Digital counter & timer

GF7

INSTRUCTION MANUAL

Thank you for purchasing Hanyoung Nux products. Please read the instruction manual carefully before using this product, and use the product correctly.
Also, please keep this manual where you can view it any time.

HANYOUNG NUX

HEAD OFFICE
HANYOUNGNUX CO.,LTD
28, Gilpa-ro 71beon-gil, Nam-gu, Incheon, Korea
TEL : (82-32)876-4697
FAX : (82-32)876-4696 http://www.hynux.com

INDONESIA FACTORY
PT. HANYOUNG ELECTRONIC INDONESIA
Jl. Jangari RT.003/002 Hegarmanah
Sukaluyu Cianjur Jawa Barat Indonesia 43284
TEL : +62-2140001930

Safety information

Please read the safety information carefully before the use, and use the product correctly.The alerts declared in the manual are classified into Danger, Warning and Caution according to their importance

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or property damage

⚠ DANGER

- The input/output terminals are subject to electric shock risk. Never let the input/output terminals come in contact with your body or conductive substances.

⚠ WARNING

- Any use of the product other than those specified by the manufacturer may result in personal injury or property damage.
- If there is a possibility that a malfunction or abnormality of this product may lead to a serious accident to the system, install an appropriate protection circuit on the outside.
- Since this product is not equipped with a power switch and fuse, install them separately on the outside (fuse rating: 250 V a.c. 0.5 A).
- To prevent electric shocks and malfunctions, do not supply the power until the wiring is completed.
- Never disassemble, modify, process, improve or repair this product, as it may cause abnormal operations, electric shocks or fires.
- Please disassemble the product after turning OFF the power. Failure to do so may result in electric shocks, product abnormal operations or malfunctions.
- Please supply the rated power voltage, in order to prevent product breakdowns or malfunctions.
- The product does not have an explosion-proof structure, so avoid using it in places with flammable or explosive gases.
- Please use this product after installing it to a panel, because there is a risk of electric shock.

⚠ CAUTION

- The contents of this manual may be changed without prior notification.
- Please make sure that the product specifications are the same as you ordered.
- Please make sure that there are no damages or product abnormalities occurred during shipment.
- Please use the product in places where corrosive gases (especially harmful gases, ammonia, etc.) and flammable gases are not generated.
- Please use the product in places where vibrations and impacts are not applied directly to the product body
- Please use the product in places without liquids, oils, chemicals, steam, dust, salt, iron, etc.
- Please do not wipe the product with organic solvents such as alcohol, benzene, etc. (use neutral detergents).
- Please avoid places where large inductive interference, static electricity, magnetic noise are generated.
- Please avoid places with heat accumulation caused by direct sunlight, radiations, etc.
- Please use the product in places with elevation below 2000 m.
- When water enters, short circuit or fire may occur, so please inspect the product carefully.
- When there is a lot of noise from the power, we recommend to use insulation transformer and noise filter. Please install the noise filter to a grounded panel or structure etc. and make the wiring of noise filter output and product power supply terminal as short as possible.
- Tightly twisting the power cables is effective against noise.
- Do not wire anything to unused terminals.
- Please wire correctly, after checking the polarity of the terminals.
- Install switches or circuit breakers that allow the operator to immediately turn OFF the power, and label them to clearly indicate their function.
- Please install switches or breakers near the operator to facilitate the operation.
- Please specify on the panel that, since switches or circuit breakers are installed, if the switches or circuit breakers are activated, the power will be cut off.
- We recommend regular maintenance for the continuous safe use of this product.
- Some components of this product may have a lifespan or deteriorate over time.
- The warranty period of this product, is 1 year, including its accessories, only when it is used for the purpose it was intended under normal conditions.
- The preparation period of the contact output is required during power supply. If used as a signal to external interlock circuit, etc. please use a delay relay together.

Features

- Counter / Timer
- Relay and transistor simultaneous outputs
- 14 input / 18 output modes
- Maximum 5 kcps counting speed support
- ON-DELAY / OFF-DELAY selectable
- Voltage input (PNP) and non-voltage input (NPN) selection
- Coefficient selection according to RISING (⌐‾) and FALLING (‾⌙) of input signal
- The decimal point position can be moved (in counter)
- Pre-scale operation (applicable when using counter)
- Decimal point calculation function (applicable when using counter)
- 1-stage output Hold, One-short, Flickering output functions (applicable when using 2-stage setting product)

Suffix code

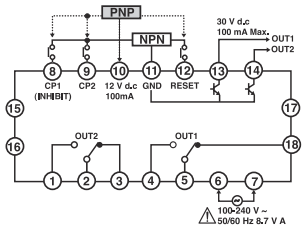
MODEL	Suffix code							Description
Shape	GF7	□	□	□	□			Digital counter DIN Size 72 (W) X 72 (H) mm
Type		P						Preset counter
		T						Total counter
Displayable digit			6					6 Digits (display : 999999)
			4					4 Digits (display : 9999)
Setting stage				2				2-stage setting
				1				1-stage setting
				0				Display only
Terminal structure					E			Pre-scale operation function support
					N			General operation

Specification

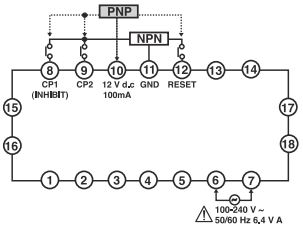
Model	Total	GF7-T60
	1-stage setting	GF7-P61 / GF7-P41
	2-stage setting	GF7-P62 / GF7-P42
Power supply voltage		100 – 240 V a.c 50/60 Hz
Voltage fluctuation		±10 % of the power supply voltage
Power consumption	Total	GF7-T60 : approx 6.4 V A (220 V a.c. 60 Hz)
	Preset	GF7-P62 : approx 8.7 V A / GF7-P61 : approx 7.6 V A (220 V a.c. 60 Hz)
Display method		GF7-P6 : red FND 6 digits (character heigt : 10 mm) GF7-P4 : red FND 4 digits (character heigt : 11 mm)
Input type	Voltage input	SPDT (1c), 250 V a.c. 3 A resistive load, cosØ = 1.0
	Non-voltage type	NPN open collector, 30 V d.c. Max. 100 ㎃ Max.
ONE Short output time		Set by the front TM volume (0.05 ~ 5.8 sec)
Input type	Voltage input	High level voltage : 5 – 30 Vd.c., Low level voltage : 0-2 V d.c., Input impedance : approx 4.7 ㏀
	Non-voltage type	Impedance when breaks : 1 ㏀ max, remaining voltage when breaks : 2 V, impedance when opens : 100 ㏀ min
Min input time	RESET	20 ㎳ min
	INHIBIT	20 ㎳ min (Applicable when using timer)
CP1,CP2 computation speed		30 cps : contact/non-contact, minimum signal time 16.7 ㎳ , 1 kcps : contactless, minimum signal time 0.5 ㎳ or more, 3 kcps : contactless, minimum signal time 0.167 ㎳ or more 5 kcps : non-contact, minimum signal time 0.1 ㎳ (when ON/OFF = 1:1)
Power backup selectable		Semi-permanent (EEPROM type)
Setting type		Constant recognition (can be changed even during energization)
External power supply		12 V d.c. ±10 %, 100 ㎃ Max.
Timer action error	Repeating operation error	Less than ± 0.01 % ± 0.05 sec (only with the power start) Less than ± 0.005 % ± 0.003 sec (only with the reset start)
	Setting error	
	Voltage error	
	Temperature error	
Relay life	Mechanical	1 million times min
	Electrical	100 thousand times min (250 V a.c. 2 A resistance load)
Insulation resistance		100 ㏁ min (500 V d.c. mega electric conduction terminal-non recharging metal)
Dielectric strength		2000 V a.c. 60 Hz for 1min (different charging terminal from cach other)
Noise immunity		Square wave noise due to the noise simulator (1 ㎲ pulse width) ±2 ㎸ (between the operation power terminal)
Vibration	Durability	10 – 55 Hz (1 minute cycle) double amplitude 0.75 mm X, Y, Z each direction, 1 h
	Malfunction	10 – 55 Hz (1 minute cycle) double amplitude 0.5 mm X, Y, Z each direction, 10 minutes
Shock	Durability	300 ㎨ (30G) X, Y, Z each direction for 3 times
	Malfunction	100 ㎨ (10G) X, Y, Z each direction for 3 times
Ambient temperature		-10 ~ 55 ℃ (with no icing)
Ambient humidity		35 ~ 85 % R.H
Storage temperature		-20 ~ 65 ℃ (with no icing)
Weight		GF7-P62 : approx 243 g / GF7-P61 : approx 225 g
		GF7-P42 : approx 238 g / GF7-P42 : approx 236 g

Dimension&Connection & Panel cutout

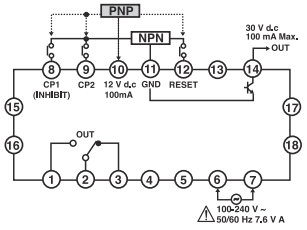
■ GF7-P62/P42



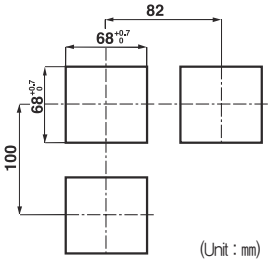
■ GF7-T60

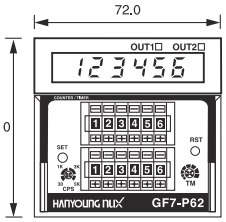


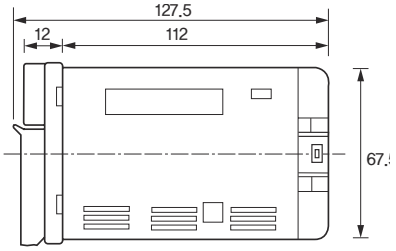
■ GF7-P61/P41



■ Panel cutout

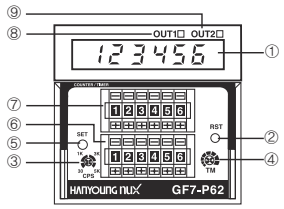






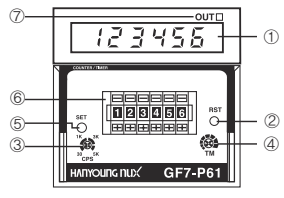
Front side configuration

■ GF7-P62/P42



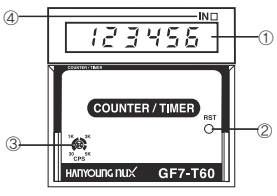
①	Count / time display unit	• Counter: shows count cumulative value • Timer: shows progress time
②	Reset (RST) switch	• When initializing count cumulative value and time progress value • When changing control specifications like counter/timer, etc.
③	Counting speed setting volume	• Used when setting counting speed • 30 / 1 k / 3 k / 5 k cps
④	Out. time volume (one-short time)	• Used when setting output time • 0.05 ~ 5.8 sec
⑤	SET switch	• Used when setting pre-scale value
⑥	2-stage set value input part	• Counter: when setting 2-stage count value • Timer: when setting 2-stage time value
⑦	1-stage set value input part	• Counter: when setting 1-stage count value • Timer: when setting 1-stage time value
⑧	1-stage output display LED	• Illuminates when output is generated to OUT2 terminal
⑨	2-stage output display LED	• Illuminates when output is generated to OUT2 terminal

■ GF7-P61/P41



①	Count / time display unit	• Counter: shows count cumulative value • Timer: shows progress Time
②	Reset (RST) switch	• used when initializing counting cumulative value and time progress value • Used when changing control specifications like counter/timer, etc.
③	Counting speed setting volume	• Used when setting counting speed • 30 / 1 k / 3 k / 5 k cps
④	Out. time volume (one-short time)	• Used when setting output time • 0.05 ~ 5.8 sec
⑤	SET switch	• Used when setting pre-scale value
⑥	2-stage set value input part	• Counter: when setting 2-stage count value • Timer: when setting 2-stage time value
⑦	1-stage set value input part	• Counter: when setting 1-stage count value • Timer: when setting 1-stage time value

■ GF7-T60

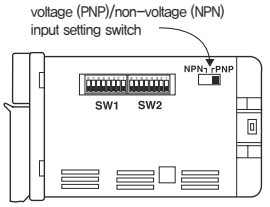


①	Count / time display unit	• Counter : shows counting cumulative value • Timer :shows progress Time
②	Reset (RST) switch	• used when initializing counting cumulative value and time progress value • Used when changing control specifications such as Counter/Timer, etc.
③	Counting speed setting volume	• Used when setting counting speed • 30 / 1 k / 3 k / 5 k cps
④	Input display LED	• Illuminates when input is generated to CP1, CP2 terminals

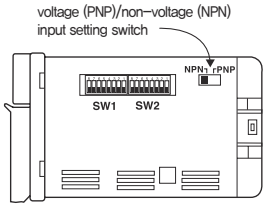
Function

■ Input logic setting

1. Turn off the GF7.
2. Set the voltage (PNP) / non-voltage (NPN) input setting switch installed on the case side to match the external input that you want to use.
3. After the setting is finished, the 'counter/timer' is activated according to the set voltage (PNP) / non-voltage (NPN) input status, when you supply power to the GF7.
   Note) Change the voltage (PNP) / non-voltage (NPN) input settings after power off.



PNP input setting



NPN input setting

■ Counting speed selection (CPS)

Sets the counting speed (CPS) using the front CPS volume (+) driver. it is recommended to set the arrows of the CPS volume as 30 cps for the left end, 5 kcps for the right end, 1 kcps for 45 °, 3 kcps for 135° There are four counting speeds. (30/1k/3k/5k)

■ One short time setting

Sets the output time (one-short time) using the (+) driver on the front TM volume. The time setting range is variable from 0.05 to 5.8 sec.

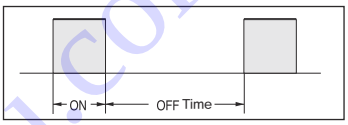
■ Decimal point selection (Common to set value)

SW2	GF7-P62/P61/T60	GF7-P42/T41
ON OFF 7 8	888888	8888
ON OFF 7 8	88888.8	888.8
ON OFF 7 8	8888.88	88.88
ON OFF 7 8	888.888	8.888
Note) when setting the decimal point, the set decimal point is applied simultaneously also to the set value		

■ Maximum counting speed

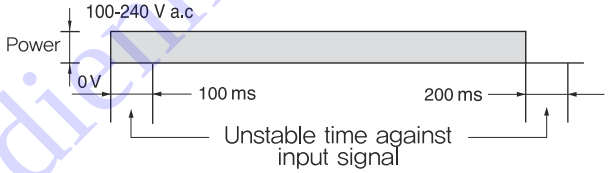
1. The maximum counting speed is the maximum response speed when you input the duty ratio (ON/OFF ratio) of the count input signal as 1: 1.
2. Even when the input signal is below the maximum counting speed, it may not be counted if the ON or OFF times are less than the specified minimum signal time.
3. In case of contact input, use contacts with excellent contact reliability.
4. Minimum signal time

Max. counting speed	Min. signal time
30 cps	16.7 ms min.
1 kcps	0.5 ms min.
3 kcps	0.167 ms min.
5 kcps	0.1 ms min.



■ Power supply

Please note that voltage of inisde circuit is increasing or decreasing in time between 100ms after power on and 200ms after power off.

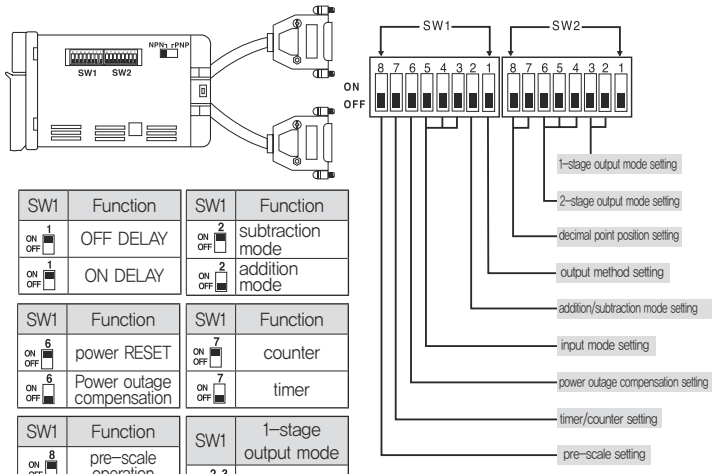


■ Sensor power supply

Since the power supply that can be supplied to the sensor (12 V d.c. 100 mA max.) is built-in, it can be used within the rated current value (proximity switch: about 10 mA, rotary encoder: about 30 mA)

■ Function setting switch

- For total counter, set 'no. 2, 3, 4, 5, 6 of SW2' all to 'OFF' as there is no output.
- For 1-stage setting model, set 'no. 2, 3 of SW2' all to 'OFF' as the output is 1-stage.
- 'No. 2, 3 of SW2' are all set to 'ON', and 1-stage output is set to 'One-short' output.
- When SW is raised upwards, it becomes 'ON'. When it goes downwards, it becomes 'OFF'.



SW1	Function
1 ON OFF	OFF DELAY
1 ON OFF	ON DELAY

SW1	Function
2 ON OFF	subtraction mode
2 ON OFF	addition mode

SW1	Function
6 ON OFF	power RESET
6 ON OFF	Power outage compensation

SW1	Function
7 ON OFF	counter
7 ON OFF	timer

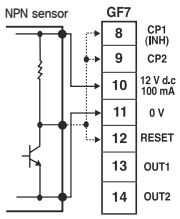
SW1	Function
8 ON OFF	pre-scale operation
8 ON OFF	general operation

SW1	1-stage output mode
2 3 ON OFF	Hold
2 3 ON OFF	Flickering
2 3 ON OFF	One-short

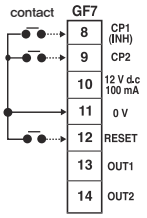
Input connection

■ Input connection when the external device is 'NPN' output

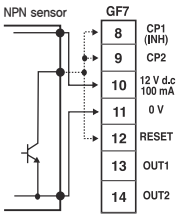
contactless input (sensor output: NPN voltage output)



contact input (contact output: NPN output)



contactless input (sensor output: NPN open collector output)

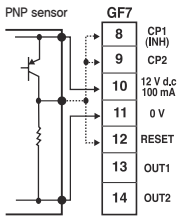


⚠

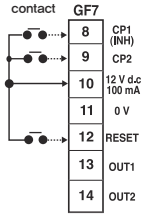
- If the output of the external device is 'NPN', change the 'NPN/PNP' S/W installed on the 'GF7' side to 'NPN'.
- When using contact input, set the counting speed to 30 cps.

■ Input connection when the external device is 'PNP' output

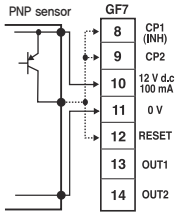
contactless input (sensor output: PNP voltage output)



contact input (contact output: PNP output)



contactless input (sensor output: PNP open collector output)



⚠

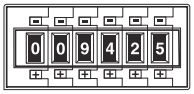
- If the output of the external device is 'NPN', change the 'NPN/PNP' S/W installed on the 'GF7' side to 'PNP'.
- When using contact input, set the counting speed to 30 cps.

Pre-scale setting method

■ What is the pre-scale function?

- It is function which counts the number of input signals and converts them to an arbitrary number.

■ Usage example according to pre-scale settings



〈 front digital switch 〉

Example) When winding the wire on the drum, to indicate the winding length or to control the actual length.

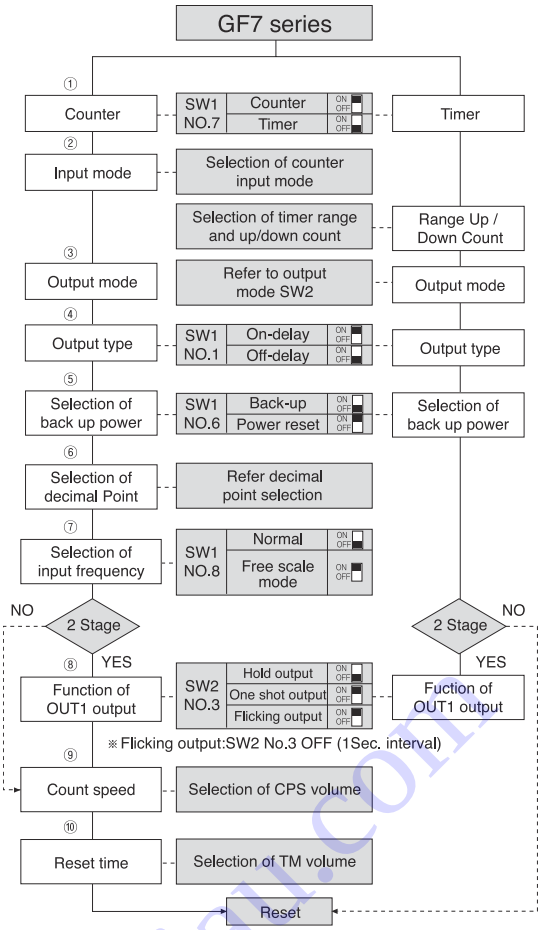
- Diameter (D) of the roller from which the wire is drawn: 600 mm
- Encoder used: 1 revolution / 20 pulses
- Display value unit: meter (m)

Under the above conditions

- Circumference = D • π = 600 x 3.1416 = 1884.96 mm (winding length per revolution)
- The winding length per pulse is 1884.96 ÷ 20 = 94.248 mm
  When you convert the unit into meters (m), it is '0.094248 m'. (94.248 ÷ 1000)
  Since it is possible to set up to 5 digits after the decimal point, if it is 6 digits, it rounds it and sets '0.09425' as the pre-scale value.

① To select the counter, set the side 'no. 7 of DIP SW1' switch to 'ON'.
② To select the pre-scale mode, set the side 'no. 8 of DIP SW1' switch to 'ON'.
③ To set the display and count set values to the lower 3 digits of the decimal point, set 'no. 7, 8 of DIP SW2' switches to 'ON' and press the front reset (RST) switch (for 1-stage setting, 'Err.0' is displayed on the display part when 1-stage set value is「0」. For 2-stage setting, when 2-stage set value is「0」or smaller than 1-stage set value).
④ Since the decimal point moves every time the SET switch is pressed, set the decimal point position of the prescale value to the lower 5th digit using the SET switch.
⑤ After setting the front digital switch (2-stage digital switch for 2-stage setting) to '0.09425', press the reset (RST) switch to complete the pre-scale value setting.

Mode selection



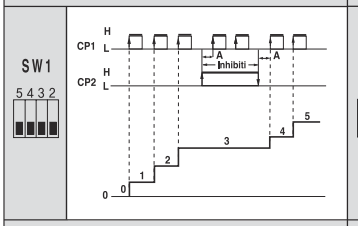
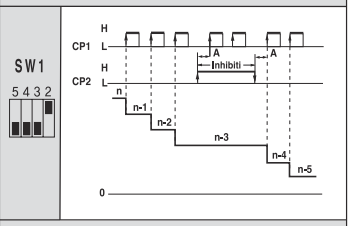
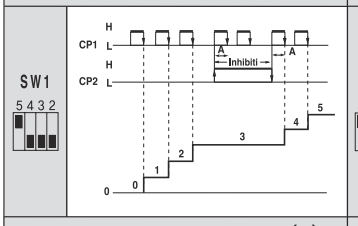
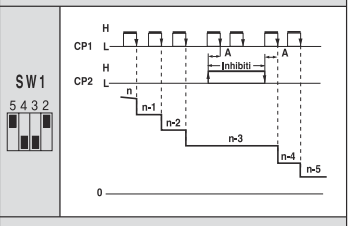
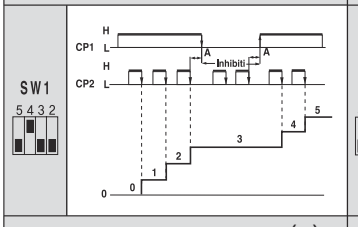
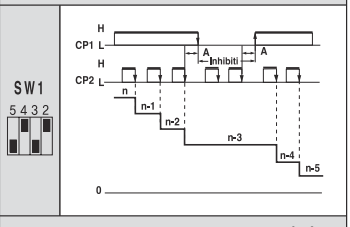
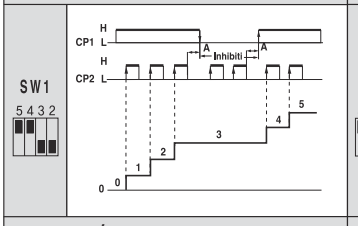
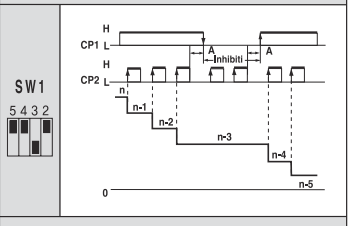
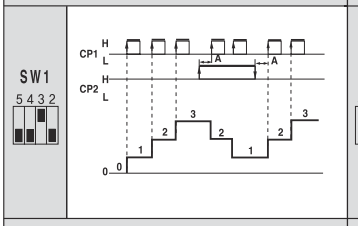
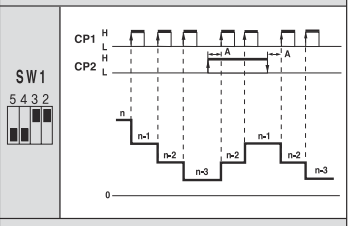
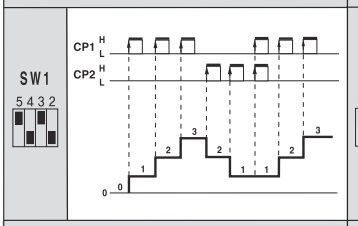
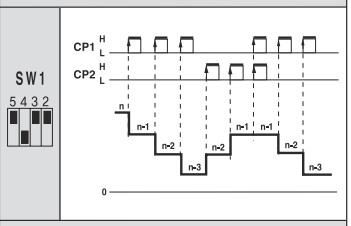
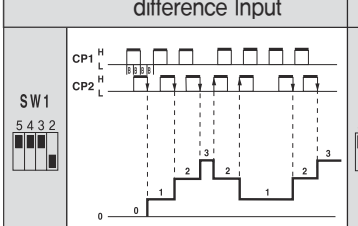
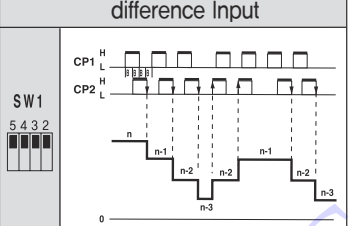
Timer range and addition/subtraction mode selection

SW1	addition mode(timer)		SW1	subtraction mode(timer)	
	GF7-P42/P41	GF7-P62/P61/T60		GF7-P42/P41	GF7-P62/P61/T60
5 4 3 2 ON OFF	99.99 s	99999.9 s	5 4 3 2 ON OFF	99.99 s	99999.9 s
5 4 3 2 ON OFF	999.9 s	999999 s	5 4 3 2 ON OFF	999.9 s	999999 s
5 4 3 2 ON OFF	9999 s	99 m 59.99 s	5 4 3 2 ON OFF	9999 s	99 m 59.99 s
5 4 3 2 ON OFF	99 m 59 s	999 m 59.9 s	5 4 3 2 ON OFF	99 m 59 s	999 m 59.9 s
5 4 3 2 ON OFF	999.9 m	99999.9 m	5 4 3 2 ON OFF	999.9 m	99999.9 m
5 4 3 2 ON OFF	99 h 59 m	99 h 59 m 59 s	5 4 3 2 ON OFF	99 h 59 m	99 h 59 m 59 s
5 4 3 2 ON OFF	999.9 h	9999 h 59 m	5 4 3 2 ON OFF	999.9 h	9999 h 59 m
5 4 3 2 ON OFF	9999 h	99999.9 h	5 4 3 2 ON OFF	9999 h	99999.9 h

Counter input mode

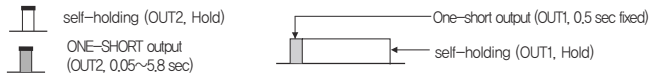
Note) A shall be above the minimum signal width, and B above ½ of the minimum signal width
Note) The timing diagram below is for when the input logic is set to 'PNP' mode.
Note) When input logic is set to 'NPN',use the timing diagram as the opposite of 'PNP'.

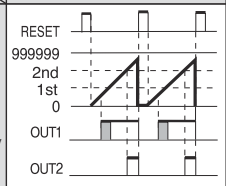
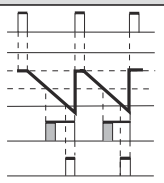
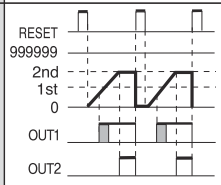
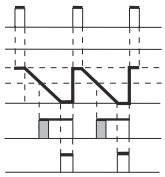
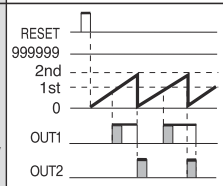
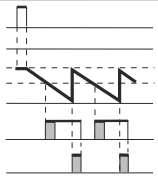
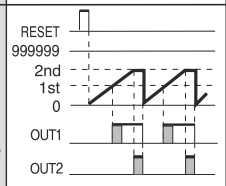
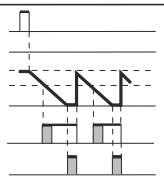
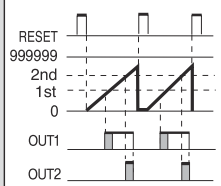
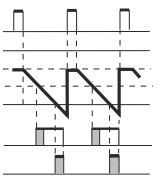
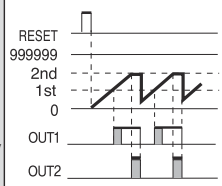
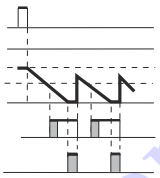
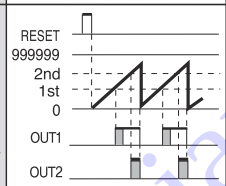
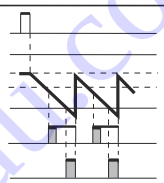
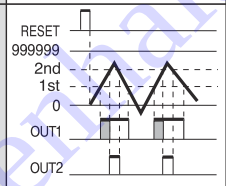
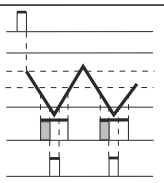
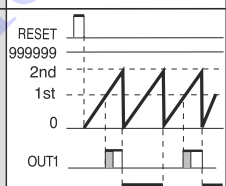
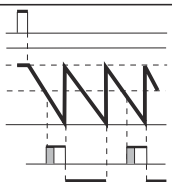
• R : Count in rising (⌐‾) of input • F : Count in falling (‾⌐) of input

UP A Inhibit Input(R)	DOWN A Inhibit Input(R)
	
UP A Inhibit Input(F)	DOWN A Inhibit Input(F)
	
UP B Inhibit Input(F)	DOWN B Inhibit Input(F)
	
UP B Inhibit Input(R)	DOWN B Inhibit Input(R)
	
UP/DOWN A Command Input	UP/DOWN D Command Input
	
UP/DOWN B Individual Input	UP/DOWN E Individual Input
	
UP/DOWN C Phase difference Input	UP/DOWN F Phase difference Input
	

Output mode

Note) For GF7-P61/P41, it operates in the same form as 2-stage output (OUT2).
Note) If 'no. 2 of DIP SW2' on case side is set to 'ON', 1-stage output (OUT1) operates with 'Flickering (ON-0.5 sec, OFF-0.5 sec)' output. (but 'no. 3 of DIP SW2 ' should be 'OFF')



Input Mode / output Mode		UP	DOWN	Operation description
F	SW2 6 5 4 Counter/ Timer			• The display value increases or decreases continuously regardless of 2-stage output, and output status is maintained. • When the reset signal is applied, the display value and output are initialized.
N	SW2 6 5 4 Counter/ Timer			• The display value stops at the same time with 2-stage output, and output status is maintained. • When the reset signal is applied, the display value and output are initialized.
C	SW2 6 5 4 Counter/ Timer			• The display value is initialized at the same time with 2-stage output, and increases or decreases continuously. • The output state is maintained during the output set time, the output is initialized after output set time, • 1-stage output is initialized together with 2-stage output. • The above operation is repeated without reset signal.
R	SW2 6 5 4 Counter/ Timer			• The display value stops at the same time with 2-stage output. • The output state is maintained during the output set time, the display value and output are initialized after output set time, • 1-stage output is initialized together with 2-stage output. • The above operation is repeated without reset signal.
K	SW2 6 5 4 Counter/ Timer			• The display value increases or decreases continuously regardless of 2-stage output. • The output state is maintained during the output set time, After the output setting time, only the output is initialized without display value change. • 1-stage output is initialized together with 2-stage output. • When the reset signal is applied, the display value and output are initialized.
P	SW2 6 5 4 Counter/ Timer			• The display value stops at the same time with 2-stage output, the count value is initialized. • The output state is maintained during the output set time, the count value increases or decreases continuously without display value change. • The output is initialized after output set time, the increased or decreased count values are displayed. • 1-stage output is initialized together with 2-stage output.
Q	SW2 6 5 4 Counter/ Timer			• The display value increases or decreases continuously regardless of 2-stage output • The output status is maintained during output set time, the display value and output are initialized after output set time. • 1-stage output is initialized together with 2-stage output.
S	SW2 6 5 4 counter only			• When using addition mode, 1-stage output is generated when the display value is higher than 1-stage set value. When lower, it is initialized. 2-stage output is generated when the display value is higher than 2-stage set value. When lower, it is initialized. • When using subtraction mode, 1-stage output is generated when the display value is lower than 1-stage set value. When higher, it is initialized. 2-stage output is generated when the display value is lower than '0' when higher than '0', it is initialized.
A	SW2 6 5 4 timer only			• When using addition mode, 2-stage output is inverted when the display value is higher than 2-stage set value, and the display value is initialized. • When using subtraction mode, 2-stage output is inverted when the display value is lower than '0', and the display value is initialized. • 1-stage output is generated when 2-stage output is 'OFF', if display value is higher than 1-stage set value.