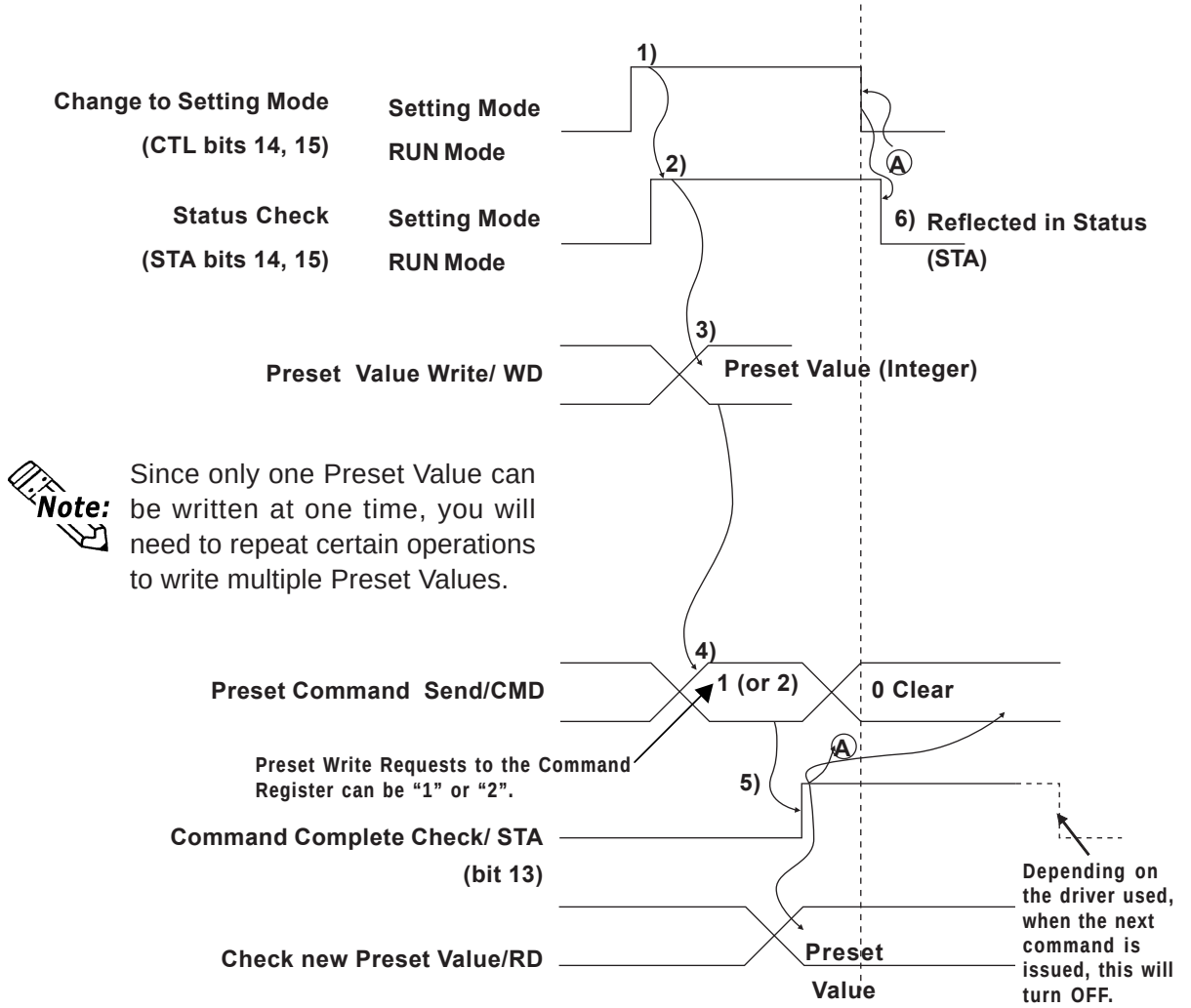
To use the above Dog Value Setting data for simultaneous output, use the following Cam Switch RUN Command to enable the Cam Switch.



Note: Perform the Cam Switch RUN Command in Setting Mode

***1** At a communication speed of 6Mbps with 63 nodes (Stations), allow at least 5ms for RESET. 8 nodes would be approx. 1ms.*

◆ Preset Value Write and Preset RUN

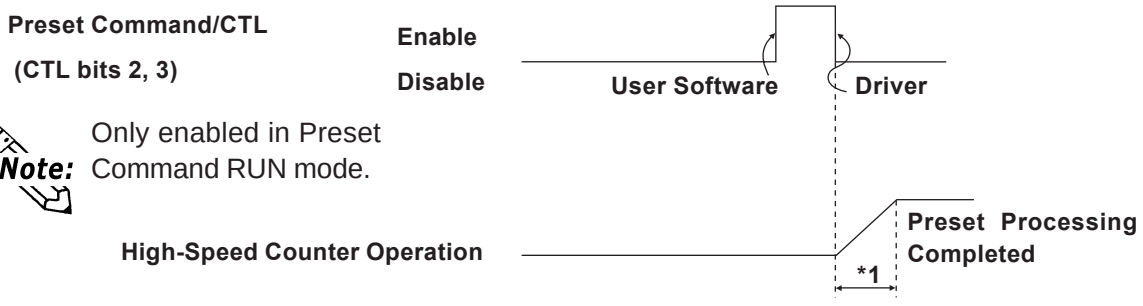


Note: Since only one Preset Value can be written at one time, you will need to repeat certain operations to write multiple Preset Values.

Important **The Flex Network Driver contains the RESET signal. All setting and resetting of all other signals is performed via the user's software.**

The above procedures describe writing a Preset Value to the FN-HC unit. However, while entering the above data is possible, it does not provide functionality for the Preset command.

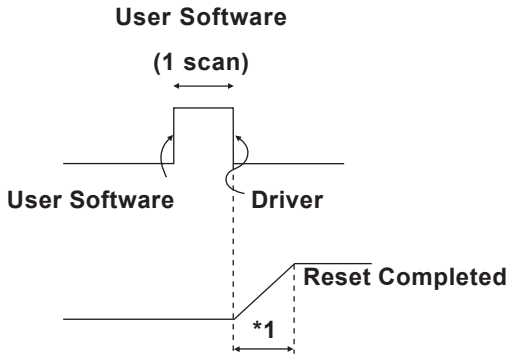
To use the above Preset data for simultaneous output, use the following Preset Command to enable the Preset feature.



Note: Only enabled in Preset Command RUN mode.

***1** At a communication speed of 6Mbps with 63 nodes (Stations), allow at least 5ms for RESET. 8 nodes would be approx. 1ms.*

◆ Reset



Note: Left and right are not performed in Setting and RUN modes.

High-Speed Counter Operation

***1** At a communication speed of 6Mbps with 63 nodes (Stations), allow at least 5ms for RESET. 8 nodes would be approx. 1ms.*

Memo

Chapter 6 Problems and Solutions

This section describes the Flex Network system's error messages and countermeasures.

6.1 Prior to Troubleshooting

Before reading this chapter's ***"Troubleshooting Checklist"*** section for the cause(s) of a unit's problem, first identify the type of problem itself, and then check other basic items.

Flex Network errors are classified, as follows, into three types of errors:

1. Logic Program Error

   The logic program does not run (GLC status LED: Green is not lit).

2. Flex Network I/F Error

   Communication cannot be performed with any Flex Network unit.

3. Flex Network Unit Error

   Flex Network unit cannot input or output signals.

■ Check Items

After completing your preliminary check, and before troubleshooting for the cause(s) of a unit's problem, be sure to check the following items:

- Is the correct power voltage supplied to the GLC and Flex Network units?
- Is the power supplied to the GLC and Flex Network units within the allowable voltage range?
- Are all connected cable wiring and connections (communication cable, I/O cable) secure and correct?
- Are any Flex Network unit terminals loose or disconnected?
- Are all Flex Network unit switches (S-No. switch, dip switch, terminal switch) set correctly?
- Is the required communication cable being used?

6.2 Error Code Display

By displaying an error code on the GLC screen with using the system variables that indicate the I/O driver error codes, troubleshooting can be performed quickly.

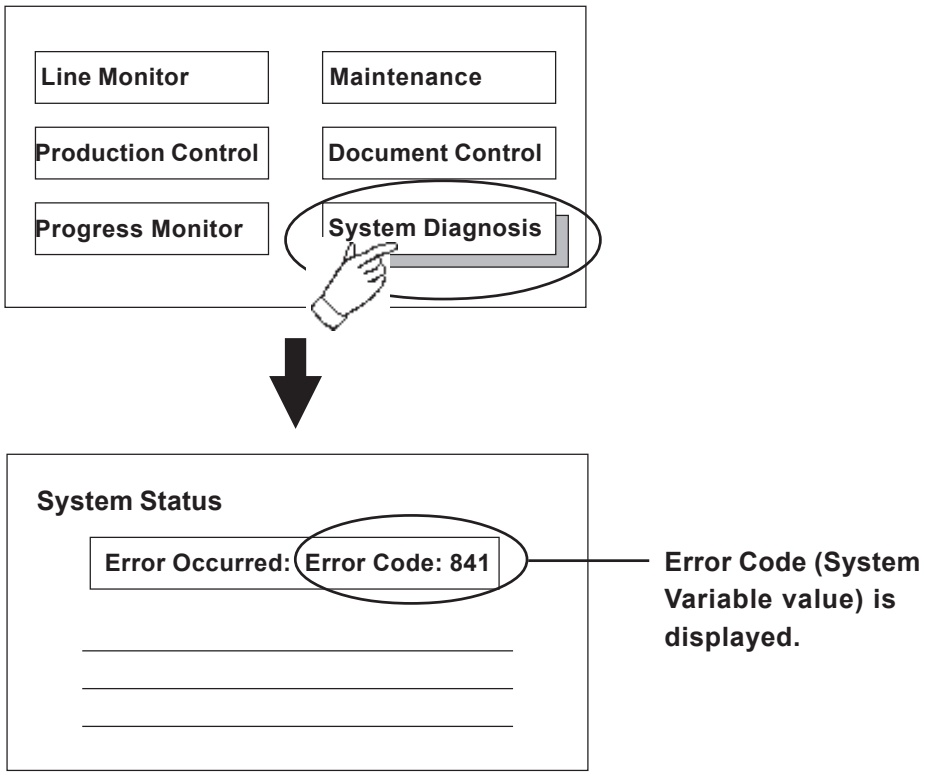
Model	System Variable
GLC2000/LT Series	#IOStatus
GP3000 Series	#L_IOStatus

Note: For GP3000 series, an error code is displayed in the system window on the GP screen without using the system variables.

The following is an example of an error code display application.

■ Example Application

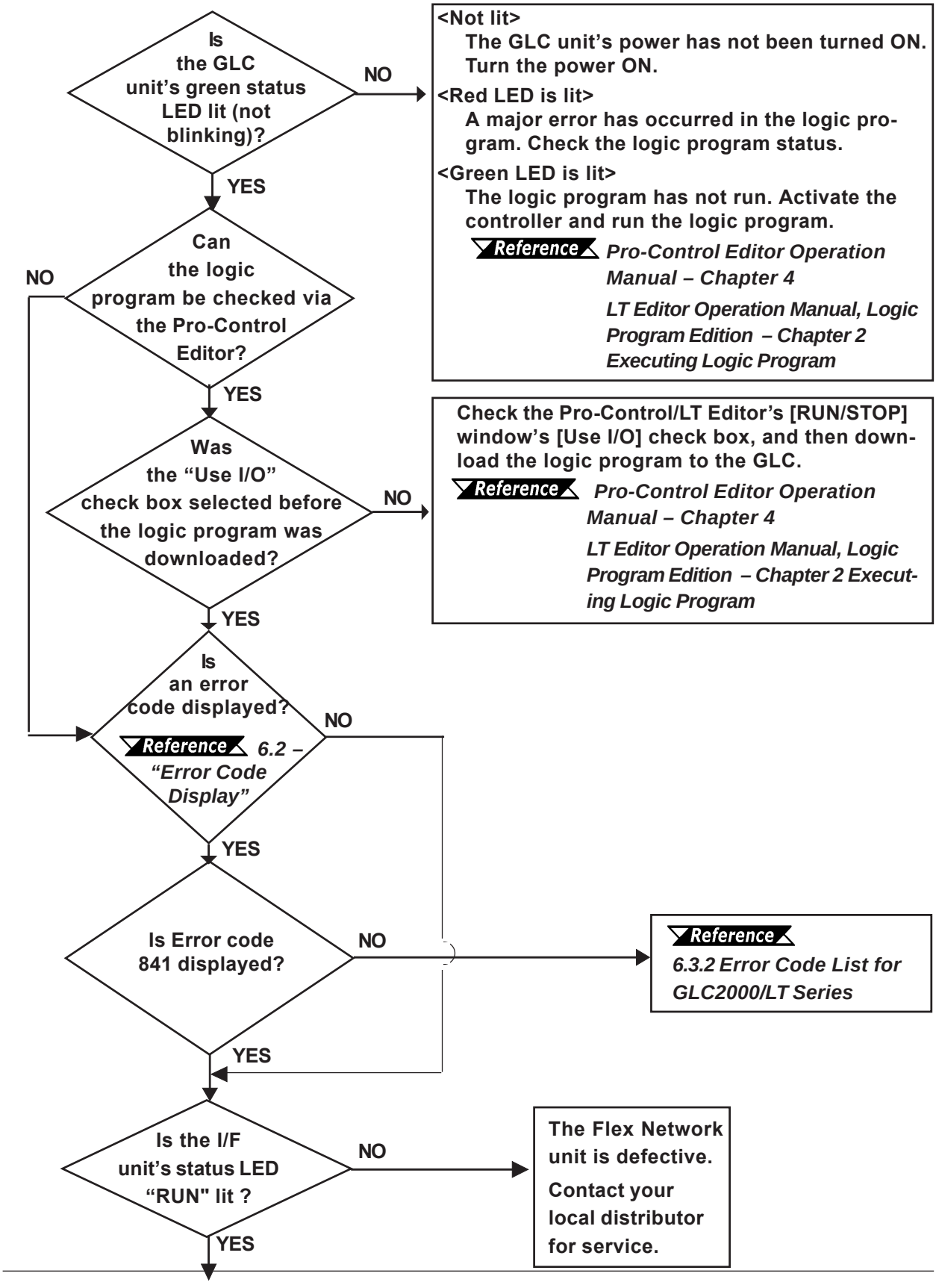
1. Create an I/O System Diagnosis button.
2. Create a ladder logic program that displays the system status as an error code when the [System Diagnosis] button is pressed.

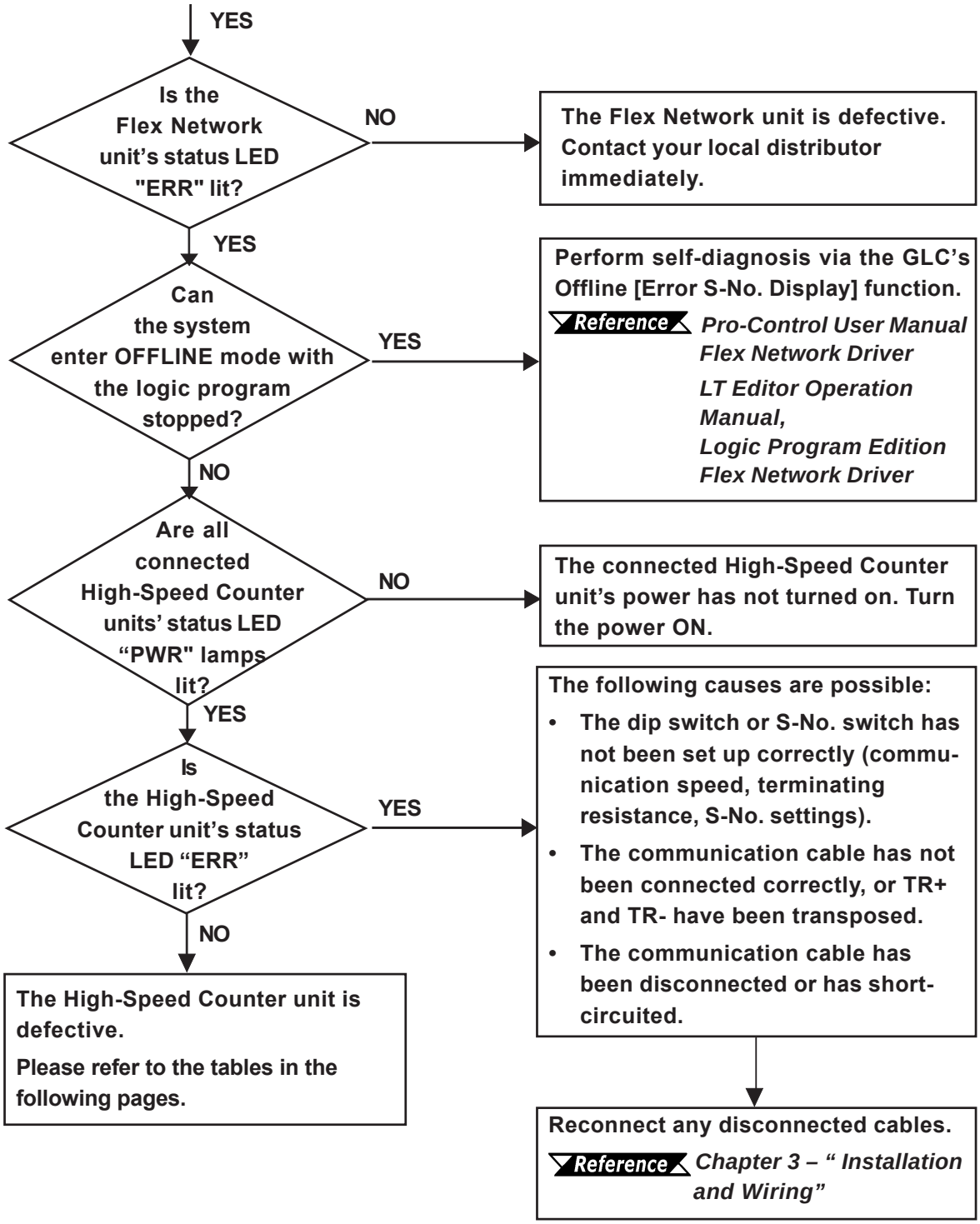


6.3 Troubleshooting for GLC2000/LT Series

6.3.1 Troubleshooting Checklist for GLC2000/LT Series

Use the following flowchart to locate the problem cause(s) and take appropriate countermeasure(s).





Note: To minimize the amount of system downtime, Pro-face recommends that you prepare Flex Network unit substitutes in case of unexpected errors or problems.

If you cannot find the source of the problem in this section's ***"Troubleshooting"*** flowcharts, the High-Speed Counter unit itself may be the problem. Use the following table to take the appropriate problem-solving measures.

■ FN-HC Unit Troubleshooting Checklist

Condition	Check Item	Solution
Cannot write set value correctly	Is the operation mode set to RUN Mode?	Set the RUN Mode / Setting Mode switch (Control bits 14, 15) to ON.
	844 in #IOSTATUS?	Failed to write initial set value. Either STOP and RUN the controller, or turn the High-Speed Counter unit OFF and then ON. If the condition is the same, the communication cable may be disconnected or improperly connected, or the High-Speed Counter unit may have failed.
	845 in #IOSTATUS?	Failed to write set value. Write set value again. If the condition is the same, the communication cable may be disconnected or improperly connected, or the High-Speed Counter unit may have failed.
	Does the previous Command value remain in CMD (has the value not cleared to 0)?	Check the values entered in the Command (CMD) setting, and enter valid values.
Does not perform count operation	Does the GLC display an error?	If the GLC unit displays an error, use the troubleshooting section of the corresponding GLC manual to set the GLC unit to normal operation.
	Are A Phase, B Phase, and PLS1/2 wired correctly?	Check and fix external wiring.
	Is voltage directly applied to pulse input terminals?	If the unit does not perform count operation, check and fix the pulse generator and/or the external wiring.
	Is the operation mode set to Setting Mode?	Set the RUN Mode and the Setting Mode (CTL bits 14, 15) to OFF.
	Has an overflow error occurred?	Clear the overflow error by running Reset or Preset.
	843 in #IOSTATUS?	An error was detected in the High-Speed Counter unit. Reference 6.3.2 – "Error Code List for GLC2000/LT Series"

FN-HC Unit Troubleshooting Checklist (cont.)

Condition	Check Item	Solution
	Is 844 written to #IOSTATUS?	The read in of the initial value has failed. Turn the controller to STOP, then RUN, or turn the FN-HC unit's power ON/OFF. IF the problem repeats, check if the data transfer cable is either cut, the connector is loose or if the FN-HC unit is damaged.
Count value is not normal.	Does the input type of pulse match the pulse input type in the I/O configuration settings?	Match the input type of pulse with the pulse input type in the I/O configuration.
	Is the maximum speed of input pulses within the range of calculated speed set in the I/O configuration?	Correct the calculated speed settings in the I/O configuration so as to correspond with the maximum speed.
	Does the pulse shape entered match performance specifications?	Check pulse shape with a synchroscope. If it does not match specifications, enter the correct pulse shape.
	Do the differential input wires use a twist pair shield cable? Is the shield line grounded?	Use a twist pair shield cable for differential input wires. If the shield line is not grounded, ground it.
	Are the insides of the panel and surrounding units protected from noise?	Protect from noise.
	Is there enough distance between high voltage units and the pulse input line?	Use an independent line for pulse input wires. The pulse input line and the power line should be separated by more than 15cm.
	Are the count input values that are entered in PLS1 and PLS2 the same?	When the count values are different, a hardware error exists. Please contact your local distributor.

6.3.2 Error Code List for GLC2000/LT Series

■ System Design Errors

Error Code	Definition
501	Internal variable mapped to I/O terminal.
502	Input variable mapped to output terminal.
503	Output variable allocated to input terminal.
504	Discrete variable mapped to integer terminal.
505	Integer variable mapped to discrete terminal.
506	Variable type not supported by driver.
507	Variable is not mapped to terminal.
801	Duplicate terminal number encountered.
802	Duplicate S-No.
803	S-No. exceeded the range.
804	S-No. is duplicated in an analog unit.
805	S-No. is duplicated in a counter unit.
806	S-No. is duplicated in a single-axis positioning unit.

■ Initialization Errors

Error Code	Definition
821	There is no hardware unit. Or the type is incorrect.
822	Initial error.
823	Analog unit setting error.

■ Runtime Errors

Error Code	Definition
841	Error (disconnect, malfunction) among connected I/O units.
842	Error (disconnect, malfunction) in analog input unit. (Input range: set at 4 – 20mA)
843	Error in the High-Speed Counter unit. Use a command to refer to the unit's error code details. Reference ■ *High-Speed Counter Unit Errors*
844	Initial error in the High-Speed Counter unit.
845	Communication error with the High-Speed Counter unit.
846	Error in the single-axis positioning unit. Use a command to refer to the unit's error code details. Reference *Flex Network Single-Axis Positioning Unit User Manual*
847	Communication error with the single-axis positioning unit.

■ Internal Error

Error Code	Definition
850 –	Driver error #850. Please contact your local distributor.

■ High-Speed Counter Unit Errors

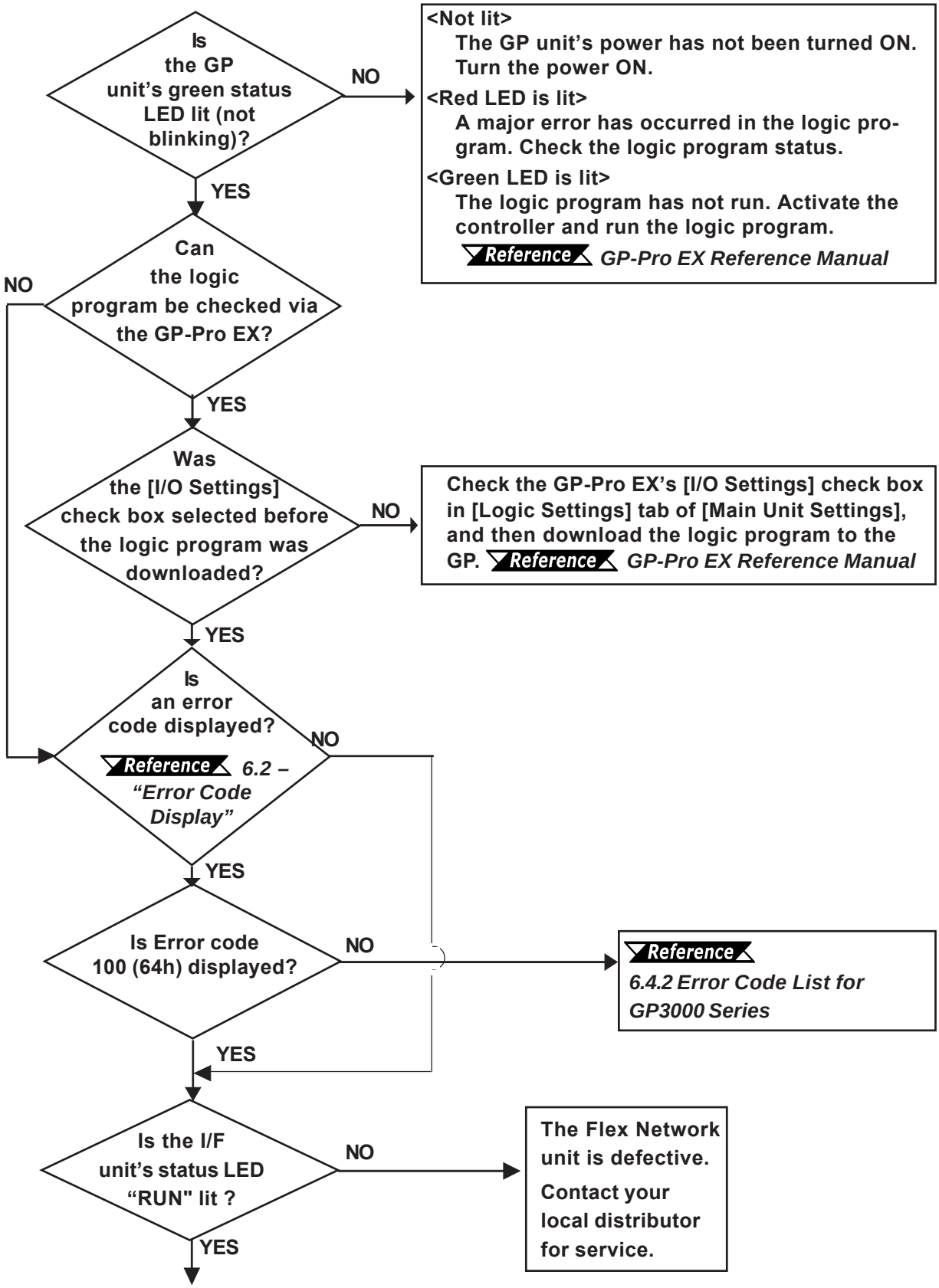
Error Code	Definition
1	Set value error on the cam switch.
2	Set data error on the Ring Counter value (Counter 1).
3	Set data error on the Ring Counter value (Counter 2).

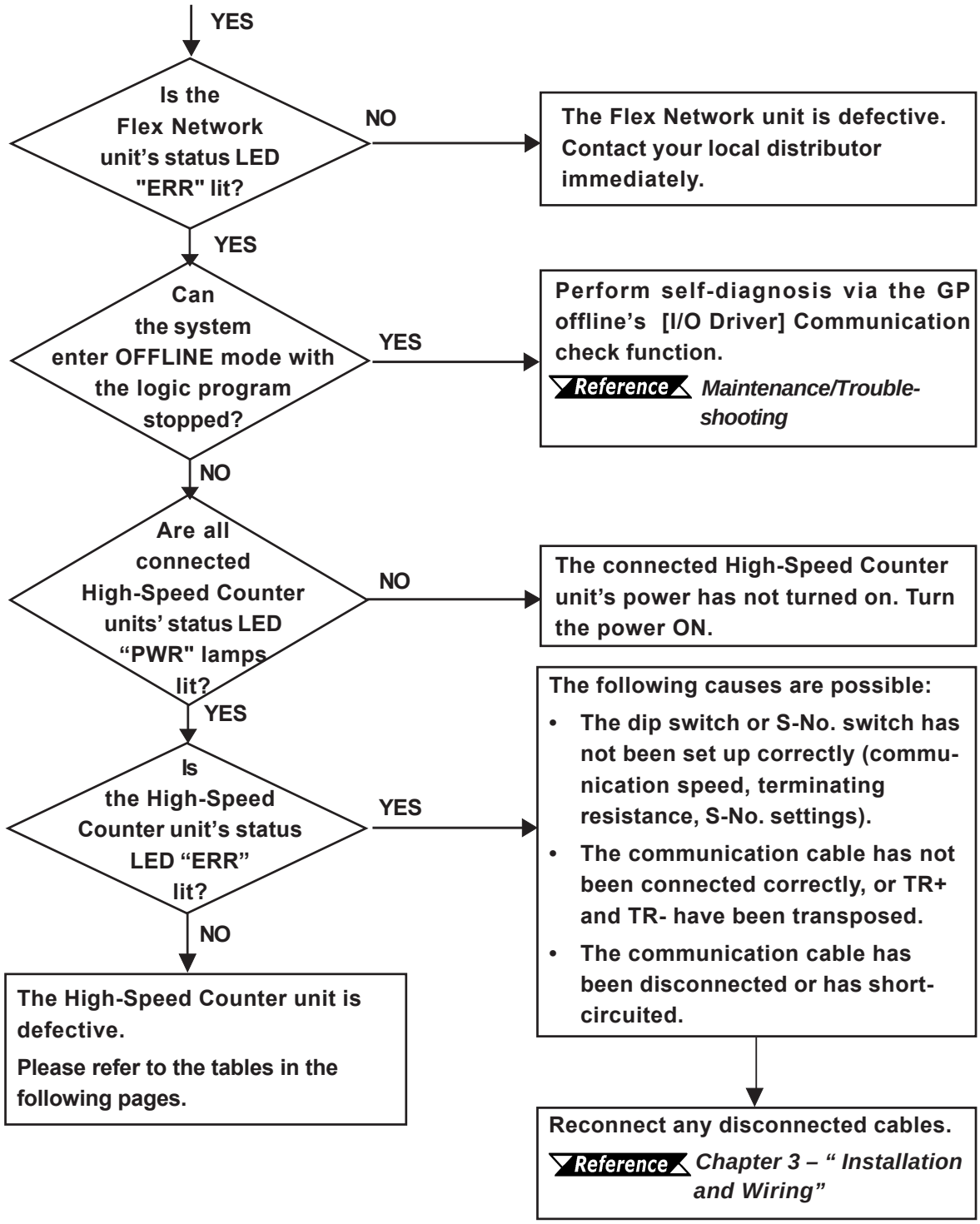
Use a Read Command to check the High-Speed Counter unit's error code details.

6.4 Troubleshooting for GP3000 Series

6.4.1 Troubleshooting Checklist for GP3000 Series

Use the following flowchart to locate the problem cause(s) and take appropriate countermeasure(s).





Note: To minimize the amount of system downtime, Pro-face recommends that you prepare Flex Network unit substitutes in case of unexpected errors or problems.

If you cannot find the source of the problem in this section's ***"Troubleshooting"*** flowcharts, the High-Speed Counter unit itself may be the problem. Use the following table to take the appropriate problem-solving measures.

■ FN-HC Unit Troubleshooting Checklist

Condition	Check Item	Solution
Cannot write set value correctly	Is the operation mode set to RUN Mode?	Set the RUN Mode / Setting Mode switch (Control bits 14, 15) to ON.
	105 in #L_IOStatus?	Failed to write initial set value. Either STOP and RUN the controller, or turn the High-Speed Counter unit OFF and then ON. If the condition is the same, the communication cable may be disconnected or improperly connected, or the High-Speed Counter unit may have failed.
	106 in #L_IOStatus?	Failed to write set value. Write set value again. If the condition is the same, the communication cable may be disconnected or improperly connected, or the High-Speed Counter unit may have failed.
	Does the previous Command value remain in CMD (has the value not cleared to 0)?	Check the values entered in the Command (CMD) setting, and enter valid values.
Does not perform count operation	Does the GP display an error?	If the GP unit displays an error, use the troubleshooting section of the corresponding GP manual to set the GP unit to normal operation.
	Are A Phase, B Phase, and PLS1/2 wired correctly?	Check and fix external wiring.
	Is voltage directly applied to pulse input terminals?	If the unit does not perform count operation, check and fix the pulse generator and/or the external wiring.
	Is the operation mode set to Setting Mode?	Set the RUN Mode and the Setting Mode (CTL bits 14, 15) to OFF.
	Has an overflow error occurred?	Clear the overflow error by running Reset or Preset.
	104 in #L_IOStatus?	An error was detected in the High-Speed Counter unit. Reference 6.4.2 – "Error Code List for GP3000 Series"

FN-HC Unit Troubleshooting Checklist (cont.)

Condition	Check Item	Solution
	Is 105 written to #L_IOStatus?	The read in of the initial value has failed. Turn the controller to STOP, then RUN, or turn the FN-HC unit's power ON/OFF. IF the problem repeats, check if the data transfer cable is either cut, the connector is loose or if the FN-HC unit is damaged.
Count value is not normal.	Does the input type of pulse match the pulse input type in the I/O configuration settings?	Match the input type of pulse with the pulse input type in the I/O configuration.
	Is the maximum speed of input pulses within the range of calculated speed set in the I/O configuration?	Correct the calculated speed settings in the I/O configuration so as to correspond with the maximum speed.
	Does the pulse shape entered match performance specifications?	Check pulse shape with a synchroscope. If it does not match specifications, enter the correct pulse shape.
	Do the differential input wires use a twist pair shield cable? Is the shield line grounded?	Use a twist pair shield cable for differential input wires. If the shield line is not grounded, ground it.
	Are the insides of the panel and surrounding units protected from noise?	Protect from noise.
	Is there enough distance between high voltage units and the pulse input line?	Use an independent line for pulse input wires. The pulse input line and the power line should be separated by more than 15cm.
	Are the count input values that are entered in PLS1 and PLS2 the same?	When the count values are different, a hardware error exists. Please contact your local distributor.

6.4.2 Error Code List for GP3000 Series

In the system window on the GP screen, an error code is displayed with RGE* put to the top of the error code.

Ex.) RGE*001 Not supported unit

■ System Design Errors

Error Code	Error Message	Definition
001	Not supported unit.	The type of the unit is different.
002	Illegal Parameter.	The data type of the symbol variable assigned to the Flex Network unit is illegal. The Flex Network unit setting value is illegal.
003	Device offset beyond limit.	The address of the symbol variable assigned to the Flex Network unit is out of range.
004	Terminal config overlapped.	The number of Flex Network unit terminals exceeds the limit.
005	Illegal terminal sequence.	The I/O terminal numbers are not specified in ascending order.
006	Insufficient terminals.	The number of I/O terminals is not appropriate (insufficient).
007	Units config overlapped.	Flex Network unit S-No. is duplicated and set.
008	Units count over limit.	The maximum number of connected Flex Network units (63 units) is exceeded. The maximum value of S-No. (S-No. 63) is exceeded. S-No. of the Flex Network unit that occupies more than one node has exceeded the max. (S-No. 63).
009	Drivers config overlapped.	The driver has been registered twice.
010	Unmatched In/Out terminal.	The input/output settings of the Flex Network unit are not correct.
011	Unmatched bit/word term.	The variable type specified in the Flex Network unit is incorrect.
012	Illegal level nunber.	Something is wrong with the I/O driver.
013	Illegal data addr. Gotten.	The I/O driver information is incorrect. The controller information is incorrect.
014	No drivers/units registed.	The I/O driver or Flex Network unit is not registered.

■ Runtime Errors

Error Code	Error Message	Definition
100	Unit communication error.	A communication error has occurred between the main unit and the Flex Network unit. The communication cable is cut off. The Flex Network unit is not connected. The editor settings have problems.
101	4ch. analog setting error.	Communication with the 4ch. analog unit has failed.
102	2ch. analog setting error.	Communication with the 2ch. analog unit has failed.
103	Analog unit's wire broken.	The 4 to 20mA-ranging input signal of the 4ch. or 2ch. analog unit is cut off.
104	Counter unit's error.	An error has occurred in the high-speed counter unit. For details, use a command to call up the unit's error code. Reference *■High-Speed Counter Unit Errors*
105	Counter initial error.	Initializing the high-speed counter unit has failed.
106	Counter communication err.	A communication error with the high-speed counter unit has occurred. The communication cable is cut off. The high-speed counter unit is not connected. The editor settings have problems.
107	Positioning Unit's error.	An error has occurred in the positioning unit. For details, use a command to call up the unit's error code. Reference *Flex Network Single-Axis Positioning Unit User Manual*
108	Comm.position error.	A communication error with the positioning unit has occurred. The communication cable is cut off. The positioning unit is not connected. The editor settings have problems.
109	2ch. analog comm. error.	A communication error with the 2ch. analog unit has occurred. The communication cable is cut off. The 2ch. analog unit is not connected. The editor settings have problems.

■ Internal Error

Error Code	Error Message	Definition
200	SetValue func.(INT) NG.	Integer-type Terminal data of the Flex Network unit could not be read.
201	SetValue func.(bit) NG.	Bit-type Terminal data could not be read.
202	GetValue func.(INT) NG.	Integer-type Terminal data could not be written.
203	GetValue func.(bit) NG.	Bit-type Terminal data could not be written.

■ High-Speed Counter Unit Errors

Error Code	Definition
1	Set value error on the cam switch.
2	Set data error on the Ring Counter value (Counter 1).
3	Set data error on the Ring Counter value (Counter 2).

Use a Read Command to check the High-Speed Counter unit's error code details.

Memo

Appendix

1. Ring Counter Function Program Example
2. Comparator Output Function Program Example
3. Cam Switch Output Function Program Example

This section gives examples of the logic program's ring counter function, comparator output function, and cam switch output function.

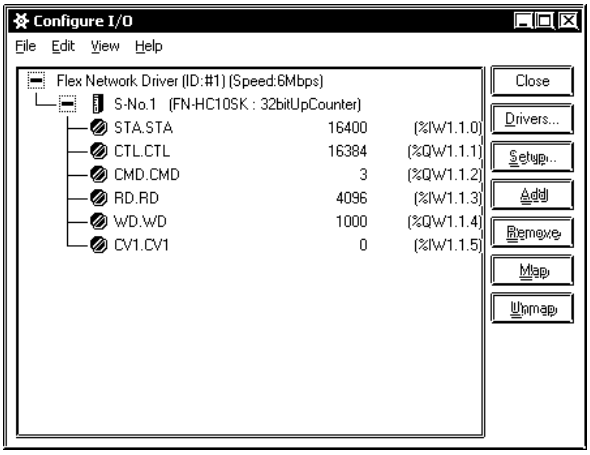
In the following programs, the first action performed is Version data read out. In order to set the Setting Value Write Flag to ON, the Preset value, Ring lower and upper limit values are read into the FN-HC unit.

Next, turn the Counter Start Flag ON when you wish to begin counting. When you want to make the current value the Preset Value, turn the Preset Command Flag ON. To use the Reset feature, turn the Reset Flag ON.

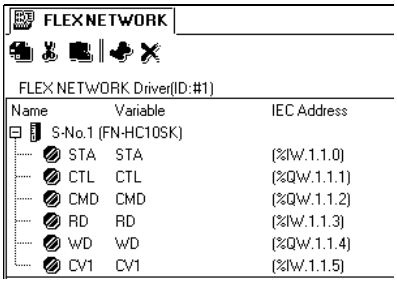
A.1 Ring Counter Function - Program Example

■ I/O Configuration

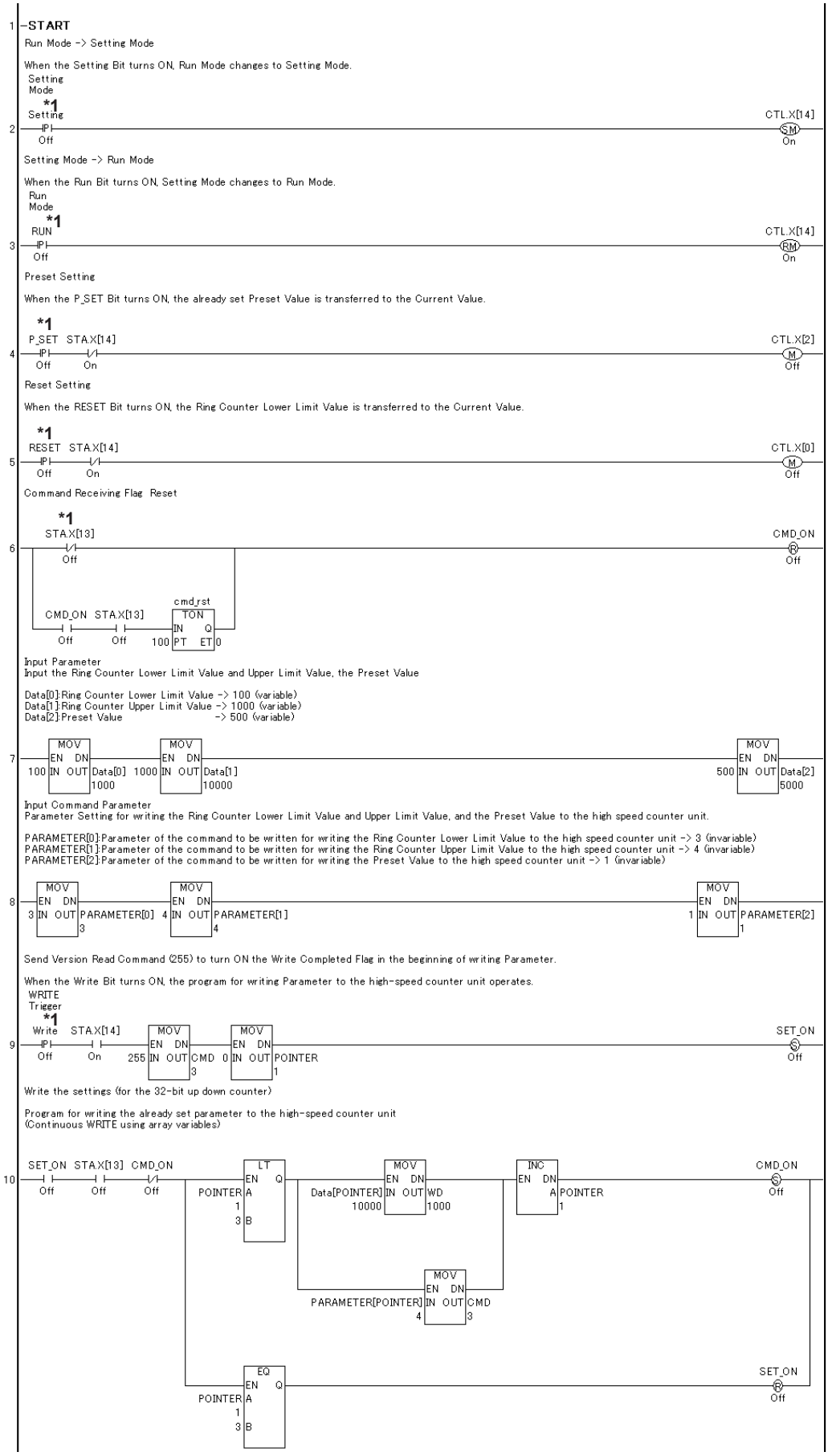
<GLC2000/LT Series>



<GP3000 Series>

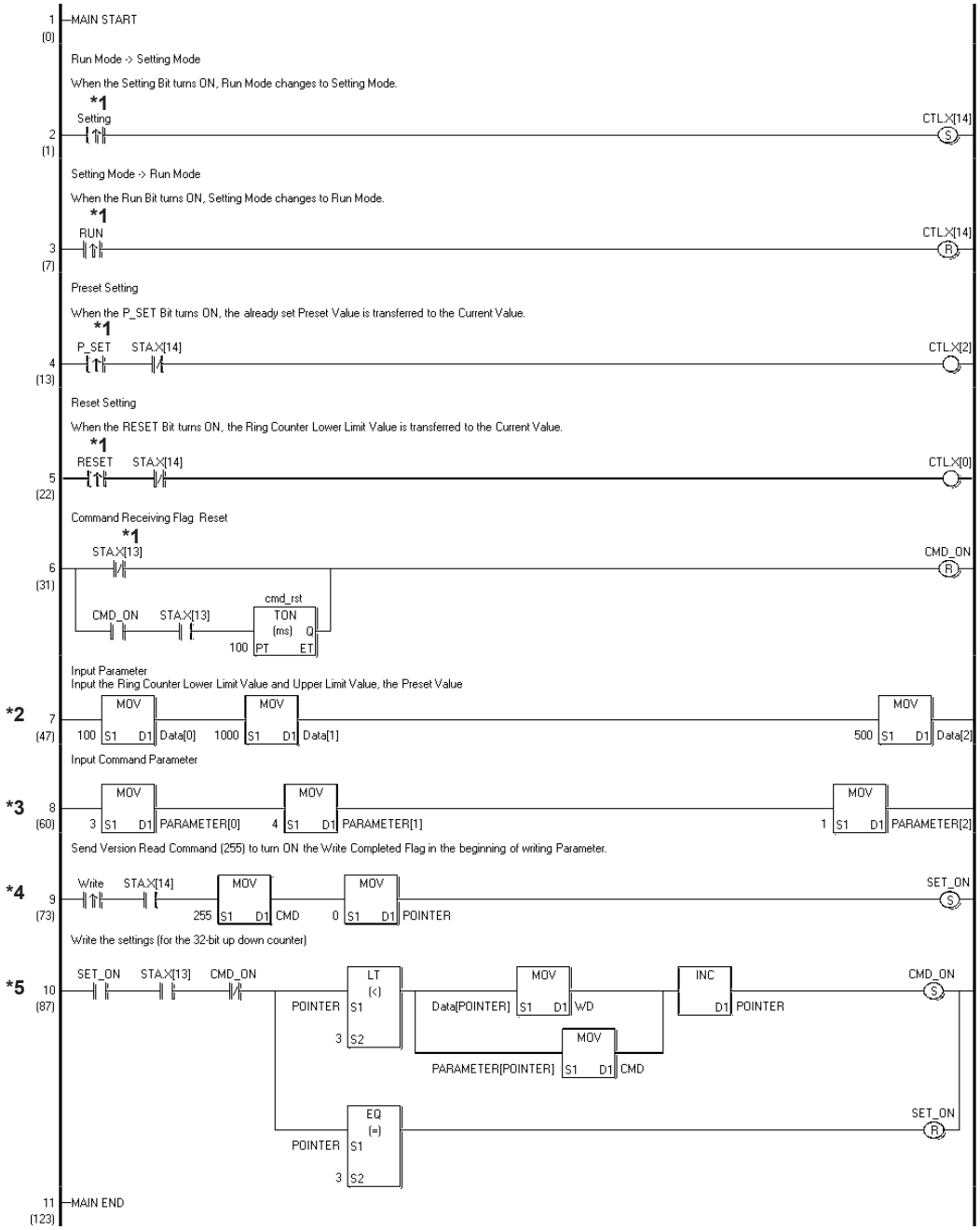


■ Logic Program Example for GLC2000/LT Series



1 *Turn each ON with the switches or the programs on the screen.*

■Logic Program Example of GP3000 Series



1 *Turn each ON with the switches or the programs on the screen.*

2 *Data[0]:Ring Counter Lower Limit Value -> 100 (variable)*
Data[1]:Ring Counter Upper Limit Value -> 1000 (variable)
Data[2]:Preset Value -> 500 (variable)

3 *Parameter Setting for writing the Ring Counter Lower Limit Value and Upper Limit Value, and the Preset Value to the high speed counter unit.*
PARAMETER[0]:Parameter of the command to be written for writing the Ring Counter Lower Limit Value to the high speed counter unit -> 3 (invariable)
PARAMETER[1]:Parameter of the command to be written for writing the Ring Counter Upper Limit Value to the high speed counter unit -> 4 (invariable)
PARAMETER[2]:Parameter of the command to be written for writing the Preset Value to the high speed counter unit -> 1 (invariable)

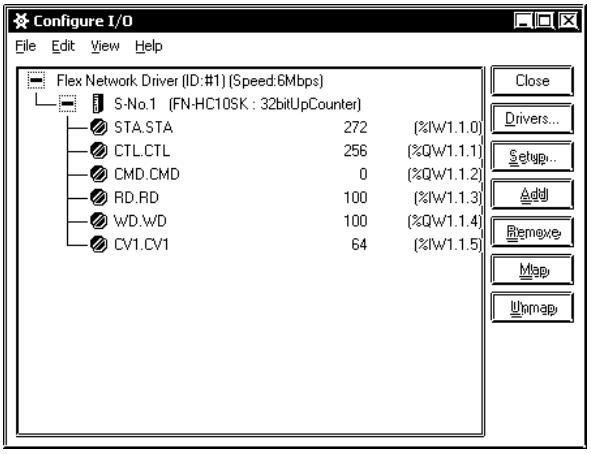
4 *When the Write Bit turns ON, the program for writing Parameter to the high-speed counter unit operates.*

5 *Program for writing the already set parameter to the high-speed counter unit (Continuous WRITE using array variables)*

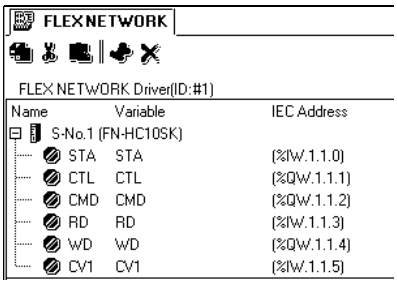
A.2 Comparator Output Function - Program Example

■ I/O Configuration

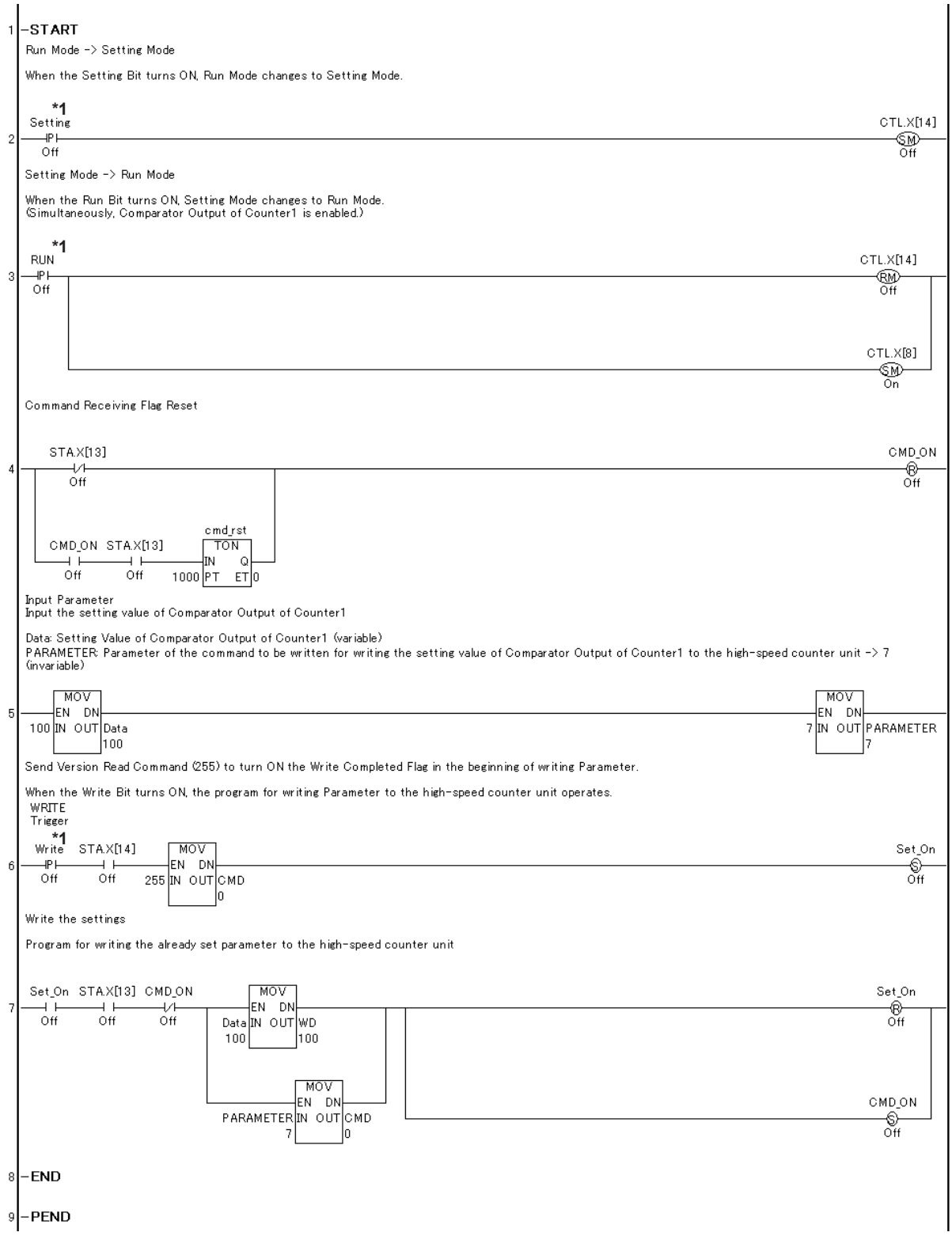
<GLC2000/LT Series>



<GP3000 Series>

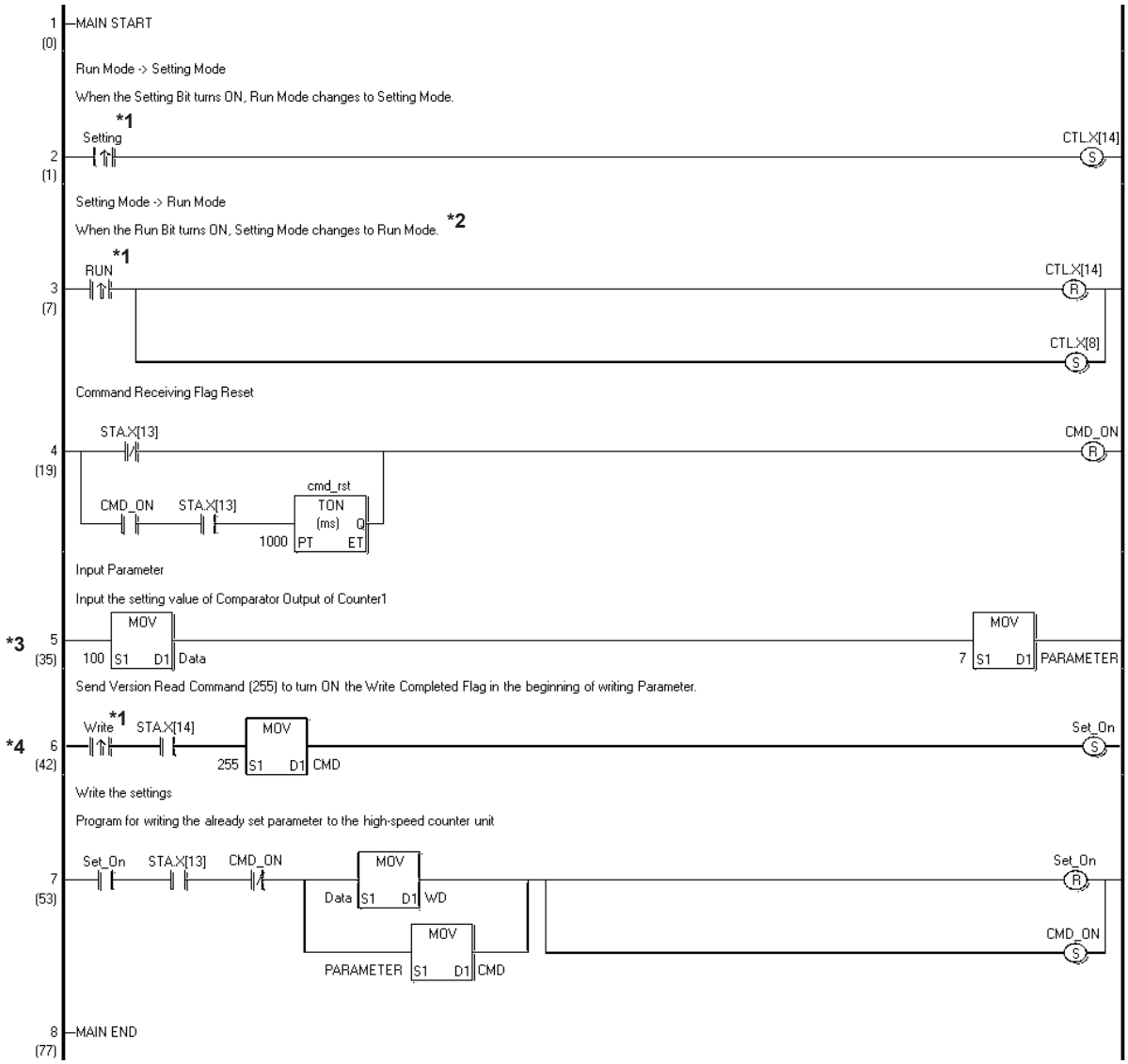


■ Logic Program Example for GLC2000/LT Series



1 *Turn each ON with the switches or the programs on the screen.*

■Logic Program Example of GP3000 Series



**1 Turn each ON with the switches or the programs on the screen.*

**2 Simultaneously, Comparator Output of Counter1 is enabled.*

**3 Data: Setting Value of Comparator Output of Counter1 (variable)*

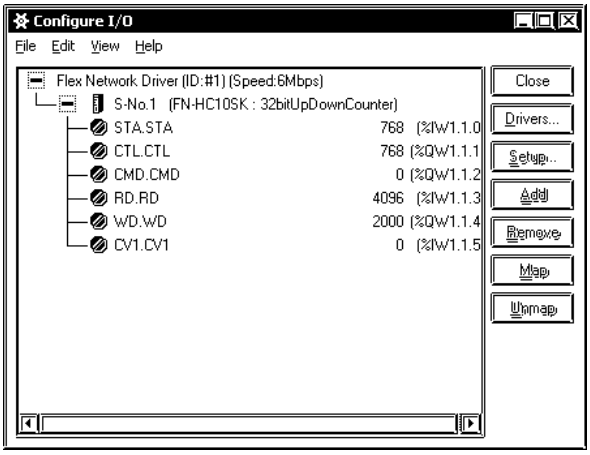
PARAMETER: Parameter of the command to be written for writing the setting value of Comparator Output of Counter1 to the high-speed counter unit -> 7 (invariable)

**4 When the Write Bit turns ON, the program for writing Parameter to the high-speed counter unit operates.*

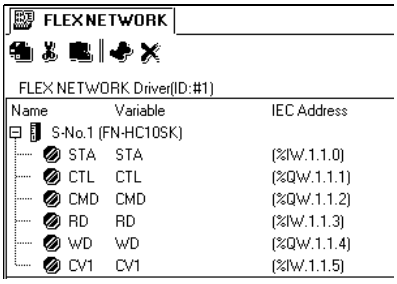
A.3 Cam Switch Output Function - Program Example

■ I/O Configuration

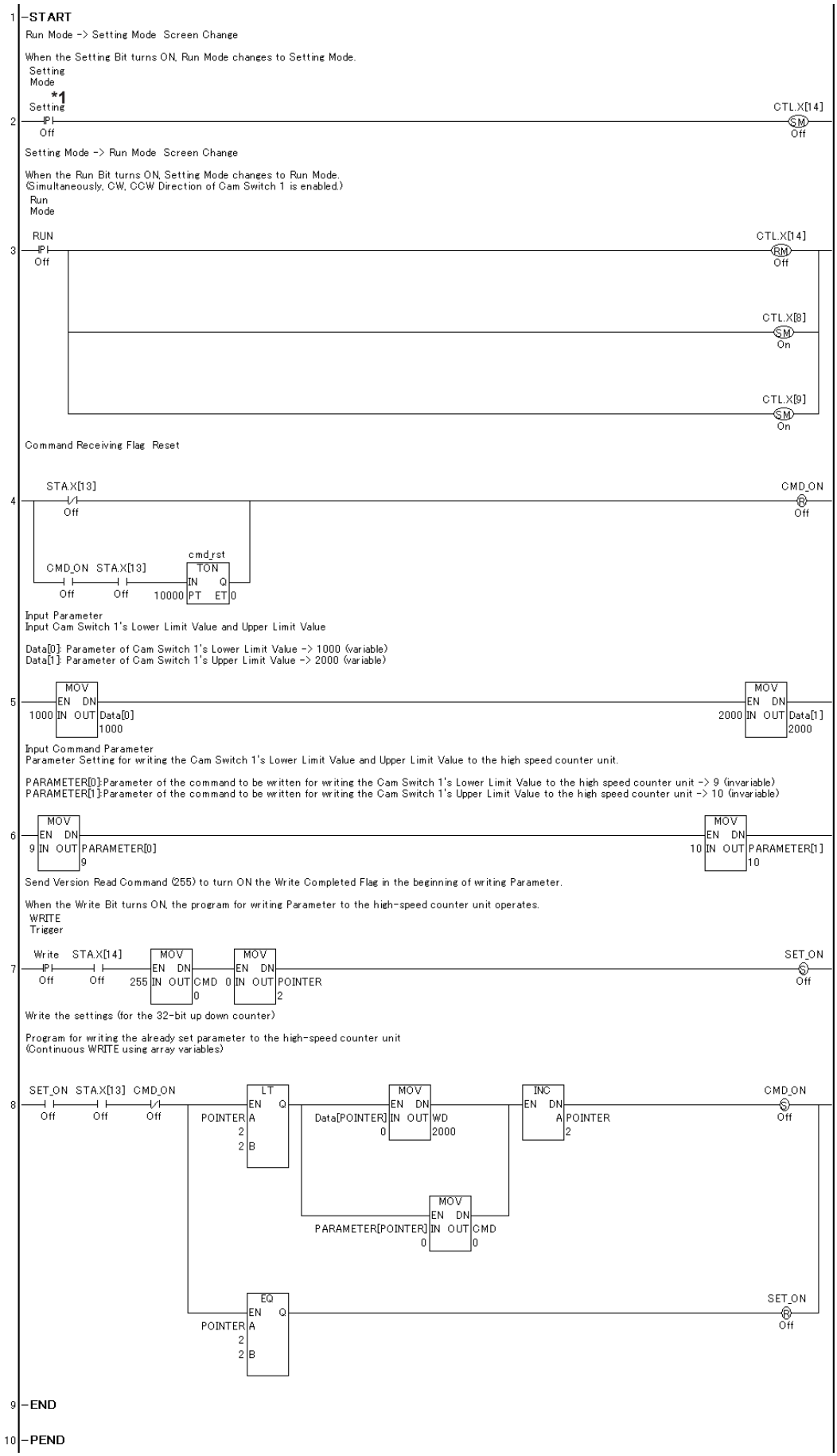
<GLC2000/LT Series>



<GP3000 Series>

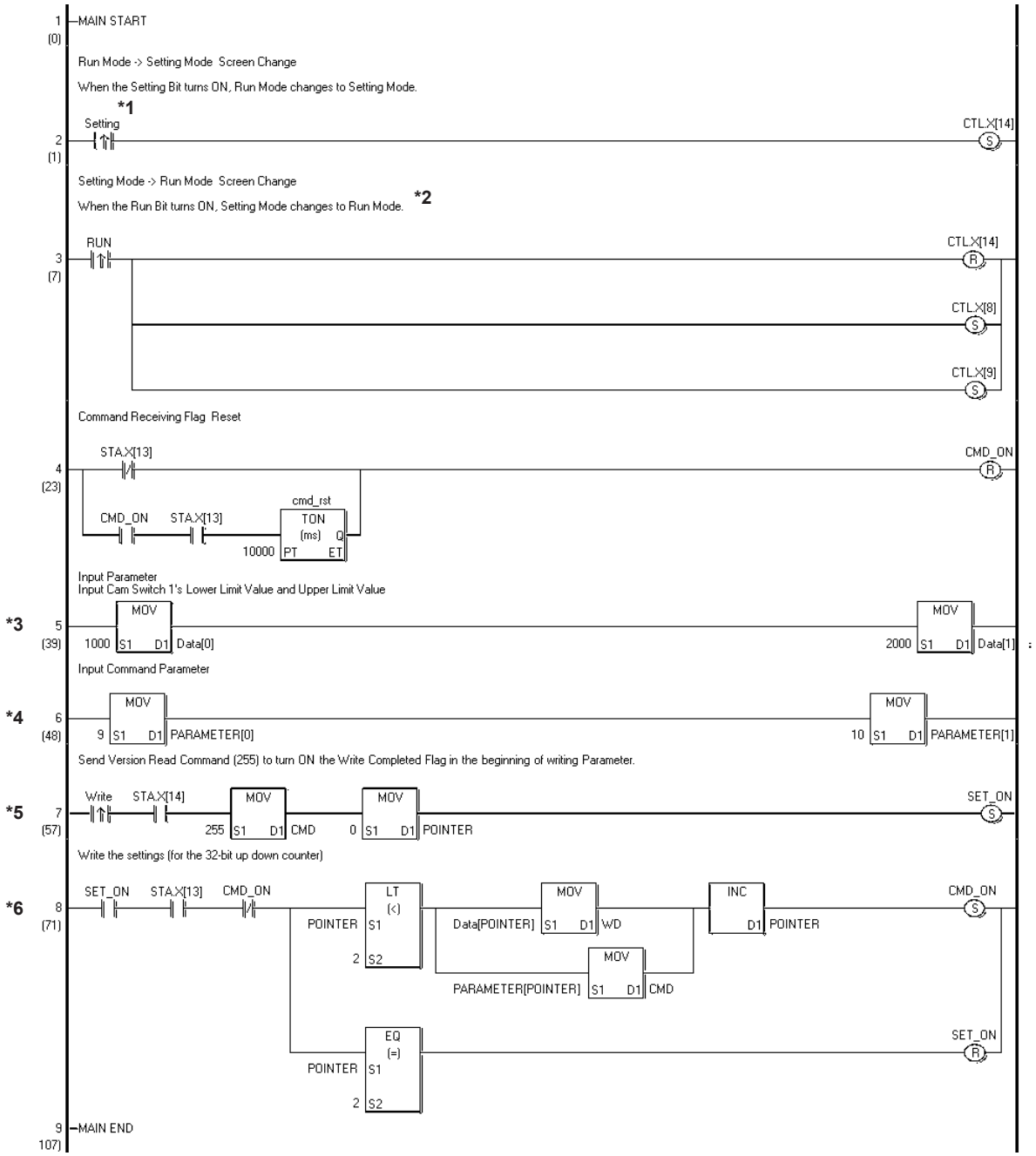


■ Logic Program Example for GLC2000/LT Series



1 *Turn each ON with the switches or the programs on the screen.*

■Logic Program Example of GP3000 Series



***1** Turn each ON with the switches or the programs on the screen.*

***2** Simultaneously, CW, CCW Direction of Cam Switch 1 is enabled.*

***3** Data[0]: Parameter of Cam Switch 1's Lower Limit Value -> 1000 (variable)*

Data[1]: Parameter of Cam Switch 1's Upper Limit Value -> 2000 (variable)

***4** Parameter Setting for writing the Cam Switch 1's Lower Limit Value and Upper Limit Value to the high speed counter unit.*

PARAMETER[0]:Parameter of the command to be written for writing the Cam Switch 1's Lower Limit Value to the high speed counter unit -> 9 (invariable)

PARAMETER[1]:Parameter of the command to be written for writing the Cam Switch 1's Upper Limit Value to the high speed counter unit -> 10 (invariable)

***5** When the Write Bit turns ON, the program for writing Parameter to the high-speed counter unit operates.*

***6** Program for writing the already set parameter to the high-speed counter unit (Continuous WRITE using array variables)*

Memo