

Chapter 3. SPECIFICATIONS

3.1 General Specifications

Table 3.1 shows general specifications of the GLOFA GM series.

No	Item	Specifications	Standards				
1	Operating ambient temperature	0 ~ 55.(32 ~ 131.)					
2	Storage ambient temperature	-25 ~ 75.(-13~167.)					
3	Operating ambient humidity	5 ~ 95%RH, non-condensing					
4	Storage ambient humidity	5 ~ 95%RH, non-condensing					
5	Vibration	Occasional vibration				10 times in each direction for X, Y, Z	IEC 1131-2
		Frequency	Acceleration	Amplitude	Sweep count		
		10.f.57 Hz	-	0.075 mm			
		57 .f.150 Hz	0.001 Kg	-			
		Continuous vibration					
		Frequency	Acceleration	Amplitude			
6	Shocks	*Maximum shock acceleration: 15g *Duration time :11 ms *Pulse wave: half sine wave pulse(3 times in each of X, Y and Z directions)	IEC 1131-2				
7	Noise immunity	impulse noise	±1,500 V				
		Electrostatic discharge	Voltage :4kV(contact discharge)		IEC 1131-2 IEC 801-2		
		Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m		IEC 1131-2 IEC 801-3		
		Fast transient burst noise	Severity Level	All power modules	Digital I/Os (Ue ≥ 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os communication I/Os	IEC 1131-2 IEC 801-4
		Voltage	2 kV	1 kV	0.25 kV		
8	Operating atmosphere	Free from corrosive gases and excessive dust					
9	Altitude for use	Up to 2,000m(6,562ft)					
10	Pollution degree	2 or lower					
11	Cooling method	Self-cooling					

[Table 3.1] General Specifications

REMARK

- 1) IEC(International Electrotechnical Commission)
: The international civilian organization which produces standards for electrical and electronics industry.
- 2) Pollution degree
: It indicates a standard of operating ambient pollution level.
The pollution degree 2 means the condition in which normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.

3.2 Performance Specifications

The following show various specifications of the High-speed counting module including basic performance specifications, input specifications, limit switch input specifications and transistor output specifications.

1) Basic Performance Specification

Item		Specifications
Number of Channels		1 channel
Counter input signal	Signal	Phase A, Phase B or Phase Z
	Signal level	5 / 12 / 24 VDC (7mA)
	Signal type	Voltage input
Counting range		0 to 16,777,215 (24 Bits Binary)
Counting speed		Maximum 50 kHz
Preset Operation		Set by connector signal or program
Limit switch input		24 VDC
Setting Increment /Decrement	1-phase input	Set by program or Phase B is set
	2-phase input	Set by difference of phase automatically
External output	Type	Out 1, Out 2(One among '>', '=' and '<' is selected)
	Signal type	Transistor output (open collector output, 10 to 30 V)
Multiplication		The multiplication factor for the input pulse may be set to 1, 2 or 4 (Selected by DIP Switch adjustment)
Current consumption		5 VDC, 180 mA
Weight		160 g

2) Input Specifications

Item	Specifications	
Rated input voltage / current	5 VDC (7 mA)	
	12 VDC (7 mA)	
	24 VDC (7 mA)	
' On ' guarantee voltage	5 VDC	4.5 V or more
	12 VDC	11 V or more
	24 VDC	14 V or more
' Off ' guarantee voltage	5 VDC	0.8 V or less
	12 VDC	1.5 V or less
	24 VDC	2.5 V or less

3) Limit Switch(L/S) and Preset(PSET) Input Specifications

Item	Specifications
Input voltage	24 VDC
' On ' guarantee voltage	19 VDC or more
' Off ' guarantee voltage	6 VDC or less
On Delay Time	1.5 ms or less
Off Delay Time	2 ms or less

4) Transistor Output Specifications

Item	Specifications
Rated output	24 VDC, 200 mA
Leakage current	50 .A or less
Saturated voltage	1.3V
On Delay Time	50 .s or less
Off Delay Time	50 .s or less

3.3 Function Description

The High-speed counting module can count high-speed pulse which cannot be proceed with the CPU counting instructions (CTU,CTUD, etc.). Up to 24 bits binary (16,777,215) can be counted.

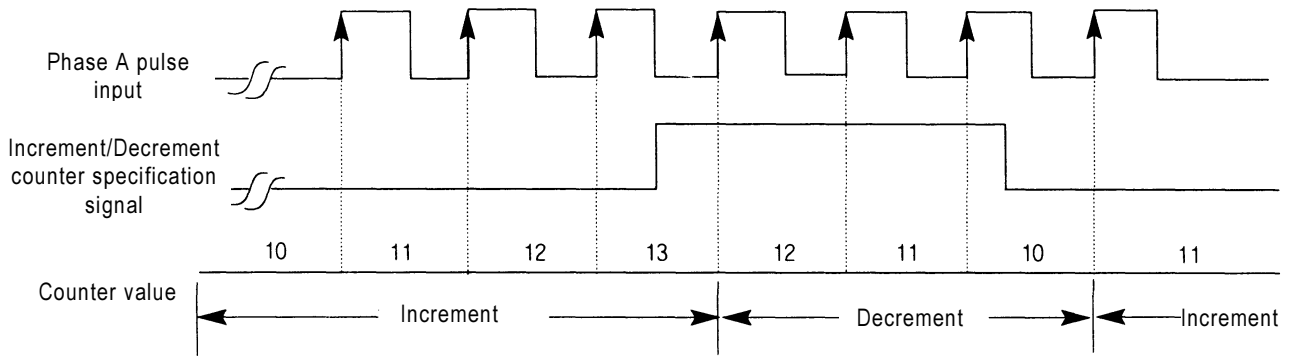
Pulse input mode is classified into 1-Phase (Phase A) pulse input and 2-Phase (Phase B) pulse input. In 1-Phase pulse input mode, there are two kinds of increment/decrement count methods. One is specified by program and the other is specified by phase B pulse input signal. In 2-Phase pulse input mode, the increment/decrement count method is specified by the phase difference between phase A and B pulsed.

3.3.1 Operation Modes

1) 1-phase Operation Mode (Increment /Decrement Count by Program)

When Phase A pulse input rises, the counter performs increment or decrement count by decrement counter specification signal.

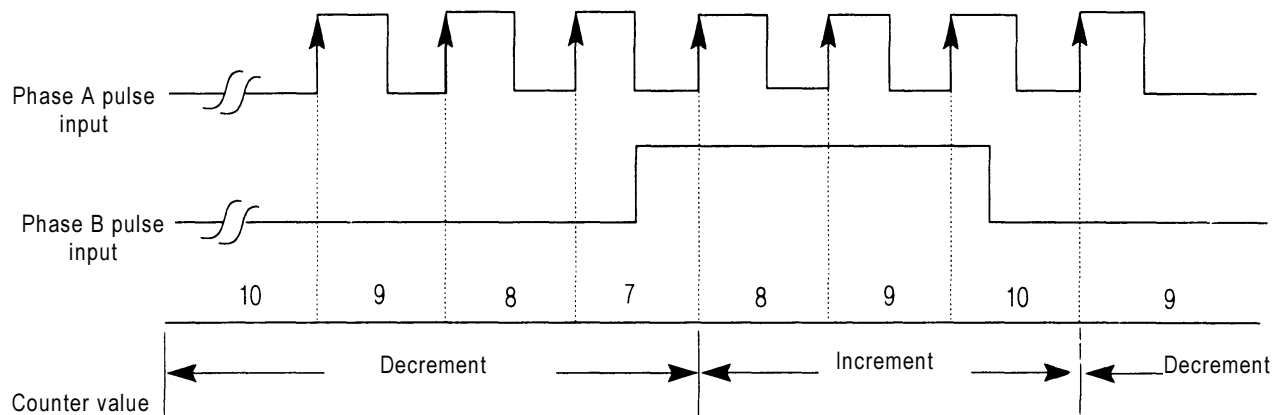
If the decrement counter specification signal is low the counter performs increment count, and if high, it performs decrement count.



2) 1-phase Operation Mode (Increment /Decrement Count by Phase B Pulse Input)

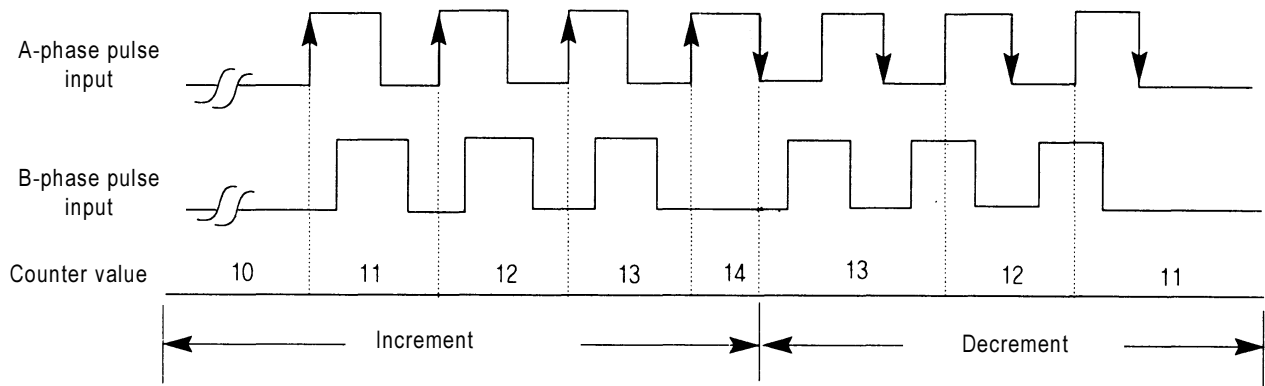
When Phase A pulse input the counter performs increment or decrement count by Phase B pulse input.

If Phase B pulse input is low, it performs decrement count, and if high, it performs increment count.



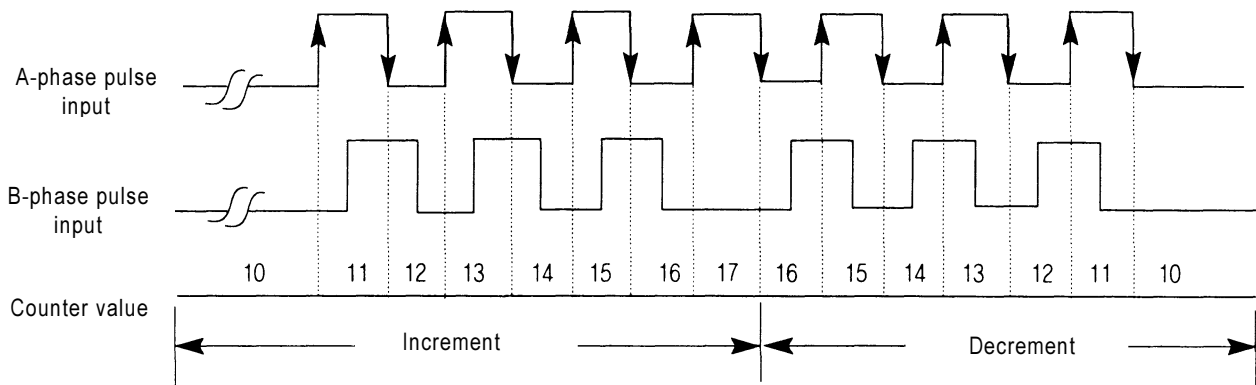
3) 2-Phase Operation Mode (Multiplication 1)

When Phase A pulse-input leads Phase B, the counter performs increment count when phase B pulse-input leads phase A, it performs decrement count.
 If Phase B pulse input is low when Phase A pulse input rises, the counter performs increment count.
 If Phase B pulse input is low when phase A pulse input falls, it performs decrement count.



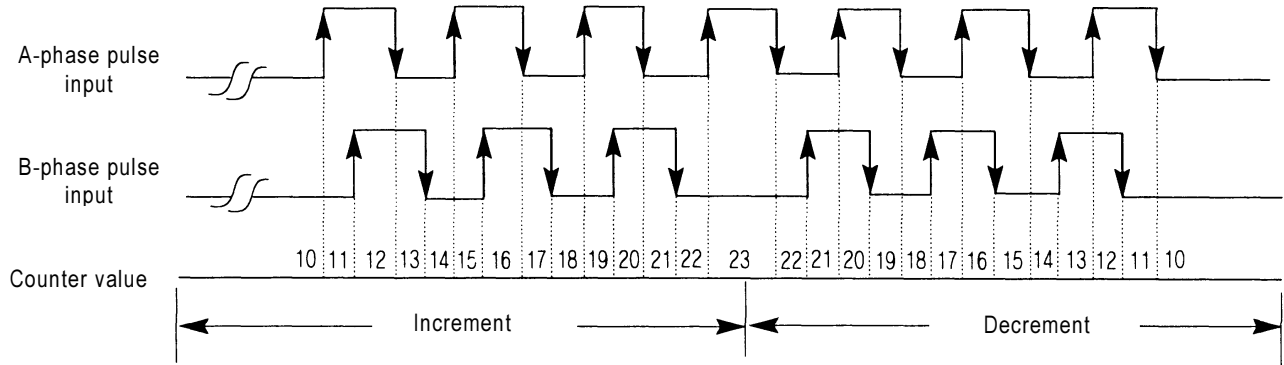
4) 2-Phase Operation Mode (Multiplication 2)

When Phase A pulse-input leads Phase B, the counter performs increment count when phase B pulse-input leads phase A, it performs decrement count.
 If Phase B pulse input is low when Phase A pulse input rises or it is high when phase A pulse input falls, the counter performs increment count.
 If Phase B pulse input is high when Phase A pulse input rises or it is low when phase A pulse input falls, the counter performs decrement count.



5) 2-phase Operation Mode (Multiplication 4)

When Phase A pulse input leads Phase B pulse input, the counter performs increment count. When the other leads the one, it performs decrement count. The counting is performed when the Phase A and B pulse inputs rise or fall.



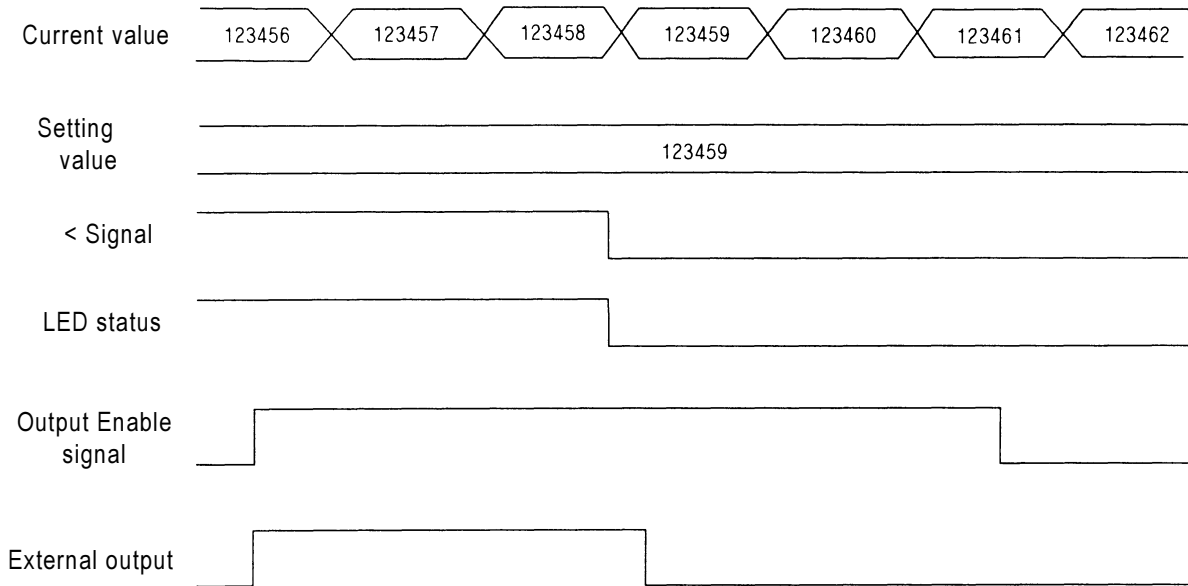
3.3.2 Comparison Signal Output

The counting module has the function of comparison output, which outputs the result of magnitude comparison between the Current value (=current value) and a comparison value. There are two outputs in the comparison output and they can be used separately. The magnitude comparison mode can be set as shown in the below table.

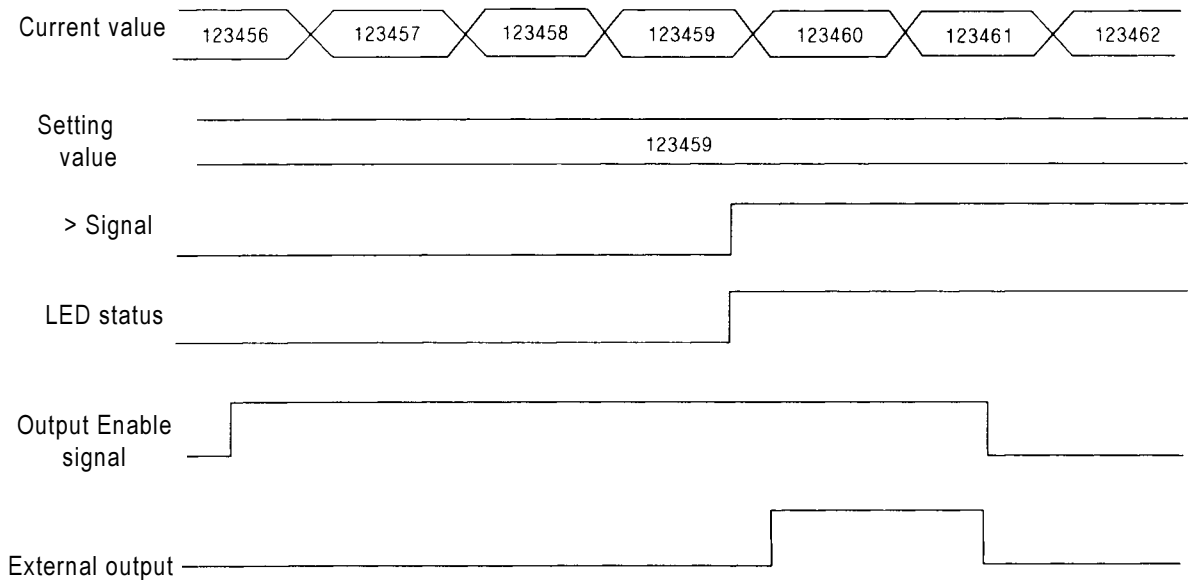
Comparison mode	Settings
0	No magnitude comparison is performed.
1	Current value < Setting value
2	Current value = Setting value
3	Current value . Setting value
4	Current value > Setting value
5	Current value . Setting value
6	Current value . Setting value
7	Always On

The results as shown above will be indicated on the OUT1 LED or OUT2 LED regardless of the output. Output to the external connector is performed only when the output enable signal is ON.

1) Example When the Comparison Mode Is Set to 'Current Value < Setting Value'

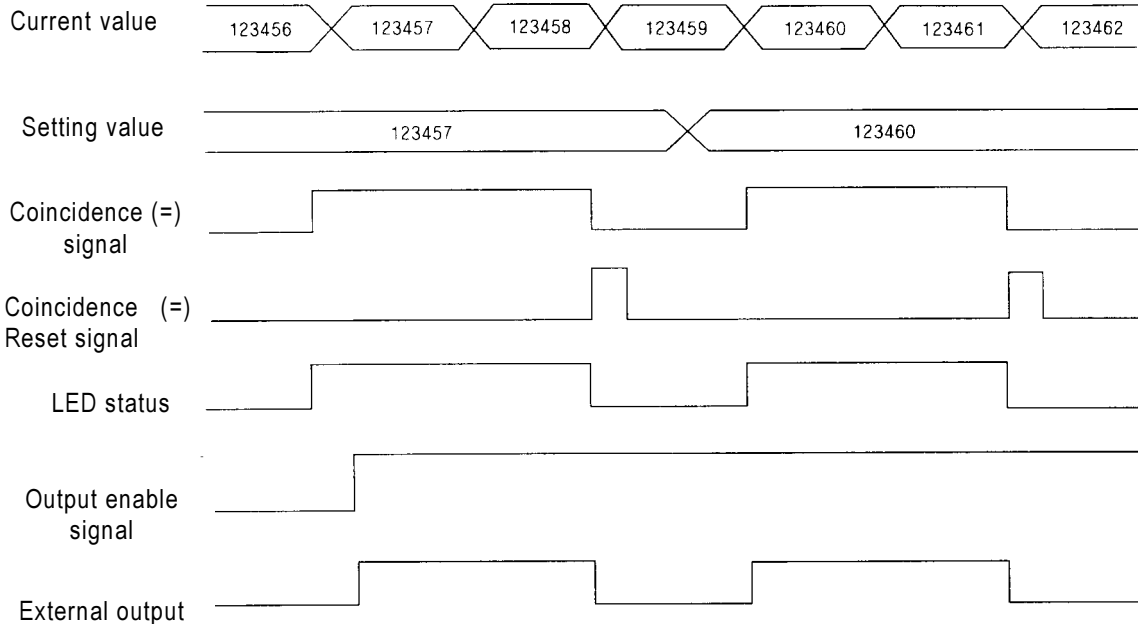


2) Example When the Comparison Mode Is Set to 'Current Value > Setting Value'



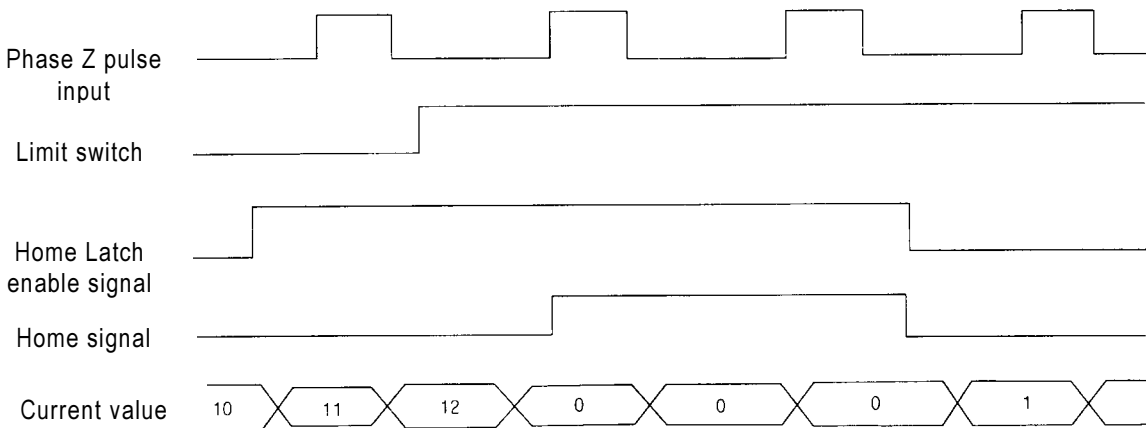
3) Example When the Comparison Mode Is Set to 'Current Value = Setting Value'

Contrary to the '>(GT)' and '<(LT)' signals, once the coincidence (=) signal is turned ON, it retains the ON state until the coincidence reset signal is turned ON. The LED status is same as the coincidence signal. Output is performed only when the output enable signal is turned ON.



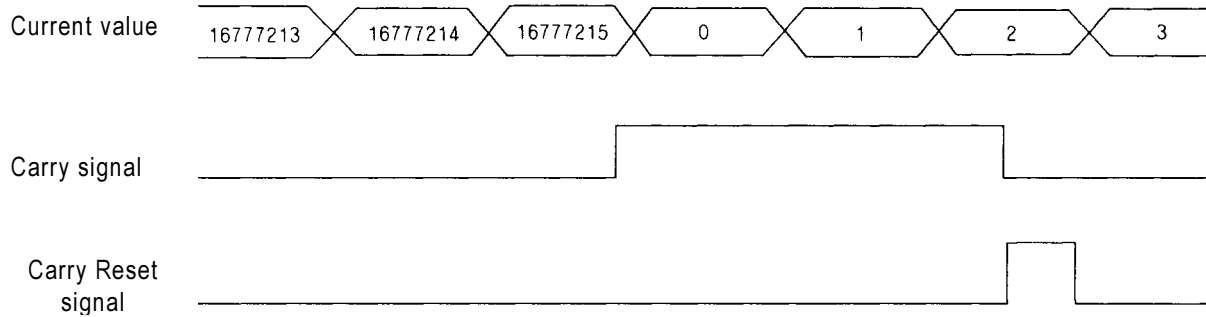
3.3.3 Home Signal

Home signal is operated only when the HOME-LATCH enable signal is turned on. Home signal turns on when both of phase Z pulse input and limit switch input is turned on. The count value retains '0' until the HOME-LATCH enable signal turns OFF though the counter continuous its counting operation.



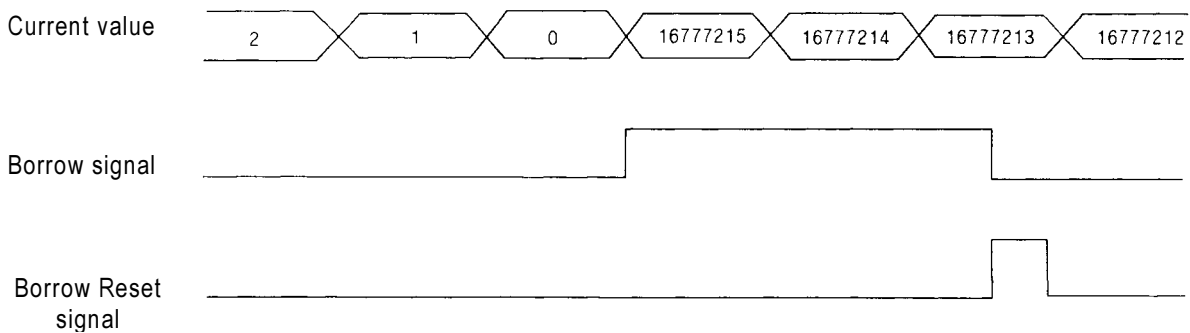
3.3.4 Carry Signal

The carry signal appears when the counter value changes from 16,777,215 to 0 during increment counting. The carry signal retains its ON State until the carry reset signal turns on. If the home signal is input, the carry signal will be cleared.



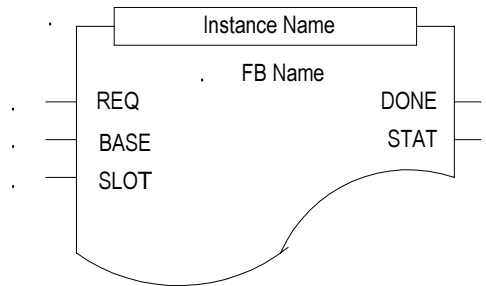
3.3.5 Borrow Signal


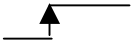
The borrow signal appears when the counter value changes from 0 to 16,777,215 during decrement counting. The borrow signal retains its ON State until the borrow reset signal turns on. If the home signal is input, the borrow signal will be cleared. The borrow reset signal is used together with the carry reset signal.



3.4 High-speed Counter Function Block

Four functions are used for the high speed counting module. They are explained in reference with the LD in this section. At first, the common terms used will be shown as follow.

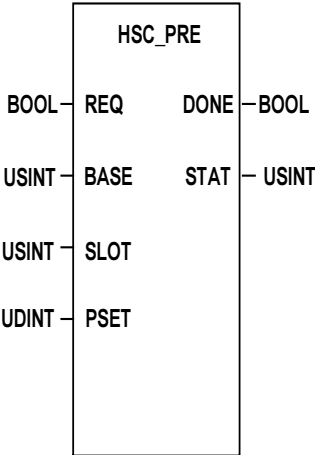



- 1 Instance name : Specifies the name for each function block when a same function block are used many times in a program
- . FB Name : Specifies the name of the function block.
- . REQ : Inputs an execution request for the function block Two.
 - LEVEL : Function block operates if the REQ input is on()
 - EDGE : Function block operates only when the REQ input turns from OFF to On()
- . BASE : Specifies the Base module No.
- . SLOT: Specifies the Slot No.
- . DONE: Set to '1' when the function block has operated without error.
- . STAT: Indicates error code.

0	Local	Normal operating
1		The base location No. exceeds
2		The base H/W defect
3		The slot location No. exceeds its range
4		The slot has not been loaded
5		Different module name
6		The channel No. exceeds its range
7		The module H/W defect
8		The module's common RAM error
9		Input setting value exceeds the setting range

• The specification of the preset value

Specifies the preset (Initial)value for the applicable channel of the High Speed Counter Module.

Function block	Descriptions
	<p>■ INPUT</p> <p>REQ : Function block execution request at rising edge.() </p> <p>BASE : Base location No. for the loaded high speed counting module.</p> <p>SLOT : Slot location No. for the loaded high speed counting module.</p> <p>PSET : Specifies the preset value (0 ~ 16,777,215)</p> <p>■ OUTPUT</p> <p>DONE : Turns on when the function block has finished without error. The On state is kept until next request. However, turns off if error occurs during execution of the function block.</p> <p>STAT : Indicates the error that occurs during execution of the function block.</p>

● The specification of the Setting value

Specifies the reference value, which will be compared with the current value for the corresponding channel of the High Speed Counter Module.

Function block	Description																																																																					
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">HSC_CMP</p> <table style="width: 100%; border-collapse: collapse; margin: 0;"> <tr> <td style="width: 15%; text-align: right;">BOOL</td> <td style="width: 15%; border-right: 1px solid black; padding: 2px;">REQ</td> <td style="width: 15%; padding: 2px;">DONE</td> <td style="width: 15%; text-align: left;">-BOOL</td> </tr> <tr> <td style="text-align: right;">USINT</td> <td style="border-right: 1px solid black; padding: 2px;">BASE</td> <td style="padding: 2px;">STAT</td> <td style="text-align: left;">-USINT</td> </tr> <tr> <td style="text-align: right;">USINT</td> <td style="border-right: 1px solid black; padding: 2px;">SLOT</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">UDINT</td> <td style="border-right: 1px solid black; padding: 2px;">CMPD</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">BYTE</td> <td style="border-right: 1px solid black; padding: 2px;">CMP1</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">BYTE</td> <td style="border-right: 1px solid black; padding: 2px;">CMP2</td> <td></td> <td></td> </tr> </table> </div>	BOOL	REQ	DONE	-BOOL	USINT	BASE	STAT	-USINT	USINT	SLOT			UDINT	CMPD			BYTE	CMP1			BYTE	CMP2			<p>■ INPUT</p> <p>REQ : Function block execution request at rising edge.()</p> <p>BASE : Base location No. for the loaded high speed counting module.</p> <p>SLOT : Slot location No. for the loaded high speed counting module.</p> <p>CMPD : Specifies the Setting value (0 ~ 16,777,215)</p> <p>CMP1 : Specifies the comparison method for the first Setting value. (0 ~ 7)</p> <p>CMP2 : Specifies the comparison method for the second Setting value. (0 ~ 7)</p> <p>[Magnitude comparison method specification]</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">No.</th> <th style="text-align: center;">Symbol</th> <th style="text-align: center;">Contents</th> <th style="text-align: center;">OUT1 LED</th> <th style="text-align: center;">OUT2 LED</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td></td> <td style="text-align: center;">Not compare</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;"><</td> <td style="text-align: center;">CNT < CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">=</td> <td style="text-align: center;">CNT = CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">.</td> <td style="text-align: center;">CNT . CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">></td> <td style="text-align: center;">CNT > CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">.</td> <td style="text-align: center;">CNT .CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">.</td> <td style="text-align: center;">CNT . CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">-</td> <td style="text-align: center;">CNT - CMPD</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table> <p>■ OUTPUT</p> <p>DONE : Turns on when the function block has finished without error. The On state is kept until next request. However, turns off if error occurs during execution of the function block.</p> <p>STAT : Indicates the error that occurs during execution of the function block.</p>	No.	Symbol	Contents	OUT1 LED	OUT2 LED	0		Not compare	OFF	OFF	1	<	CNT < CMPD	ON	ON	2	=	CNT = CMPD	ON	ON	3	.	CNT . CMPD	ON	ON	4	>	CNT > CMPD	ON	ON	5	.	CNT .CMPD	ON	ON	6	.	CNT . CMPD	ON	ON	7	-	CNT - CMPD	ON	ON
BOOL	REQ	DONE	-BOOL																																																																			
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6	.	CNT . CMPD	ON	ON																																																																		
7	-	CNT - CMPD	ON	ON																																																																		


● Writing the Run Information

Specifies the run status control information for the corresponding channel of the High Speed Counter Module.

Function block	Description																																																		
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: center; margin: 0;">HSC_WR</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: right;">BOOL</td> <td style="width: 15%;">REQ</td> <td style="width: 15%;"></td> <td style="width: 15%; text-align: left;">DONE</td> <td style="width: 15%; text-align: right;">BOOL</td> </tr> <tr> <td>USINT</td> <td>BASE</td> <td></td> <td>STAT</td> <td>USINT</td> </tr> <tr> <td>USINT</td> <td>SLOT</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>OT_E</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>HOME</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>CY_R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>EQ_R</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>DOWN</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>CT_E</td> <td></td> <td></td> <td></td> </tr> <tr> <td>BOOL</td> <td>PRE_I/E</td> <td></td> <td></td> <td></td> </tr> </table> </div>	BOOL	REQ		DONE	BOOL	USINT	BASE		STAT	USINT	USINT	SLOT				BOOL	OT_E				BOOL	HOME				BOOL	CY_R				BOOL	EQ_R				BOOL	DOWN				BOOL	CT_E				BOOL	PRE_I/E				<p>■ INPUT</p> <p>REQ : Function block execution request.()</p> <p>BASE : Base location No. for the loaded high speed counting module.</p> <p>SLOT : Slot location No. for the loaded high speed counting module.</p> <p>OT_E: Specifies output enable/disable (0:disable, 1:enable)</p> <p>HOME :Specifies Home-Latch enable/disable (0:disable, 1:enable)</p> <p>CY_R: Specifies carry/borrow reset enable/disable (0:disable, 1:enable)</p> <p>EQ_R: Specifies coincidence reset enable/disable (0:disable, 1:enable)</p> <p>DOWN: Specifies the increment/decrement (0:increment, 1:decrement)</p> <p>CT_E : Specifies counting enable/disable (0:disable, 1:enable)</p> <p>PRE_I/E: Specifies outside connector usable (0:HSC_PRE F/B usable, 1:outside connector pre_set usable)</p> <p>■ OUTPUT</p> <p>DONE : Turns on when the function block has finished without error. The On state is kept until next request. However, turns off if error occurs during execution of the function block.</p> <p>STAT : Indicates the error that occurs during execution of the function block.</p>
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● Reading the value of the operating Status

Reads the current value and operating status for the corresponding channel of the High Speed Counter Module.

Function block	Descriptions																																				
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p style="text-align: center; margin: 0;">HSC_RD</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: right;">BOOL</td> <td style="width: 15%; text-align: center;">REQ</td> <td style="width: 15%; text-align: center;">DONE</td> <td style="width: 15%; text-align: left;">BOOL</td> </tr> <tr> <td style="text-align: right;">USINT</td> <td style="text-align: center;">BASE</td> <td style="text-align: center;">STAT</td> <td style="text-align: left;">USINT</td> </tr> <tr> <td style="text-align: right;">USINT</td> <td style="text-align: center;">SLOT</td> <td style="text-align: center;">CNT</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">OUT1</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">OUT2</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">UP</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">HOME</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">CY</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">BW</td> <td></td> </tr> </table> </div>	BOOL	REQ	DONE	BOOL	USINT	BASE	STAT	USINT	USINT	SLOT	CNT				OUT1				OUT2				UP				HOME				CY				BW		<p>■ INPUT</p> <p>REQ : Function block execution request. ()</p> <p>BASE : Base location No. for the loaded high speed counting module.</p> <p>SLOT : Slot location No. for the loaded high speed counting module.</p> <p>■ OUTPUT</p> <p>DONE : Turns on when the function block has finished without error. The On state is kept until next request. However, turns off if error occurs during execution of the function block.</p> <p>STAT : Indicates the error that occurs during execution of the function block.</p> <p>CNT : Current count value read from the High Speed Counter Module (0~16,777,215)</p> <p>OUT1: OUT1 status (0:Off, 1:On)</p> <p>OUT2: OUT2 status (0:Off, 1:On)</p> <p>UP : Increment/decrement status (0:decrement, 1:increment)</p> <p>HOME: Home signal input status (0:Off, 1:On)</p> <p>CY :Carry signal status (0:Off, 1:On)</p> <p>BW :Borrow signal status (0:Off, 1:On)</p>
BOOL	REQ	DONE	BOOL																																		
USINT	BASE	STAT	USINT																																		
USINT	SLOT	CNT																																			
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