KHAE ® GW621/GW626/GW631/GW636
# Multifunctional pulse meter instruction manual

Pulse counting, rotating pulse measurement and time interval measurement with high speed plus and minus count

1 Characteristics

- 18 measuring functions to support all kinds of pulse measurement applications
- It can be equipped with voltage-free contacts, photoelectric switches, proximity switches, rotary encoders and other sensors
- High accuracy measurement range <u>0.0001Hz – 100kHz</u>
- Memory function of counting value, maximum value and minimum value, memory/no memory can be set
- Measure value display update cycle, monitor brightness can be set
- Two sets of alarm output, alarm type, action error, start delay and close delay can be set
- Output function of photoelectric isolation transformer, current output (4-20mA) / voltage output (0-10VDC)
- Photoelectric isolation communication interface RS-485 / RS-232C, with a baud rate range of 2400 ~ 38400bps

2 Model Indication

GW ☐☐☐ — ☐ — ☐☐ — ☐☐ — 1 — ☐
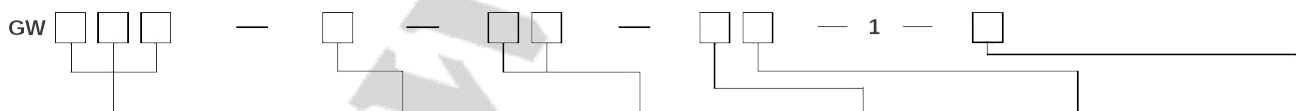
Dimensions and Display		Power		Sensor Power		Alarm Output 1		Alarm Output 2		Relay Output	
621	160x80x80mm 4 LED, 20.3mm	1	100 - 240VAC	05	5VDC	0	None	0	None	0	None
631	160x80x80mm 6 LED, 20.3mm	2	24V AC/DC	12	12VDC	1	Relay	1	Relay	1	RS-485
626	96x48x82mm 4 LED, 20.3mm			24	24VDC	2	NPN	2	NPN	2	RS-232C
636	96x48x82mm 6 LED, 14.2mm									3	4-20mA
										4	0-10VDC

3	Dimensions and opening dimensions of panel

GW621 / GW631

80
160
14
66
Panel Open
76
152

GW626 / GW636

48
96
11
71
Panel Open
45
92
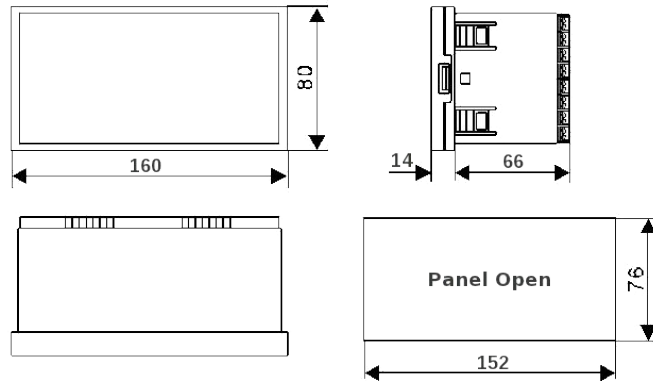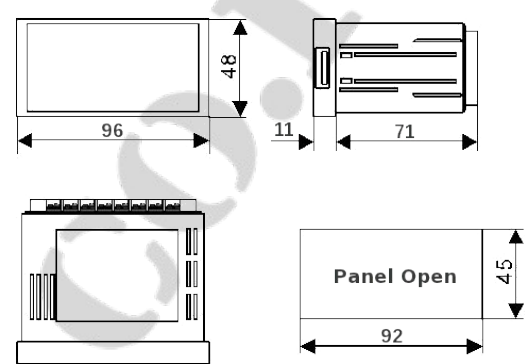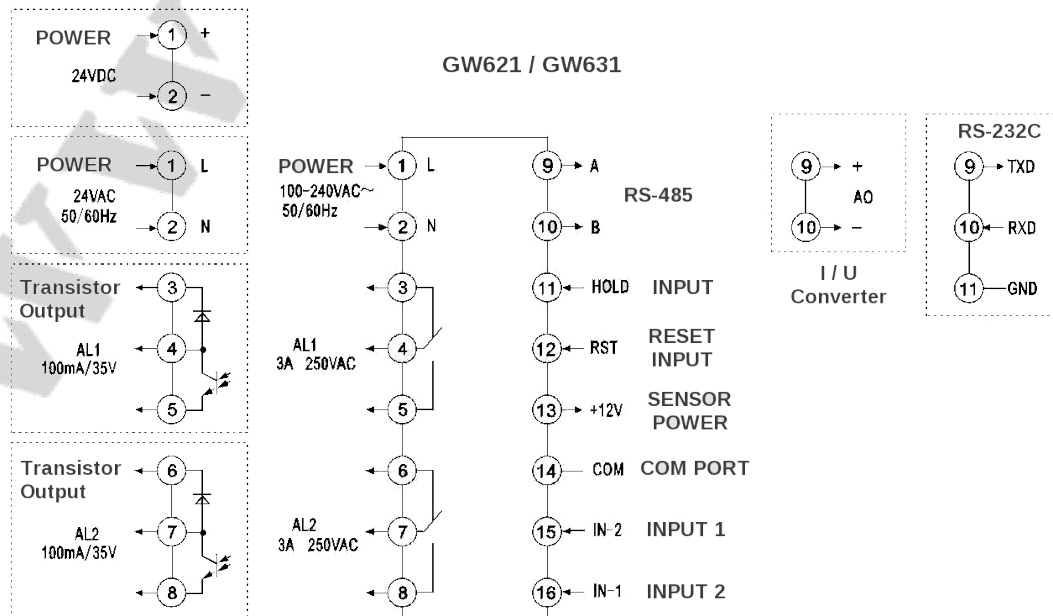
4	Function description of each part of operation panel
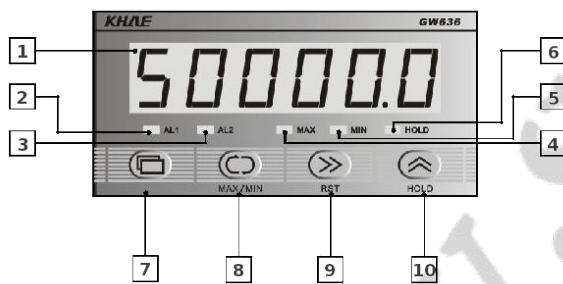
No.	Description	No.	Description
1	Display	6	Holding Light
2	Alarm 1 Indicator	7	Menu
3	Alarm 2 Indicator	8	Switch Max/Min
4	Max Indicator	9	Shift Key / RST
5	Min Indicator	10	Increase Key / HOLD

5	Wiring

POWER 24VDC   (1) +   (2) −

POWER 24VAC 50/60Hz   (1) L   (2) N

Transistor Output   AL1 100mA/35V   (3) (4) (5)

Transistor Output   AL2 100mA/35V   (6) (7) (8)

GW621 / GW631

POWER 100-240VAC~ 50/60Hz   (1) L   (2) N   (3)   AL1 3A 250VAC (4) (5)   (6)   AL2 3A 250VAC (7) (8)

(9) → A   (10) → B   **RS-485**

(11) ← HOLD   INPUT

(12) ← RST   RESET INPUT

(13) → +12V   SENSOR POWER

(14) — COM   COM PORT

(15) ← IN-2   INPUT 1

(16) ← IN-1   INPUT 2

(9) → +   (10) → −   AO   I / U Converter

RS-232C   (9) → TXD   (10) ← RXD   (11) — GND

I / U Converter: + AO − (1) (2)

RS-232C: TXD RXD GND (1) (2) (3)

GW626 / GW636

RS-485: A B (1) (2)
INPUT HOLD (3)
RESET INPUT RST (4)
SENSOR POWER +12V (5)
COM PORT COM (6)
INPUT 2 IN-2 (7)
INPUT 1 IN-1 (8)

L (9) N (10) (11) (12) (13) (14) (15) (16)

POWER 50/60Hz

AL1 3A 250VAC   AL2 3A 250VAC

24VDC POWER: + − (9) (10)

24VAC 50/60Hz POWER: L N (9) (10)

AL1 100mA/35V Transistor Output: (11) (12) (13)

AL2 100mA/35V Transistor Output: (14) (15) (16)

Signal Input Connections

Proximity switch, photoelectric switch, etc
V+ → +12V
OUT → IN-1 (IN-2)
0V → COM

Double phase output sensor, encoder, etc
V+ → +12V
A → IN-1
B → IN-2
0V → COM

Photoelectric pipe connection
R: 360Ω ~ 1kΩ (12V)
120Ω ~ 330Ω (5V)
+12V
IN-1 (IN-2)
COM
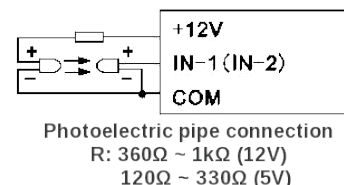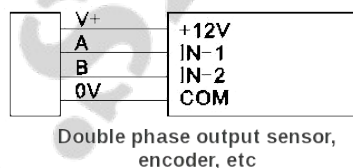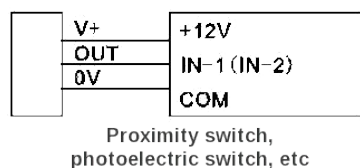
No voltage contact connection
IN-1
IN-2
COM
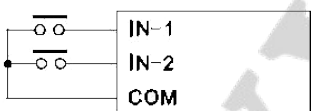
Voltage pulse signal connection
IN-1
IN-2
COM
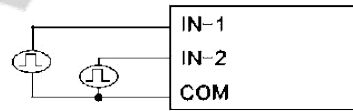
The input terminals of IN-1, IN-2, RST and HOLD are internally connected with pull-up resistance, so when the terminals are not wired (suspended), the input on IN is a high level state. When the RST and HOLD terminals are not used and are suspended, the input logic of RST and HOLD should be reversed, that is, the parameter value of RH-N is ON (see "7. Parameter specification").

    * This instrument is equipped with a sensor of NPN type.
   If the meter USES PNP sensor, please contact us for the customization

## 6   Panel display and button operation

In normal mode, the display window displays the measured value (current value), the maximum value and the minimum value. When the value exceeds the display range, it displays HHHH (HH); when it exceeds the display range, it displays LLLL (LL).
In setup mode, the display window is used to display parameter symbols, parameter values, etc.

5 indicators AL1 / AL2 / MAX / MIN / HOLD, indicating the working status and display status of the instrument.

The panel buttons are used to set the parameters ⟳ ≫ ⌃ They have a second function, in regular mode.

⟳ The key is used as the MAX / MIN (maximum / minimum) key to switch between the current values, the maximum value and the minimum value. When it is displayed as the maximum or minimum value, the corresponding indicator light will be on. If you press the MAX / MIN key for more than 3 seconds, you will reset the maximum and minimum values (equal to the current value).

≫ The key is used as the RST (reset) key. When the key is pressed, the measured value and the output of the instrument are reset and the measurement stops.

⌃ The key is used as the HOLD key. When pressed, the input of IN-1 and IN-2 is prohibited, the measurement value and instrument output remain unchanged, and the HOLD (HOLD) indicator light is on. Press the button again, exit the holding state and start measuring.
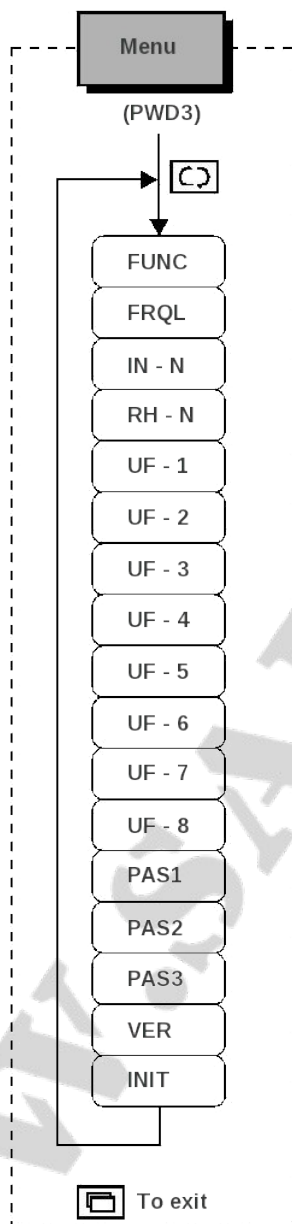
⟳ ≫ ⌃ The second function allows or disallows use, which can be set separately in "engineer menu - display key parameter group". The instrument parameters are distributed in the operation menu, engineer menu and configuration menu, and can be set according to the need of measurement and control process.
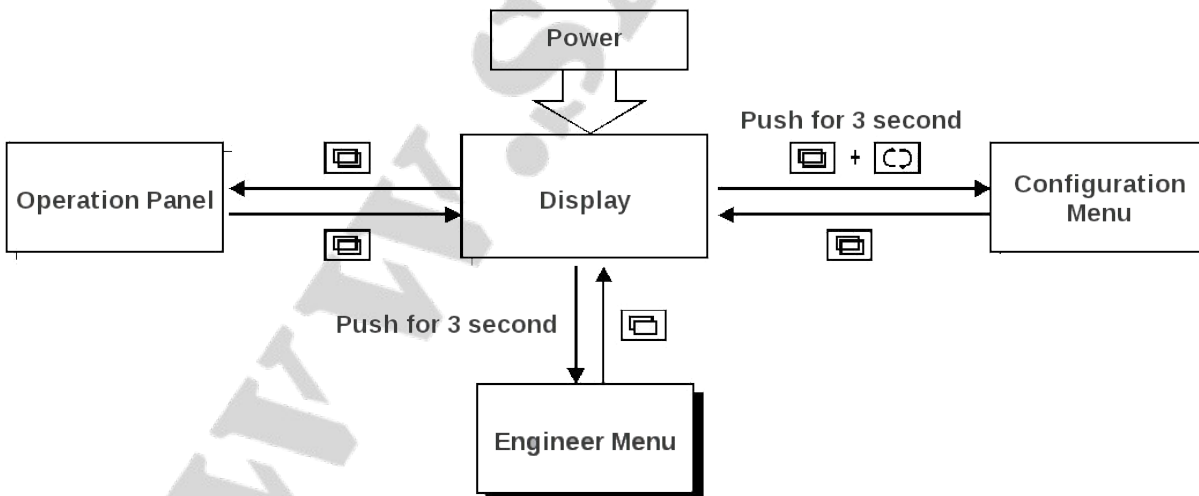
If the parameter values of PAS1, PAS2 and PAS3 are not 0, the password will be prompted before entering the corresponding menu. The operation method is the same as the parameter setting.
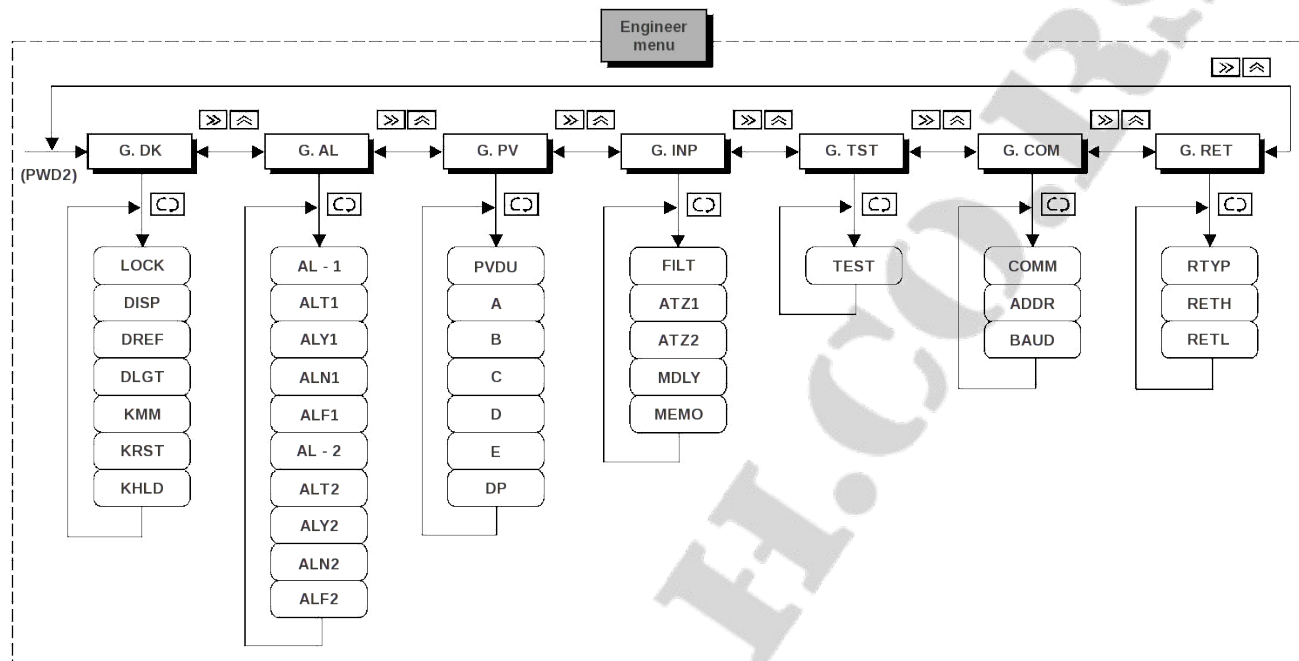
Operation menu (PWD1)

```
US - 1
US - 2
US - 3
US - 4
US - 5
US - 6
US - 7
US - 8
```

⟲ To exit
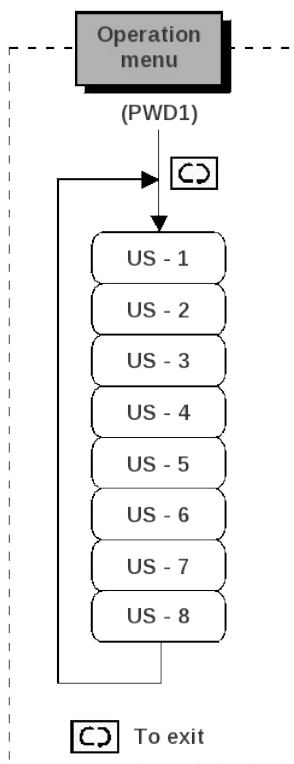
US - 1 ~ US - 8 display most be selected by the user. Common parameters in the configuration Menu UF - 1 ~ UF - 8 are in the Settings.

Menu (PWD3)

```
FUNC
FRQL
IN - N
RH - N
UF - 1
UF - 2
UF - 3
UF - 4
UF - 5
UF - 6
UF - 7
UF - 8
PAS1
PAS2
PAS3
VER
INIT
```

▣ To exit

- Action menu: used to set parameters that needs to be changed frequently. It consists of 0 ~ 8 parameters selected randomly in the engineer menu. Push ▣ enter the action menu. Push ⟲ to select parameter. Press down in the parameter selection state. ▣ Exit to menu.

- Engineer menu: used to set the measurement, control, display and other parameters of the meter. Push ▣ for 3 seconds to enter the engineer menu. Push ≫ or ⌅ to choose parameters and then push ⟲ to select it. Push ▣ to go back.

- Configuration menu: used to set parameters such as instrument function, input signal range, etc., which are usually not allowed to be modified after instrument installation and debugging. Push ▣ and ⟲ at the same time for 3 seconds to enter configuration menu. Push ⟲ to select the parameters. Press down in the parameter selection state. ▣ Exit to menu.

- Parameter setting: after entering each menu push ⟲ to choose parameter. Push ≫ to display the code value. It will flash if it is available to be changed. Use ≫ and ⌅ to increase or decrees the value. Press ⟲ to save new parameter value in the internal memory storage. Push ⟲ again to finish the setting.

The meter will automatically return to normal mode if there is no button operation within 1 minute in the setting mode. If the meter returns to normal mode during parameter setting, the parameter values being modified are not stored.

Engineer menu

(PWD2)

G. DK → G. AL → G. PV → G. INP → G. TST → G. COM → G. RET

G. DK:
LOCK
DISP
DREF
DLGT
KMM
KRST
KHLD

G. AL:
AL - 1
ALT1
ALY1
ALN1
ALF1
AL - 2
ALT2
ALY2
ALN2
ALF2

G. PV:
PVDU
A
B
C
D
E
DP

G. INP:
FILT
ATZ1
ATZ2
MDLY
MEMO

G. TST:
TEST

G. COM:
COMM
ADDR
BAUD

G. RET:
RTYP
RETH
RETL

In the state of parameter selection, press ⬚ to return to the parameter group selection.
In the parameter group selection state, press ⬚ to exit menu and return to the regular pattern.
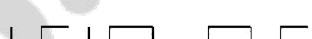
7	**Parameters description**

Code	Name	Range	Factory Default	Description
FUNC	Function	F01 ~ F18	F01	
FRQL	Input signal range	HI, MD, LO	LO	
IN-N	IN-1, IN-2 inputs; Logic reverse	ON, OFF	ON	
RH-N	RST, Hold inputs; Logic reverse	ON, OFF	ON	
UF-1 UF-8	User functions 1 ~ 8	NONE All parameters are in the engineers menu	UF-1: AL-1 UF-2: Al-2 UF-3 ~ UF-8: NONE	
PAS1	Menu password	0 ~ 9999	0	
PAS2	Engineer menu password	0 ~ 9999	0	
PAS3	Configuration menu password	0 ~ 9999	0	
VER	Version	-	-	
INIT	Factory reset	ON, OFF	OFF	

1. FRQL Input frequency range

Parameter value	Range	Pulse with on/off
HI	0 ~ 100kHz (50kHz)	Min. 4.8µs
MD	0 ~ 3kHz	Min. 160µs
LO	0 ~ 30kHz	Min. 16ms

When no voltage contact input, FRQL must be set to LO

2. IN-N, RH-N Input signal logic reversal

Input signal		
Inside signal	IN-N=OFF (RH-N=OFF)	
	IN-N=ON (RH-N=ON)	

3. If the menu password PAS1 / PAS2 / PAS3 parameter value is not 0, PWD1 / PWD2 / PWD3 prompt will appear in the display window when entering the operation menu/engineer menu/configuration menu, and only enter the correct password to enter the menu.

Remember to set the menu password! Forget password meter parameters will not be modified! If you forgot password please contact the manufacturer or distributor to restore the instrument factory value.

Code	Name	Rang	Factory Default	Description
G. DK	Display, key parameter group			
LOCK	DATA LOCK	ON, OFF	OFF	ON: DATA CAN'T CHANGE OFF: DATA CAN CHANGE
DISP	DISPLAY SELECTION	PV, MAX, MIN	PV	Current value, maximum and minimum value are displayed
DREF	Display update cycle	OFF 0.10 0.25 0.50 1 2 4	OFF	OFF ≤ 50ms 0.10 100ms 0.25 250ms 0.50 500ms (1) 1 1s 2 2s 4 4s
DLGT	Brightness	1 ~ 5	3	1 Lowest, 5 Highest
KMM	MAX / MIN keyboard	ON, OFF	ON	ON: Alow OFF: Ban
KRST	RST	ON, OFF	ON	ON: Alow OFF: Ban
KHLD	HOLD	ON, OFF	ON	ON: Alow OFF: Ban

| Code	Name	Rang	Factory Default	Description
G. AL	Alarm parameter set			
AL - 1	Alarm 1	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	1000	(2)
ALT1	Alarm 1 type	HI, LO	HI	
ALY1	Alarm 1 action error	0 ~ 9999	10	
ALN1	Alarm 1 start delay time	0.0 ~ 599.9s	0.0s	
ALF1	Alarm 1 close delay time	0.0 ~ 599.9s	0.0s	
AL - 2	Alarm 2	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 GW636)	2000	
ALT2	Alarm 2 type	HI, LO	HI	
ALY2	Alarm 2 action error	0 ~ 9999	10	
ALN2	Alarm 2 start delay time	0.0 ~ 599.9s	0.0s	
ALF2	Alarm 2 close delay time	0.0 ~ 599.9s	0.0s	
G. PV	Measurement parameters			
PVDU	Time unit selection	OFF, MMSS (GW621 / GW626) OFF, HHMMSS (GW631 / GW636)	OFF	OFF: display is in seconds MMSS: minutes and seconds HHMMSS: hours, minutes and seconds (3)
A, D	Ratio (multiplication)	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	1	The input value can be converted and displayed as the required unit value by setting the ratio (4)
B, E	Ratio factor	1 ~ 9999 (GW621 / GW626) 1 ~ 999999 (GW631 / GW636)	1	
C	Initial counter value	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	0	Make the measurement start with the desired value
DP	Point position	0 ~ 3 (GW621 / GW626) 0 ~ 5 (GW631 / GW636)	0	The position of the decimal point of the measured value and its associated parameters (5)
G. PV	Measurement parameters			
FILT	Digital filter coefficient	0 ~ 9	0	As function size of digital filter is larger more powerful it is (6)
ATZ1	IN-1 Automatic reset time	0 ~ 9999s	2s	When there is no pulse input during this time the value is forced to be 0.
ATZ2	IN-2 Automatic reset time	0 ~ 9999s	2s	
MDLY	Measure delay time with power on	0.1 ~ 99.9s	0.1s	Set the appropriate time to wait for the input signal
MEMO	Power out storage	ON, OFF	OFF	ON: remember the measurements taken before the power outage OFF: power off no record
G. TST	Test parameter set			
TEST	Output test	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	0	The key operation simulation of measurement value check

Code	Name	Rang	Factory Default	Description
G. COM	Communication parameter set			
COMM	Communication methods	OFF, RO, R-W	R-W	(8)
ADDR	Local address	1 ~ 255	1	
BAUD	Baud rate	2.4k, 4.8k, 9.6k, 19.2k, 38.4k	9.6kbps	
G. RET	Variable feed output parameter set			
RTYP	Variable output type	A output: 4 – 20mA DC 0 – 20mA DC 0 – 10mA DC	4 – 20mA DC	The output current signal is proportional to the change in the measured value
		V output: 0 – 10V DC 0 – 5V DC 1 – 5V DC	0 – 10V DC	The output current signal is proportional to the change in the measured value
RETH	Transmission upper limit	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	1000	Measured value is corresponding to the output of 20mADC
RETL	Transmission lower limit	-1999 ~ 9999 (GW621 / GW626) -199999 ~ 999999 (GW631 / GW636)	0	Measured value is corresponding to the output of 4mADC

(1) Display update cycle: when the measured value changes rapidly, increasing the display update cycle can improve the readability of the display.
(2) ALT1, ALT2 Alarm type: HI upper limit alarm, LO lower limit alarm.
ALY1 and ALY2 alarm action error: when the measured value is near the alarm value, repeated actions often occur in the alarm output due to input fluctuations and other reasons. Setting appropriate alarm action error can prevent repeated actions of the alarm output.
Start delay time for ALN1 and ALN2 alarm, and close delay time for ALF1 and ALF2 alarm: when the measured value reaches the alarm action value, move after the delay time. If the measured value changes during the delay and the action condition is no longer met, there is no alarm action.

Upper limit alarm (ALTx=HI)

Lower limit alarm (ALTx=LO)
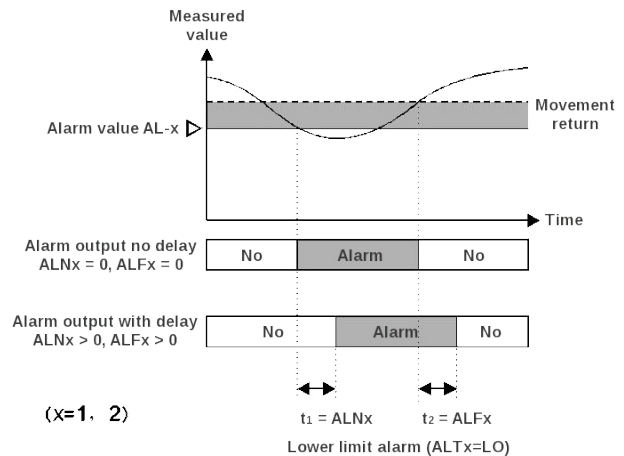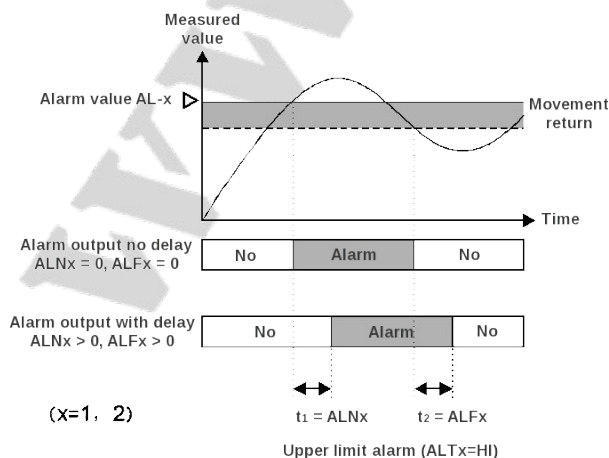
(3) PVDU time unit selection: in time interval measurement function F10 / F11 / F12, select time unit. When PVDU is set to OFF, the ratio factor A and B are set to 1, and the display units are seconds. The ratio factor A and B can be displayed as other units.

(4) The ratios of A, D ratio factor (multiplication), B and E ratio (except): A B B and D E E are used as ratios. For example, set A = 215, B = 1000, that is, the ratio is 0.215

(5) When setting the decimal point position parameter, push ⟨≫⟩ the decimal point shift right, push ⟨≪⟩ the decimal point moves to the left.

(6) When there is a sharp change in the measured value and the measured value shows digital jump repeatedly or caused by interference, the digital filter coefficient should be increased to make the display stable. The larger the digital filter is, the more stable the measured value is, but the slower the response is.

(7) The output test function can use keys to change the test value, and can confirm the output action without the actual input signal. Push ⟨≫⟩ to reduce test values, push ⟨≪⟩ to increase the value.

(8) The instrument can be equipped with RS-485 or RS-232C communication interface with photoelectric isolation, using Modbus RTU communication protocol, and the baud rate is 2400-38400 bps. When using the RS - 485 interface, each host can directly connect 63 meters at most.

The host can read the working state of the meter and send commands such as RST and HOLD.

The host can read parameter values and read 1 or more parameter values at a time.

The host can write parameter values and write 1 or more parameter values at a time.

Each parameter has EEPROM address and RAM address at the same time. Due to the limited number of write times of EEPROM (about 100,000 times), it is recommended that the parameters with excessive replacement frequency be written into RAM without the limit of write times, but when power on again, the instrument uses the data in EEPROM.

When the communication mode parameter COMM is set to OFF, the communication function of the instrument is closed; when RO is set, only the parameters and working status of the instrument can be read, and the parameters can not be modified; when R-W is set, both the parameters and working status of the instrument can be read and the parameters can be modified.
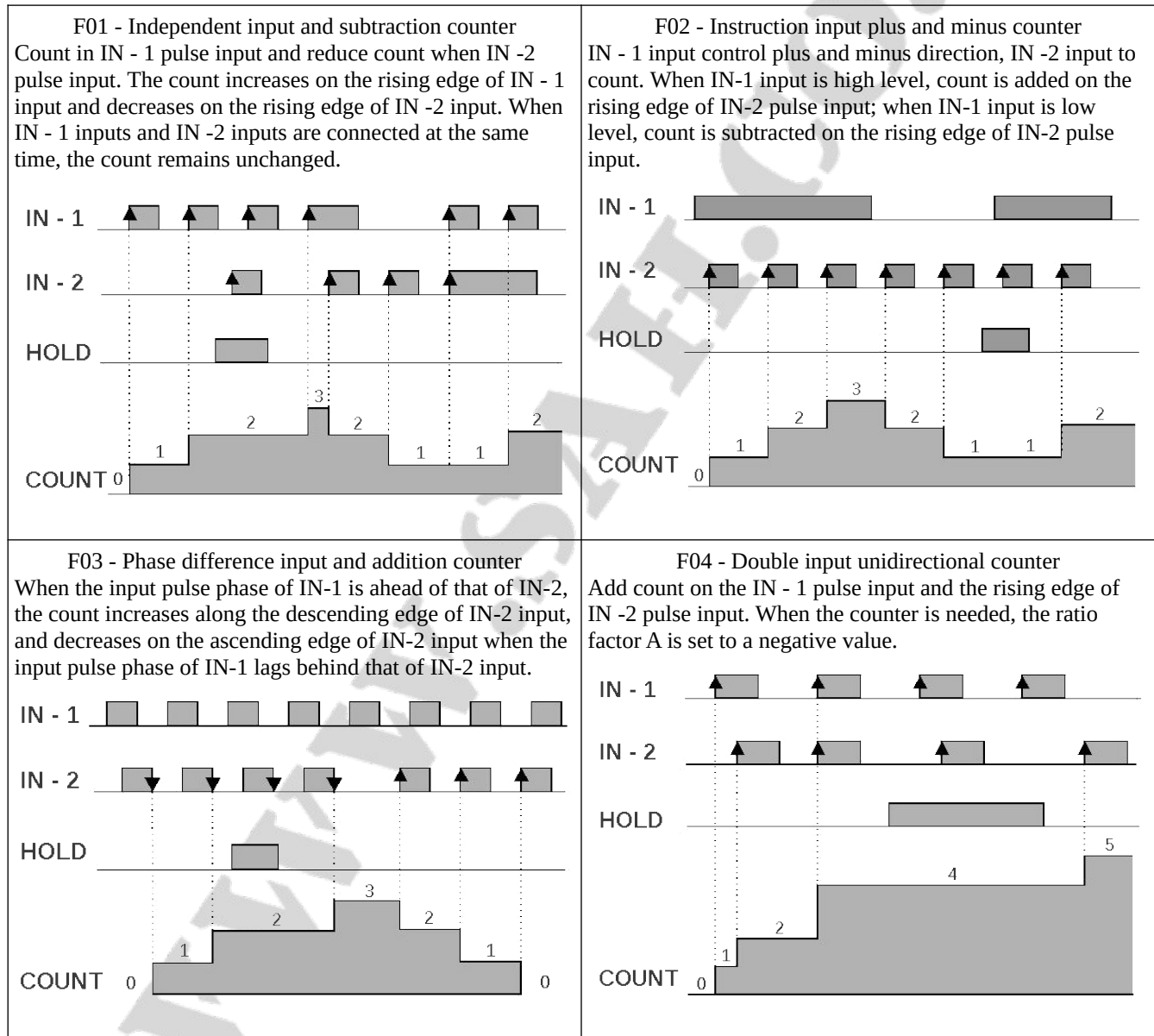
"GW621/GW626/GW631/GW636 Multifunctional Pulse Meter Communication Instructions" contains detailed communication instructions.

Download address: http://www.khae.cn/support/manual/pgw620.pdf

The instrument has 18 measuring functions, F01 to F18, and is set in the parameter FUNC. The graphical and literal descriptions of pulse signals in the following paragraphs, if not specified, refer to the case of input uncorrelated closure (IN-N = OFF, RH-N = OFF).

F01, F02, F03, F04

F01 - Independent input and subtraction counter Count in IN - 1 pulse input and reduce count when IN -2 pulse input. The count increases on the rising edge of IN - 1 input and decreases on the rising edge of IN -2 input. When IN - 1 inputs and IN -2 inputs are connected at the same time, the count remains unchanged.	**F02 - Instruction input plus and minus counter** IN - 1 input control plus and minus direction, IN -2 input to count. When IN-1 input is high level, count is added on the rising edge of IN-2 pulse input; when IN-1 input is low level, count is subtracted on the rising edge of IN-2 pulse input.
F03 - Phase difference input and addition counter When the input pulse phase of IN-1 is ahead of that of IN-2, the count increases along the descending edge of IN-2 input, and decreases on the ascending edge of IN-2 input when the input pulse phase of IN-1 lags behind that of IN-2 input.	**F04 - Double input unidirectional counter** Add count on the IN - 1 pulse input and the rising edge of IN -2 pulse input. When the counter is needed, the ratio factor A is set to a negative value.

Keep measurement value: HOLD stops counting and keeps the measured value when input, and the output is also maintained.

Reset measurement value: RST zero count when input, and all outputs are disconnected.

Power off memory: the parameter MEMO is set to ON, and the memory count value is cut off. After the power is on again, count from the count before power failure. When the parameter MEMO is set to OFF, there is no power off memory.

The counter functions F01, F02, F03 and F04 are measured by using the following formulas:
measurement value = count *A_B+C

A, B: ratio factor. Set the ratio factor to convert the count value into the unit of measurement.

C: the initial value of the counter, so that the measurement starts with the desired value.

For example, the encoder with output pulse 1000p/r is used in the measurement of sheet metal length in the following figure. The circumference of the roll is 200 mm. Setting parameters: When A = 2000, B = 1000, C = 0, DP = 1, the display value unit of the instrument is mm, and 1 digit is reserved after decimal point.

Sheet Length
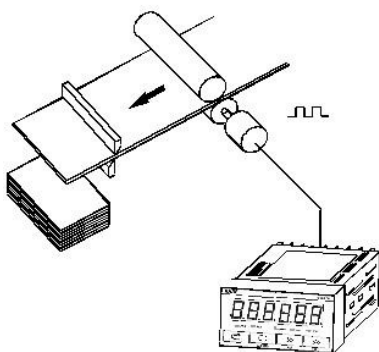
Yield Count
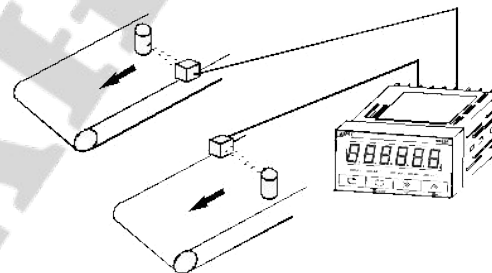
Fabric and Paper Length
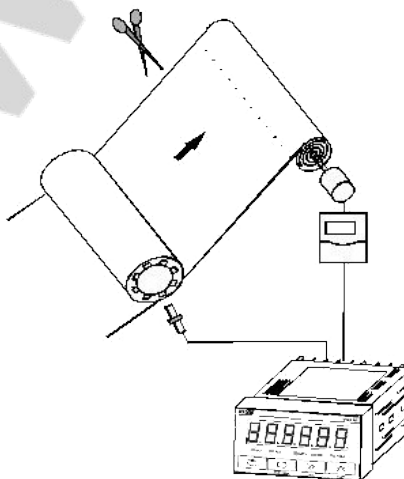
F05, F06, F07, F08

F05 – Tachometer	F06 - Frequency table
The pulse signal is input by IN - 2, the number of pulses per minute is measured, and the speed is displayed in rpm. Setting the ratio factor A and B enables the measured values to be displayed in the required units. Measurement = pulse count per minute * A B Example: motor speed test	The input pulse frequency of IN-2 is measured in HZ. Setting ratio factors A and B, the measured value can be displayed in the required units. Measured value = frequency * A * B Example: measuring circumferential speed or linear velocity (unit: M / s) A = circumference length (unit: m) B = number of pulses per turn
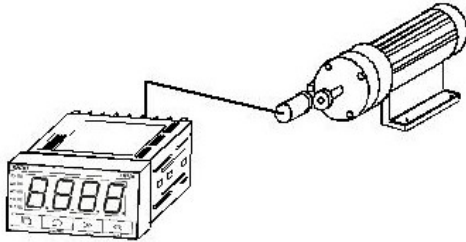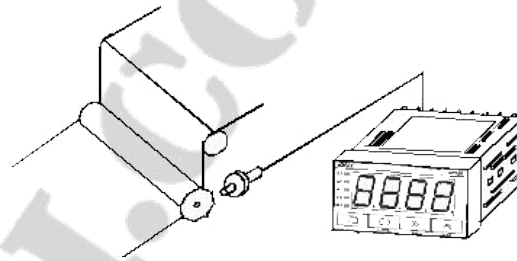
F07 – Cycle	F08 - Duty Cycle
Measuring the input pulse period of IN - 2, setting the ratio factor A and B can make the measured value display in required units. The measured value = cycle A * B (periodic unit: ms	Measure the ratio of the input pulse width to the period of IN-2. Set the ratio factors A and B to display the measured value in the required units. Measurement = duty cycle * A * B (duty cycle:%)

F09, F10, F11, F12, F13, F14

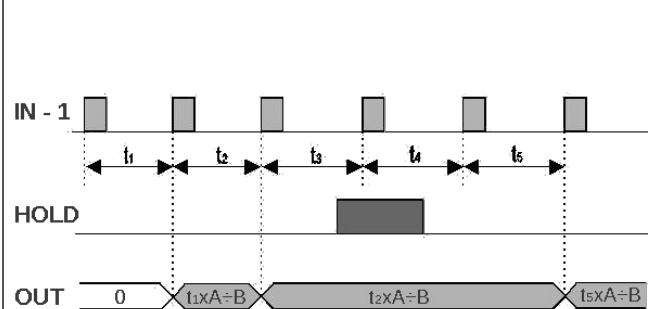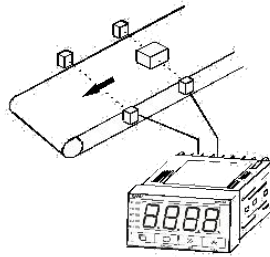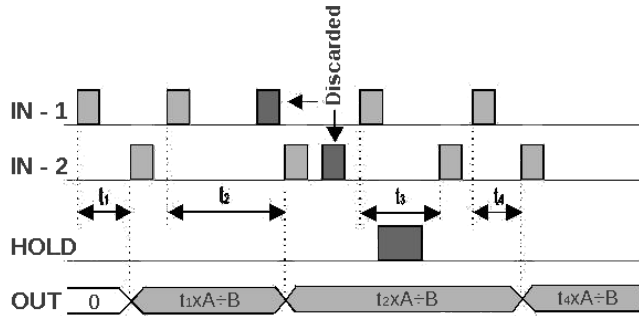| F09 - Through Speed	F10 - Transmission Cycle
Multiply the reciprocal of time t(s) from IN-1 to IN-2 by 60, and show the object's passing speed between two points. Measured value = $1t \times 60 \times A \div B$	Displays the time from IN to 2 to the next conduction time t(s). Measure = t * A * B(A, B: ratio factor)
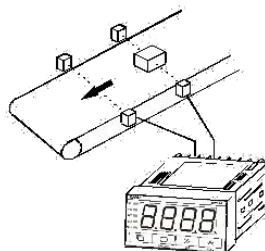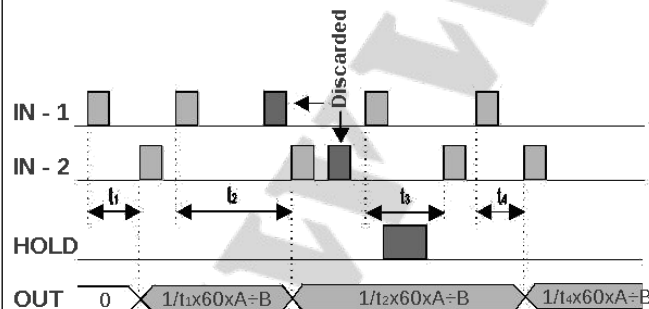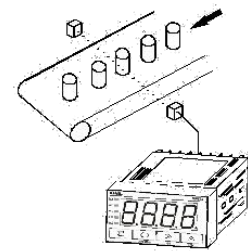
F11 - Time Difference

Show the time between IN - 1 and IN - 2 conduction (T)(s)

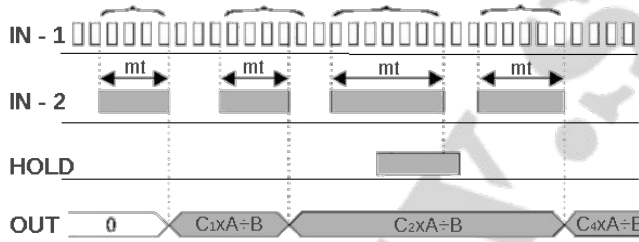Measured value = $t \times A \div B$
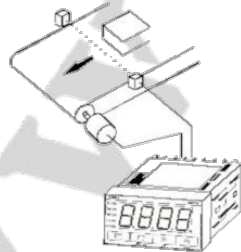

F12 - Time Slot

Display IN - 1 conduction time t(s)
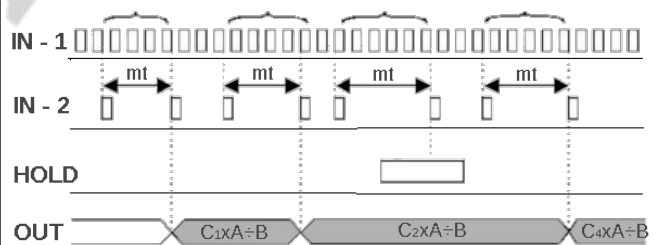
Measured value = $t \times A \div B$
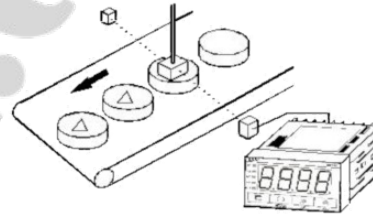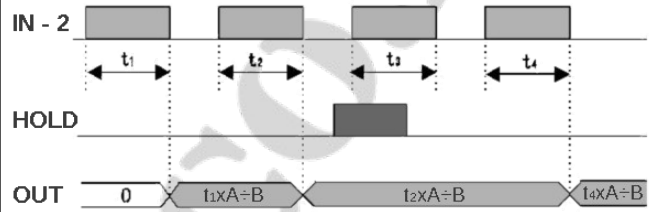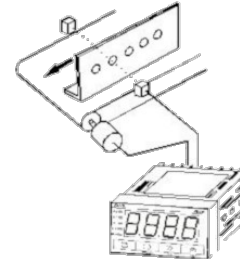

F13 - Measurement Length

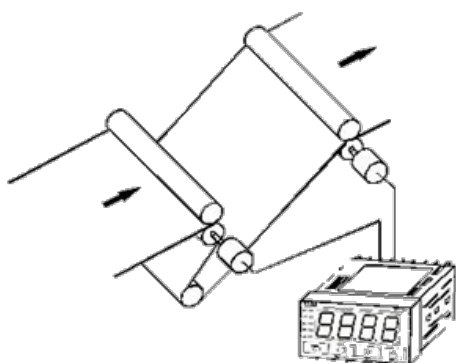mt = measure time

F14 – Time Interval

mt = measure time

F15 - Absolute Ratio

The absolute value between frequencies of IN - 2 F2 and IN - 1 F1 is shown in percentage form.
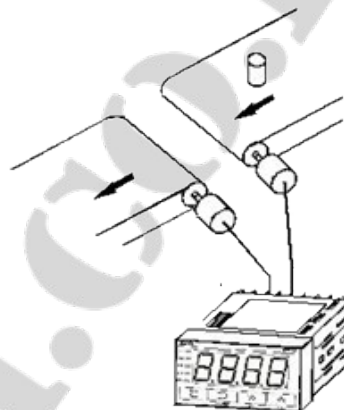
$$\mathbf{Out} = \frac{f_2 \times D \div E}{f_1 \times A \div B} \times 100\%$$

F16 - Error Ratio

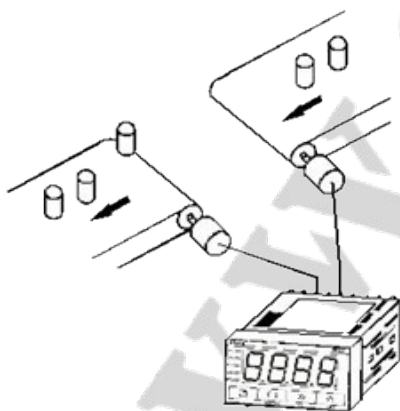The error between the frequency of IN - 2 F2 and IN - 1 F1 is shown in percentage form.

$$\mathbf{Out} = \frac{f_2 \times D \div E - f_1 \times A \div B}{f_1 \times A \div B} \times 100\%$$

F17 - Rotation Difference

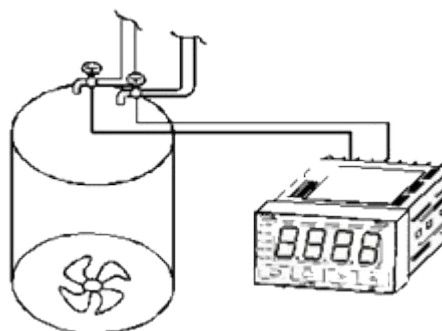Shows the difference between the speed of IN - 2 N2 and IN - 1 N1.

$$\mathbf{Out} = n_2 \times D \div E - n_1 \times A \div B$$

F18 - Flow Rate

The flow rate ratio of IN - 2 is shown on the basis of the frequency of IN - 2 frequency F2 and IN - 1 F1.

$$\mathbf{Out} = \frac{f_2 \times D \div E}{f_1 \times A \div B + f_2 \times D \div E} \times 100\%$$

9   Technical characteristics and specifications

Model	GW621	GW626	GW631	GW636
Panel Size	160 x 80mm	96 x 48mm	160 x 80mm	96 x 48mm
Display	4 bits LED, Red Height 20.3mm	4 bits LED, Red Height 20.3mm	6 bits LED, Red Height 20.3mm	6 bits LED, Red Height 14.2mm
Display Range	-1999 ~ 9999		-199999 ~ 999999	
Input	IN - 1 ,IN - 2 ,RST, HOLD No voltage contacts, voltage pulse, collector open circuit Input voltage: high level 4 ~ 30VDC, low level 0 ~ 1VDC Minimum width of external reset signal: 20ms			
Power Supply	5VDC ±5%, 130mA; 12VDC ±5%, 60mA; 24VDC ±5%, 30mA			
Measure Range	F01 / F02 / F04 0 ~ 30Hz, 0 ~ 3kHz, 0 ~ 100kHz F03 0 ~ 30Hz, 0 ~ 3kHz, 0 ~ 50kHz F05 / F06 / F07 0.0001Hz ~ 100kHz F08 0.0001Hz ~ 50kHz (Square wave) F09 / F10 / F11 / F12 10ms ~ 9999s F13 / F14 0.01Hz ~ 50kHz F15 / F16 / F17 / F18 0.01Hz ~ 50kHz			
Accuracy	F05 / F06 / F07 ±0.02%rdg ±1digit F08 ±0.05%rdg ±1digit F09 / F10 / F11 / F12 ±0.05%rdg ±1digit F15 / F16 / F17 / F18 ±0.05%rdg ±1digit			
Data Store	EEPROM (Nonvolatile memory) Rewriting times = 100 thousand times			
Alarm Output	Reply output: 3A 250VAC / 30VDC (Resistive load) Electrical life 1000000 times Mechanical life 100000000 times Transistor output: 100mA / 35VDC			
Converter Output	Current output: 4 - 20mADC (0 – 20mADC, 0 – 10mADC), Maximum load resistance 600Ω Voltage output: 0 - 10VDC (0 – 5VDC, 1 – 5VDC), Minimum load resistance 2kΩ Variable output accuracy: ±0.3%FS (4 – 20mADC, 0 – 10VDC)			
Communication	RS - 485 (2 lines), the maximum communication distance is 500m, and each host is directly connected to 63 meters at most RS - 232C (3 lines), the maximum communication distance is 15m Baud rate: 2400, 4800, 9600, 19200, 38400bps			
Power Supply	100 – 240VAC, allowed band 85 ~ 264VAC 50/60Hz 24V AC/DC, allowed band 20 ~ 55VAC 50/60Hz 20 ~ 75VDC			
Consumption	≤5W			
Temperature	Working: 0 ~ 50ºC Storage: -20 ~ 70ºC			
Humidity	≤85%			
Environment	Indoor, no dust, no water drops, no oil mist, no corrosion, no serious vibration and impact			

- This instrument does not have power switches and fuses. If necessary, it can be installed in external lines.
- Do not install the instrument near devices that can generate strong high frequency waves or surges (such as high-power converters, motors, welding machines, transformers, etc.). Signal lines should be separately wired away from power lines with high voltage or high current, and not parallel to or within the same cable. The signal line should be as short as possible and the shielded cable must be used when extending the signal line.
- When the instrument is not working normally due to electrical interference, the following measures can be taken:
  1. Install the power filter, and the installation position should be as close as possible to the instrument.
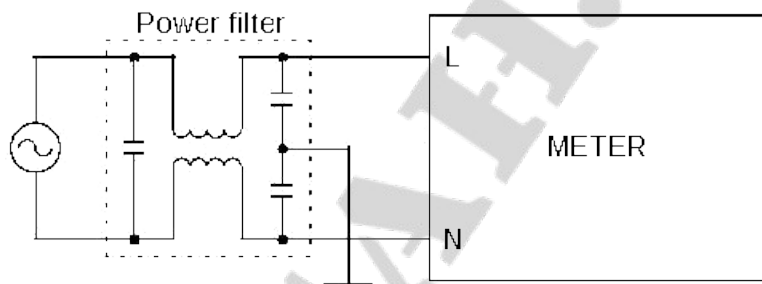
  2. The signal input terminal is connected with the capacitor to filter out the high-frequency interference signal, and the capacitance is 100pF to 1F. The magnitude of capacitance affects the maximum frequency of measurement. The larger the capacity, the lower the frequency of measurement. The specific capacity should be determined according to the test.
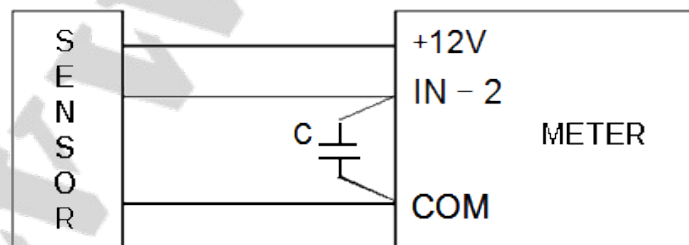
- The following table shows the correspondence between the characters displayed in the display and the characters in the alphabet.

Matters needing attention:
- Please read the instructions carefully before using the meter.
- The instrument should be used in a standard environment (such as temperature, humidity, etc.). Please do not close the meter, and keep enough space for heat dissipation.
- Please do not disassemble the meter. There is a possibility of electric shock or malfunction. When wiring, installing and disassembling, it is necessary to cut off the power supply first.
- Please do not touch the live parts such as power terminals.

Product warranty and after sales service:
1. The product warranty period is 18 months (counting from the date of sale), life-long maintenance.
2. During the warranty period, when the product breaks down or is damaged in normal use, it will be guaranteed or replaced free of charge. Any failure or damage caused by user's improper custody or use, or accidents or other accidents is not covered by the warranty, but the company can provide maintenance services.
3. Product maintenance will reasonably charge parts and maintenance costs.

Note: this warranty does not include transportation cost and on-site service.