COCORESEARCH

F/V CONVERTER

KAZ-723A

Instruction Manual

COCORESEARCH INC.

The precautionary indications in this User's Guide

Thank you for purchasing F/V Converter KAZ-723A. We recommend you to read this User's Guide thoroughly prior to use. The User's Guide packaged with the product should be kept handy so that you can refer to it when necessary.

Warning symbols

The following symbols are utilized within this manual commensurate with the degree of danger. Please read with particular care the sections where these warning indications are incorporated.

⚠ Warning — This indication warns you of a potential for serious injury or fire.

⚠ Attention — This indicates notifies you of the possibility of damage to this product or connected equipment.

Attention — The point of caution in regard to operation is written.

The cautions on use

⚠ Warning

- Keep your body, cables, and other items away from the rotating object.
- A secondary possibility of damages may be a result of malfunctioning of the product. In such a case take appropriate preventive measures to ensure safety.

⚠ Attention

- Observe the ratings.
- Do not use a power supply other than the specified ones.
- This product is not designed to withstand strong magnetic or electrical fields.
- Do not immerse the product in liquids like water, petroleum, oil, organic solvents etc or apply them to the product.
- Do not apply external voltage to the sensor power supply output or short-circuit the wiring.
- Do not disassemble or modify the product.

Attention

- Do not drop the product or bump it against other objects.

The product is under constant review and improvement whilst every effort has been made to keep this manual up-to-date. However, the company reserves the right to change the specifications and equipment at any time without any prior notice.

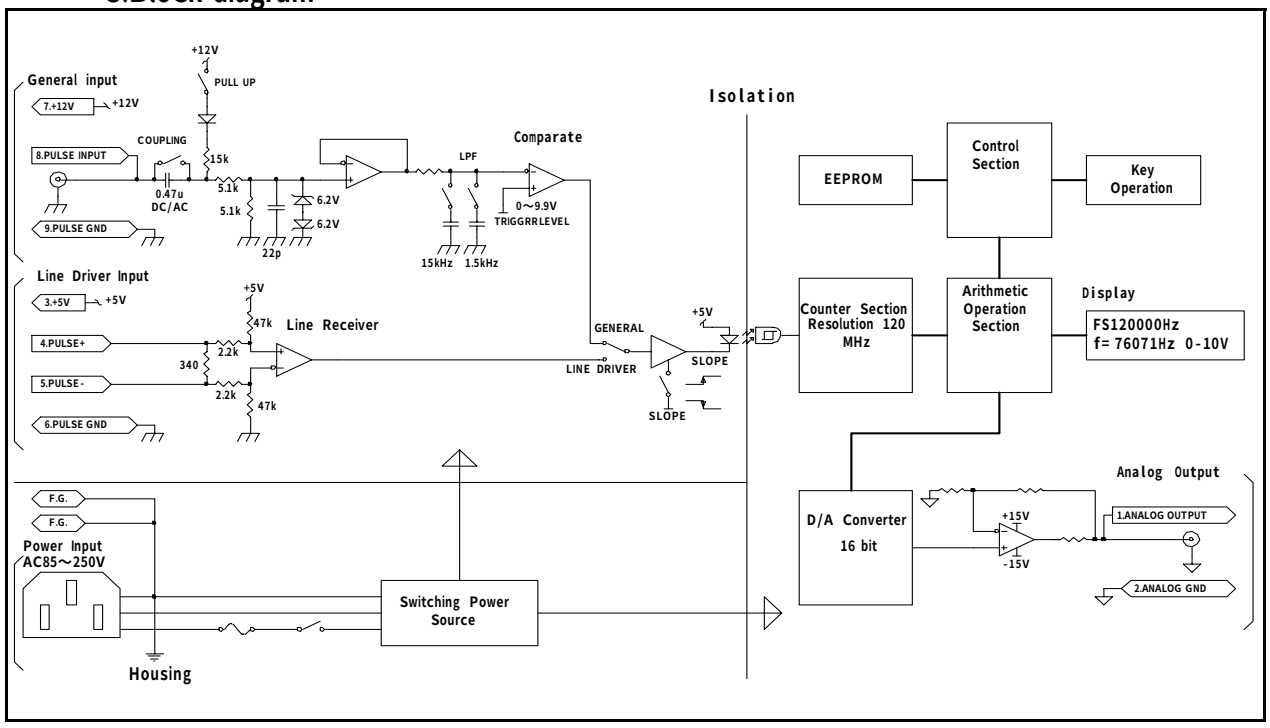
1. Outline

KAZ-723A is the F/V converter of a high-speed response converted/transformed into the analog voltage in proportion to frequency. It is proportional to frequency for every pulse from the input frequency of 0.04Hz to 200kHz. There are many kinds of signals such as an encoder and a motor driver can be used as an input. In addition to the basic frequency-to-voltage conversion function, it has a deviation output function and is equipped with arithmetic functions that support various speed measurements such a pulse moving average function and a pulse dividing function.

2. Features

- Measuring method is PERIOMATIC ™ (periodic computation method with the stop forecast function) which is an our patented technology.
- Wide measurement range of 0.04Hz to 200kHz.
- Response speed is 5 μs or less from a pulse input.
- Optional setting of full scale in 1 Hz units.
- Deviation output function: ± 10V (± 5V) output in the following measurement range is possible on the basis
- of center frequency.
- Measurement range: ± 0.5% / ± 1% / ± 2% / ± 5% / ± 10% / ± 20% / ± 50% / ± 100%.
- Pulse moving average function: 1 to 23 pulses (optional setting).
- Pulse dividing function: 1 to 64 pulses (optional setting).
- Various signal input responses: logic, zero cross (AC), NPN open collector, line driver.
- Isolation: Sensor power supply & signal input, analog output, power input, housing.
- Sensor power supply: +5 V 150 mA, +12 V 120 mA.

3.Block diagram



【Figure 1】

4. Checking the accessories

This product is packaged together with the following accessories. After unpacking, first check that all the accessories are included.

If something is missing or damaged, contact your dealer or our Sales Department
(Indicated on the back cover of this manual).

① Instruction manual (this manual) .....: 1 copy.
② Power supply cable (Model CPW-L) .....: 1 pc.
③ 2p-3p conversion connector (model MPR-13GR) for power supply cable..: 1 pc.
④ The example of connection according to input signal and the DIP switch explanation label

Chapter1 Preparations

1.Part designations

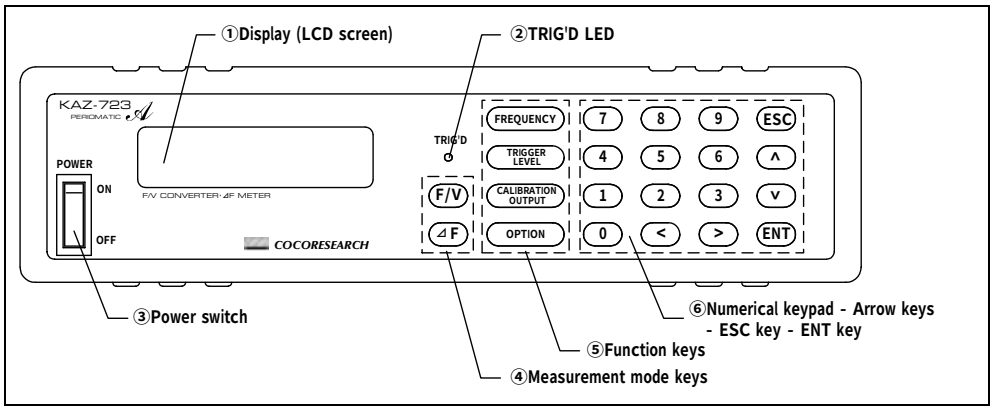
2.Keys and their functions

3.Terminal explanation

4.Input circuit

1. Part designations

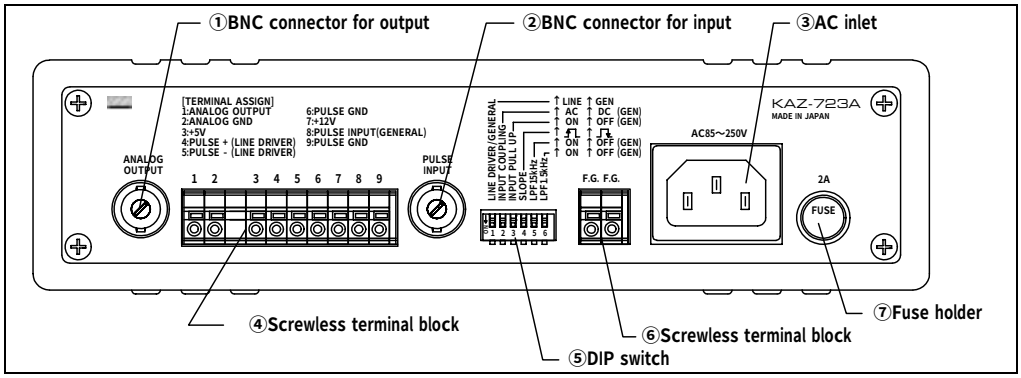
1.1. Front panel



【Figure 2】

① Display (LCD screen).....Displays the Measured value at the time of measurement. When the setting is changed it shifts to the Menu screen or Setting Change screen.
② TRIG'D LED .....When a signal is inputted, the LED lights up.
③ Power switch .....When the power switch is turned on and the voltage is applied than the display lights up.
④ Measurement mode keys .....These keys are used when changing to F/V or ⊿ F mode is desired. (Refer to the P.15 from P.4)
⑤ Function keys .....These are used for setting such functions as the frequency full scale, the center frequency, the trigger level, the calibration output and the output voltage range. (Refer to the P.18 from P.4)
⑥ Numerical keypad - Arrow keys - ESC key - ENT key
.....These are used for entering, confirming and canceling set or entered values.

1.2. Rear panel



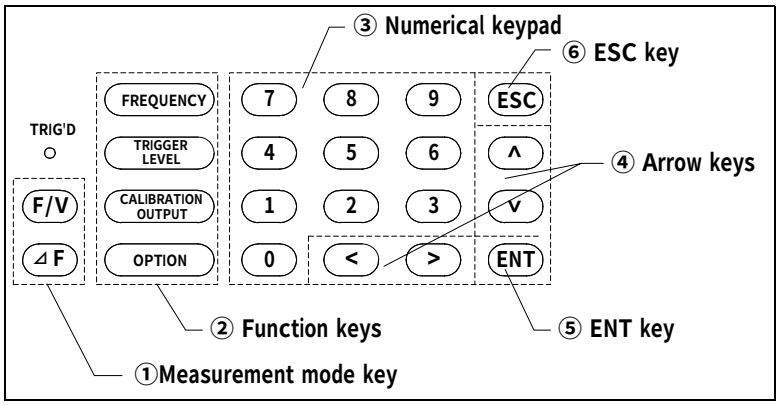
【Figure 3】

① BNC connector for output .....This is a BNC connector for analog output, which is shorted inside with the terminal block on the inside. (Refer to P.5)
② BNC connector for input .....This is a BNC connector for pulse input, which is shorted with the terminal block on the inside. (Refer to P.5)
③ AC inlet .....Connect the power supply cable (CPW-L)
④ Screwless terminal block .....This is a screwless terminal block for signal wiring. (Refer to P.5)
⑤ Dip switch .....Use the DIP- switch, and set the change of input circuit, the input coupling, the pull-up, the slope, and the low-pass filter. (Refer to the P.11 from P.8)
⑥ Screw less terminal block .....This is a screw less terminal block for the F.G. (Refer to P.5)
⑦ Fuse holder .....2A & 250 V semi time lag fuse is used.

⚠ Attention

Semi time lag fuses are fused that extended an fusion time and are used as a transient over current counter measure, such as for inrush currents. You should always use a semi time lag fuse for replacement. When a fuse burns out even when replaced with a new one, the KAZ-723A unit may be fault. You should consult the store where you purchased this product, or our customer service. Contact our Sales Department for inquiries (indicated on the back of this User's Guide). When a fuse burns out even when replaced with a new one, the KAZ-723A unit may be fault. You should consult our Sales Department for inquiries (indicated on the back page of this User's Guide).

2. Keys and their functions

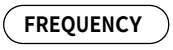


【Figure 4】

① Measurement mode key
Changes to the F/V (speed output) mode or ⊿ F (deviation output) mode.

When either the F/V key or the ⊿ F key is pushed, the pushed key lights and the measurement mode changes. (Refer to P.13)

② Function keys
This sets various functions for the measurement



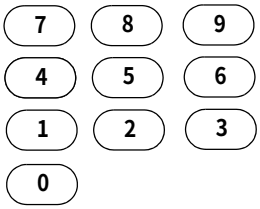
In the F/V mode, sets full scale frequency. (Refer to P.13)
In the ⊿ F mode, sets the center frequency, the deviation range and unit. (Refer to P.13)

Use for setting the trigger level of the input signal. (for general input signals) (Refer to P.18)

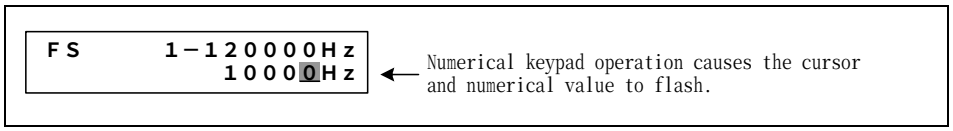
Use for setting the calibration output and the zero adjustment. (Refer to P.19)

Sets the output voltage range, the pulse moving average and the pulse dividing, auto zero, key lock, parameter list, parameter clear and version information. (Refer to P.20)

③ Numerical keypad

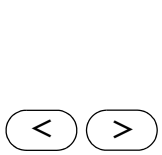


Use to a input or a change of set values and for menu selections.
Arrow key operations are convenient for fine adjustments of set values.
The arrow keys cannot be operated when entering set values on the numeric keypad.

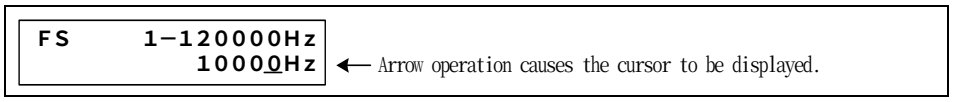


【Figure 5】

④ Arrow keys



Arrow keys are used to increase or decrease numerical values and to move the cursor.
> key: Moves the cursor to the right.
< key: Moves the cursor to the left.
∧ key: The cursor moves up or the numerical value of the cursor digit increases by one.
∨ key: The cursor moves down or the numerical value of the cursor digit decreases by one.



【Figure 6】

⑤ ENT key
ENT key is used to enter the selected menu and to store the set value. The ENT key lights while the set value is changed. Push the ENT key to store a setting. The ENT key puts out the light.

⑥ ESC key
ESC key is used to cancel a setting, change, and to return from the Menu screen to the Measurement screen. The ESC key lights while the set value is changed. When canceling a setting, push the ESC key. The ESC key puts out the light.

3. Terminal explanation

BNC Connector	
ANALOG OUTPUT	PULSE INPUT (GENERAL)
Analog output	General input signal

Screwless Terminal Block									
1	2	3	4	5	6	7	8	9	F.G.
ANALOG OUTPUT	ANALOG GND	+5V	PULSE+ INPUT	PULSE- INPUT	PULSE GND	+12V	PULSE INPUT	PULSE GND	F.G.
ANALOG OUTPUT		sensor power output	PULSE INPUT (LINE DRIVER)			sensor power output	PULSE INPUT (GENERAL)		
Analog output			Line driver input				General input signal		

3.1. Terminal array table

Screwless Terminal Block				
No.	Item	Input/Output	Details	Remarks
1	ANALOG OUTPUT	Output	Terminal for analog output	Internal short circuit with BNC connector for analog output
2	ANALOG GND	–	Ground for analog output	
3	+5 V	Output	Terminal for +5 V sensor power output	
4	PULSE+ INPUT	Input	Terminal for line diver input	Line driver input
5	PULSE- INPUT	Input	Terminal for line diver input	
6	PULSE GND	–	Terminal for signal input. This is internal short with No. 9 terminal	
7	+12V	Output	Terminal for +12 V sensor power output	Internal short circuit with BNC connector for general input
8	PULSE INPUT	Input	Terminal for general input signal	
9	PULSE GND	–	Terminal for signal input. This is internal short with No. 6 terminal	
F.G.	F.G.	–	Terminal for frame ground. Use this as ground. Two are established for shielded wire connection.	

BNC Connector			
Item	Input/Output	Details	Remarks
ANALOG OUTPUT	Output	BNC connector for analog output	Analog output
PULSE INPUT (GENERAL)	Input	BNC connector for general input signals	General input signals

Warning

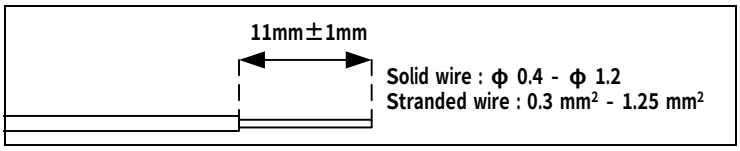
Turn off the power supply while making connection and wiring work. There is a hazard of electric shock and damage to the equipment if you do not turn off the power.

Attention

- Before turning on the power supply make sure that there is no mistake in connection and wiring set up.
- Use a shielded out put signal cable to avoid malfunctioning which considers noise as a major cause.
- Do not use simultaneously +5V of a sensor power supply, and +12V. It becomes the cause of failure.
- There are two systems, the screw less terminal block and the BNC connector, for general input signals and analog outputs. However, they are short-circuited internally, so connect to only one of them.

3.2. Product specifications of the screwless terminal block

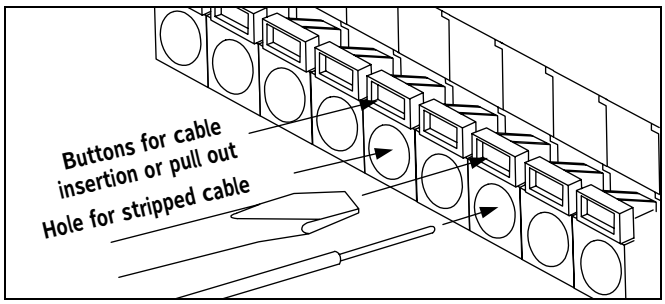
The product specifications for the use of screw less terminal block are given below:



【Figure 7】

Usable electric wire range	Solid wire	φ0.4 mm (AWG 26) – φ1.2 mm (AWG 16)
	Stranded wire	0.3 mm² (AWG 22) – 1.25 mm² (AWG 16) strand dia. φ0.18 or more
Standard stripped wire length	11 mm ± 1 mm	
Recommended compatible tool	Flathead screwdriver (shaft diameter φ3, tip width 2.6mm)	

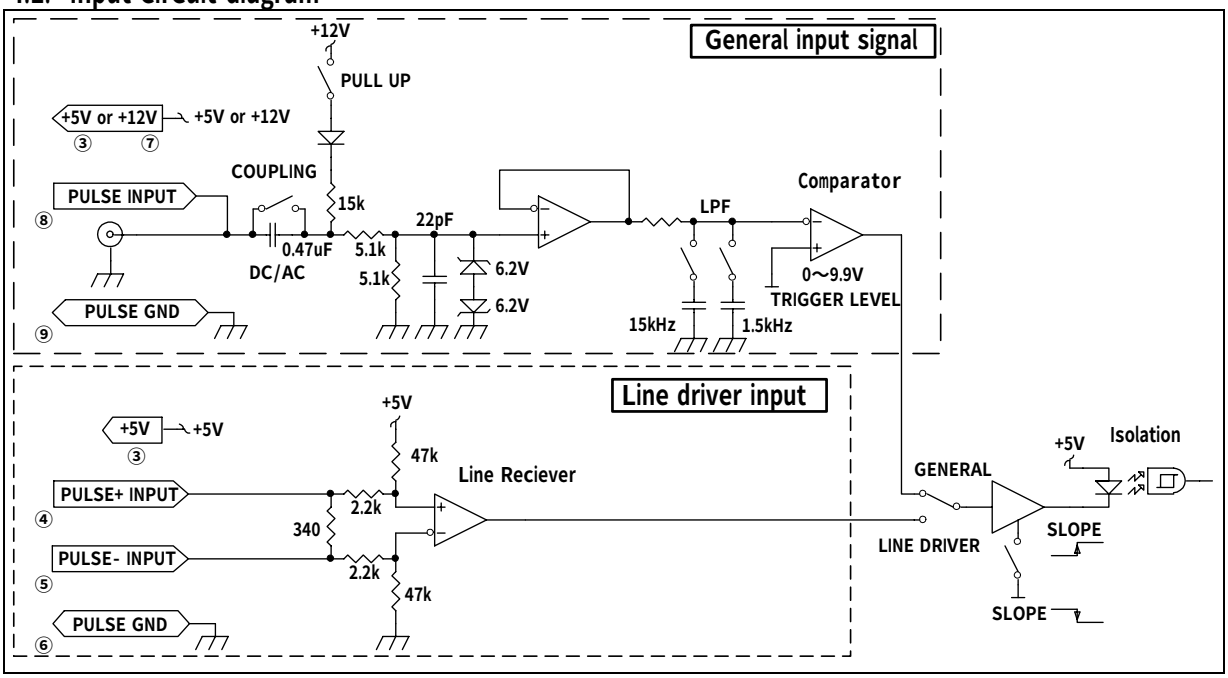
The screw less terminal block can take out and insert an electric wire, if "Buttons for cable insertion or pull up" is pushed with a slotted screwdriver.



【Figure 8】

4. Input circuit

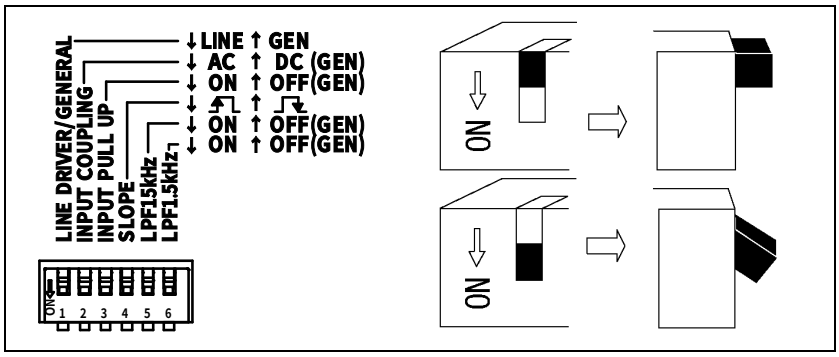
4.1. Input circuit diagram



【Figure 9】

4.2. Change of the input circuit and the low-pass filter

By using the DIP -switch of rear panel one can set and change the input circuit, the input coupling, the pull-up, the slope, and the low-pass filter.



【Figure 10】

No.	Item	The switch direction	Details		Remarks
1	LINE DRIVER/GENERAL	↑	GEN	General input signal	
		↓	LINE	Line driver input	
2	INPUT COUPLING	↑	DC	DC coupling	Ineffective for line diver input
		↓	AC	AC coupling	
3	INPUT PULL UP	↑	OFF	Pull-down at 10 kΩ	Ineffective for line diver input
		↓	ON	Pull-up to +5 V at 6 kΩ	
4	SLOPE	↑	⊓↓	Falling edge effective	
		↓	↑⊓	Rising edge effective	
5	LPF 15 kHz	↑	OFF	OFF	Ineffective for line diver input
		↓	ON	15 kHz (-3dB, -6dB/oct)	
6	LPF 1.5 kHz	↑	OFF	OFF	
		↓	ON	15 kHz (-3dB, -6dB/oct)	

All the DIP switch is set to 【↑】at the time of factory shipment.

4.2.1 LINE DRIVER/GENERAL (change of the input circuit)

Changes the general input signal and the line driver input. If line driver input is selected the general input signal becomes invalid. Change the DIP- switch in accordance with the input signals.

GENERAL

Using the general pulse signals as input (voltage pulse, NPN open collector, etc.). Refer to P.10 "4.3. Signal input connection examples" for the connection of general input signals.

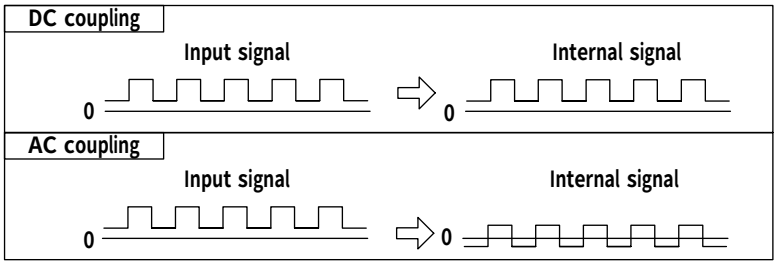
LINE DRIVER

Using the line driver signals as input.

Differential line driver (AM26LS31, etc.) signals can be input only to the screw less terminal block. Refer to P.10 "4.3. Signal input connection examples" for the connection.

4.2.2 INPUT COUPLING (change of the AC/DC coupling)

Changes the input coupling to AC or DC.
The DC coupling transfers the entire input signal.
AC coupling cuts the DC parts of the signals and transfers during transfer. (Effective for signals of above 10 Hz.)
AC coupling is effective in a case where the Dc signals have overlapped the frequency of AC signal during the measurement etc. AC coupling input characteristics: 35 Hz (-3 dB, 6 dB/oct)



【Figure 11】

⚠ Attention If the direct current level is high the DC signals might have overlapped several time and it may disturb/damage the unit. In that case check the voltage level imposed on the unit does not exceed the rating (± 80 V) for the PULSE GND of the unit.

4.2.3 INPUT PULL UP

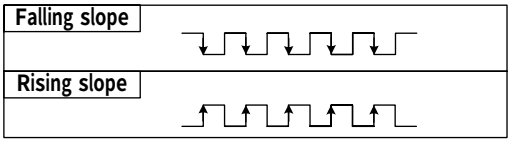
Like an NPN open collector, it is used at the time of the signal input that needs a pull-up on non-voltage at the time of an input. A pull-up will be carried out if 3 INPUT PULL UP of a DIP switch are in ON state 【↓】, where INPUT PULL UP is a setup for only general input signals. For zero cross (AC) signals, Turn it off.
Refer to P.10 "4.3. Signal input connection examples" for NPN open collector connection examples. Sometimes it is also used to improve the anti-noise characteristics of the input signal and to accelerate the rise speed of the sensor output waveform.

*** Explanation ***

The pull-up resistance is indicated as 6 kΩ. However, this uses a resistance of 15 kΩ and 10kΩ from a +12 V power supply and divides the voltage to create a pull-up voltage of +5 V. When it has shorted between the signals input terminal and PULSE GND a current of 0.83 mA from a supply of +5 V appears to flow. This is to enable the use of either the +5 V type or the +12 V type sensor.

4.2.4 SLOPE

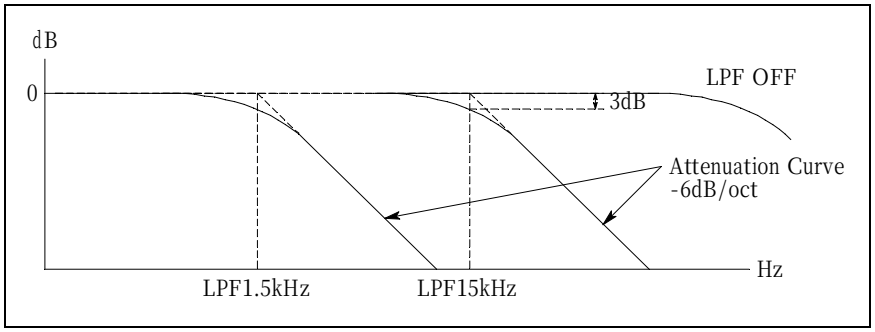
Changes the detection of input signal to either the rising edge or the falling edge.



【Figure 12】

4.2.5 LPF (low-pass filter)

The low-pass filters are used to remove the undesired frequencies such as noise from the input signals. With a DIP-switch, a low path filter can be set up in three stages (**what is this**of none)), 15 kHz (-3 dB and-6 dB/oct) or 1.5 kHz (-3 dB and-6 dB/oct). Please set up according to the situation at the time of use. A setup of a low pass filter becomes effective only when general signal are applied.

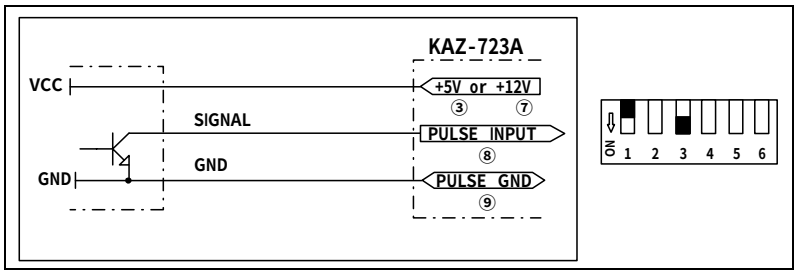


【Figure 13】

⚠ Attention The low-pass filter functions as a countermeasure for high-frequency noise. A low-pass frequency filter lower than the measured frequency should be set up other wise the input signals may also be attenuated by considering as noise. It should be adjusted in such a way so that the signal to be measured does not fade away.

4.3. Signal input connection examples

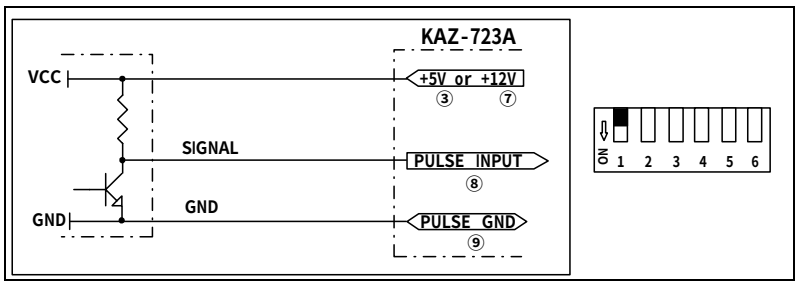
● **NPN open collector signal**



Example:
Rotary encoder
Proximity sensor
Photoelectric sensor

【Figure 14】

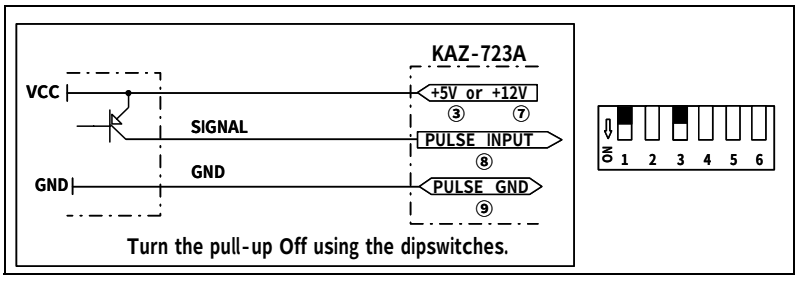
● **Voltage pulse (NPN transistor output) signal**



Example:
Proximity sensor
Photoelectric sensor
Electromagnetic gear speed sensor (COCORESEARCH FDP10/16 series)

【Figure 15】

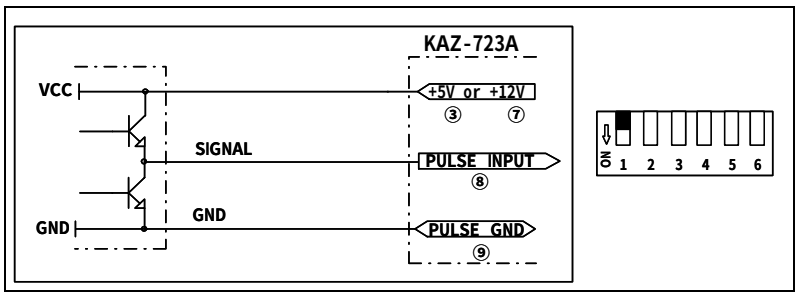
● **PNP open collector signal**



Example:
Proximity sensor
Photoelectric sensor

【Figure 16】

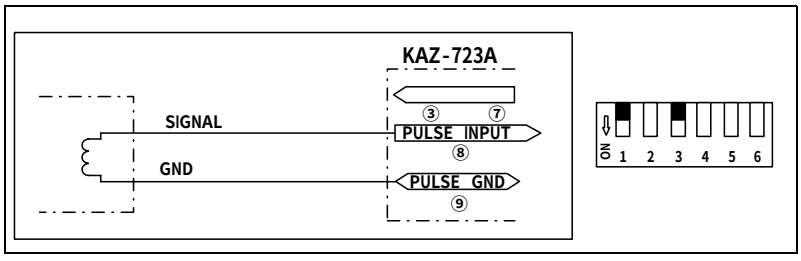
● **Voltage pulse (logic IC output) signal**



Example:
Rotary encoder
Electromagnetic gear speed sensor (COCORESEARCH FP12/16 series)

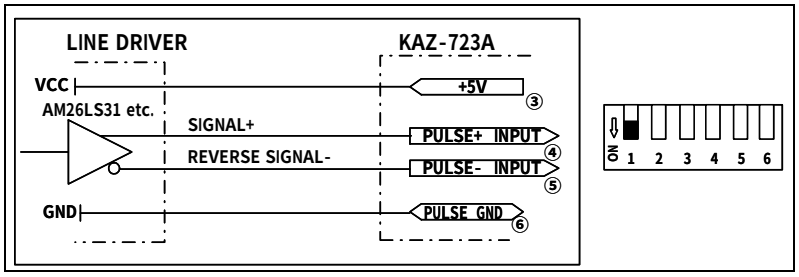
【Figure 17】

● **Zero cross (AC) signal**



Example:
Power generation type electromagnetic pickup sensor (COCORESEARCH GP series)
AC tacho-generator
Various alternating current waveforms
【Figure 18】

● **Line driver signal**



Example:
Motor diver
Rotary encoder Linear scale
Electromagnetic gear
speed sensor
(COCORESEARCH
FP12/16 series)

【Figure 19】

Attention Wring and dip-switch should be adjusted after verifying the specifications of the sensor used.

Chapter2 Operation

1.Basic operation examples

2.List of settings

3.Measurement mode key operation

4.Setup of a unit (Hz/rpm)

5.The display at the time of measurement.

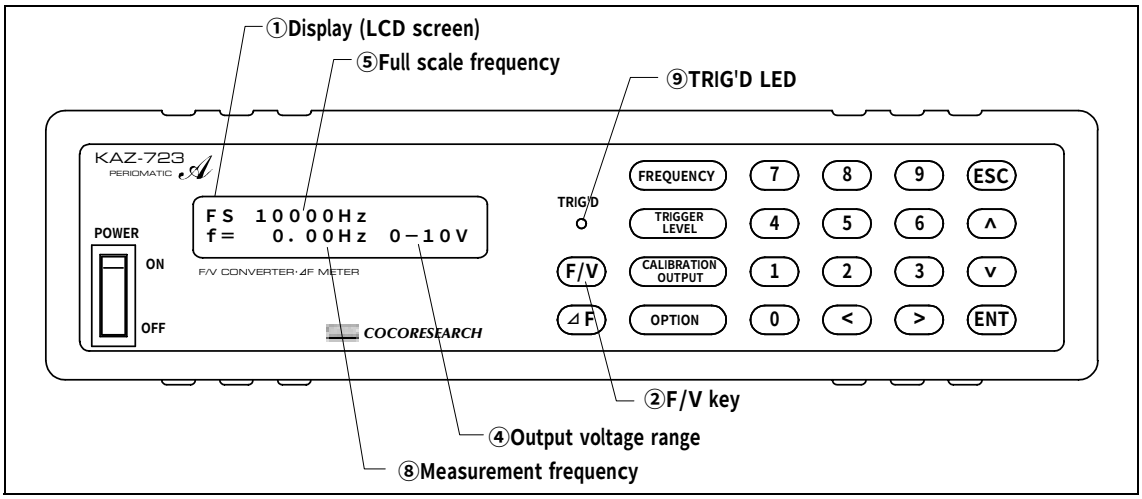
6.Function key operation

1. Basic operation examples

(1) Connect the power supply cable and signal wire for the pulse input and analog output. (Refer to the P.11 from P.5)
(2) When the power switch is turned On, ① the Display (LCD screen) will light up and ② the 【F/V key】 or ③ the 【⊿ F key】 will light up.
(3) Check ④ the Output voltage range on the LCD screen. (Refer to P.21 when changing the output voltage range.)
(4) In using it in F/V (speed output) mode, set up ⑤ Full scale frequency. In using it in ⊿ F (deviation output) mode, set up ⑥ Center frequency and ⑦⊿ F range. (Refer to P.15)
(5) Set up the unit (Hz/rpm).
(6) ⑧ Measurement frequency is displayed on a LCD screen and the analog output of the voltage proportional to the measurement frequency is carried out.

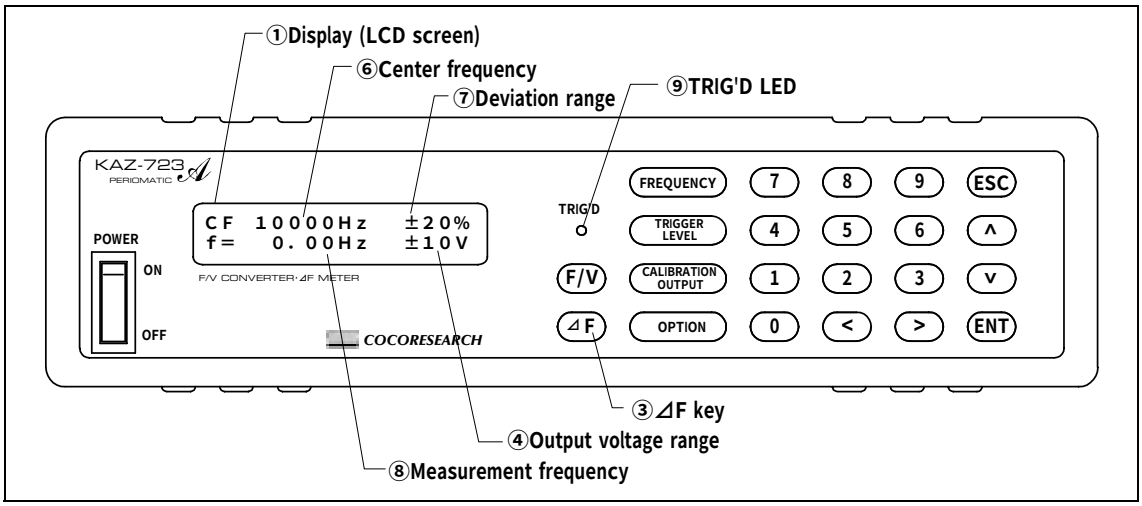
Attention If the measurement does not start even after applying the input pulse signals, than change a setup of a trigger level and a DIP- switch as well in accordance with an input signal. The trigger state of a signal can be checked by the measurement frequency and TRIG'D LED of the LCD screen.
(For details of trigger level, refer to "6.3.TRIGGER LEVEL" on P.18, and for details of dip switches, refer to "4.2.Change of the input circuit and the low-pass filter" on P.8.)

F/V (speed output) mode



【Figure 20】

⊿ F (deviation output) mode



【Figure 21】

2. List of settings

Key	Setting Item		Setting Range		factory-set	Setting Page
F/V･⊿F	F/V (speed output) mode		—		F/V	P.15
	⊿F (deviation output) mode		—			P.15
FREQUENCY	F/V	FS (full scale frequency)	Hz	1Hz - 200000Hz	10000Hz	P.17
			rpm	1rpm - 200000rpm	10000rpm	
		2：DISPLAY UNIT	Hz／rpm		Hz	
		3：PULSE/ROTATION (resolution)	1 PULSE - 200000PULSE		1 PULSE	
	⊿F	1：CENTER	Hz	1Hz - 100000Hz	10000Hz	P.17
			rpm	1rpm - 100000rpm	10000rpm	
		2：⊿ RANGE (deviation output)	±0.5%／±1%／±2%／±5%／±10%／±20%／±50%／±100%		±20%	P.18
		3：DISPLAY UNIT (unit)	Hz／rpm		Hz	
		4：PULSE/ROTATION (resolution)	1 PULSE - 200000PULSE		1 PULSE	
TRIGGER LEVEL	TRIGGER LEVEL		0.0V - 9.9V		2.5V	P.19
CALIBRATION OUTPUT	1: CALIBRATION OUT (calibration output)		F/V	0%／+100%	0%	P.20
			⊿F	-100%／0%／+100%		
	2: 0 ADJUSTMENT (zero adjustment)		±200mV		0mV	P.21
OPTION	1: OUTPUT VOLTAGE (output voltage range)		F/V	0 - 10V／0 - 5V／1 - 5V	0 - 10V	P.22
			⊿F	±5V／±10V	±10V	
	2: MOVING AVERAGE (pulse moving average)		1 - 32 (1=OFF)		1 (1=OFF)	P.22
	3: DIVIDING PULSE (pulse dividing)		1 - 64 (1=OFF)		1 (1=OFF)	P.23
	4: AUTO ZERO (DF)		1.5／3／5／8／16		8	P.23
	5：KEY LOCK		LOCK／UNLOCK		UNLOCK	P.23
	6：PARAMETER LIST		—		—	P.24
	7：PARAMETER CLR . (parameter clear)		Yes／No		—	P.24
	8：VERSION INFO (version information)		—		—	P.25

Attention

F/V mode

When the display unit is "rpm" the full-scale should be set in such a way that the setting value of resolution should not exceed the exceed 200kHz by frequency conversion. It is a sort of restriction. When resolution is set up with 200000 pulses, maximum value of the full-scale becomes 60rpm. When a full scale is set as 200000rpm, the maximum of the number of pulses, which can be applied, goes up to 60 pulses.

⊿ F mode

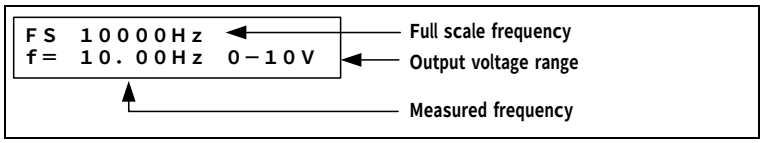
When the display unit is "rpm", the center frequency setting value and the setting value of resolution are restricted so that it may not exceed 100kHz by frequency conversion. When resolution is set up with 200000 pulses, the maximum value of full-scale becomes 30rpm. When a full scale is set as 100000rpm, the maximum number of pulses, which can be set up, is up to 60 pulses.

3. Measurement mode key operation

Selects the F/V (speed output) mode or ⊿ F (deviation output) mode. When the mode key is pushed, the LED lights up as an indication of measurement mode.

3.1. F/V (speed output) mode

Push the 【F/V key】 to change to the F/V mode. When full scale input frequency is applied, the output voltage reaches to 100%.



【Figure 22】

Setting example

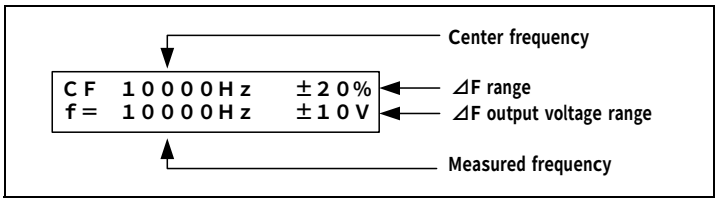
Full scale frequency : 10000 Hz
Output voltage range : 0 - 10 V

Output example

In case of 10,000 Hz input-frequency, the output voltage becomes 10 V.
In case of 5,000 Hz input-frequency, the output voltage becomes 5 V.

3.2. ⊿ F (deviation output) mode

Push the 【⊿ F key】 to change to the ⊿ F mode. The voltage proportional to the deviation on the basis of center frequency can be plotted as an output analog signal.



【Figure 23】

Setting example

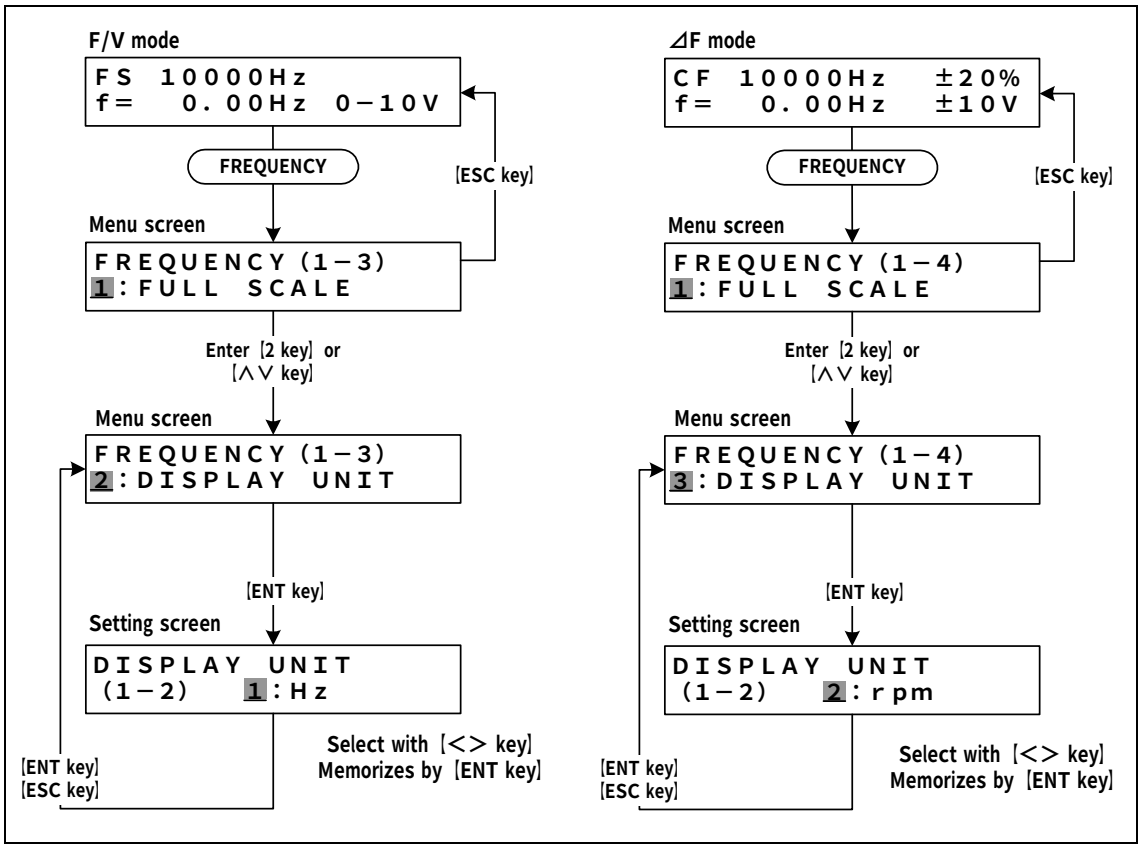
Center frequency : 10000 Hz
⊿ F range : ± 20%
Output voltage range : ± 10 V

Output example

In case of 12,000 Hz input-frequency, the output voltage becomes +10 V.
In case of 10,000 Hz input-frequency, the output voltage becomes 0 V.
In case of 8,000 Hz input-frequency, the output voltage becomes -10 V.

4. Setup of a unit (Hz/rpm)

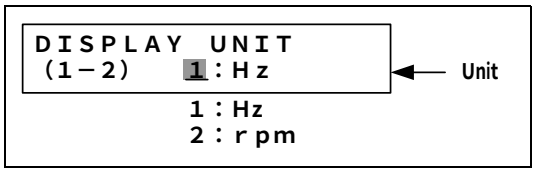
The unit at the time of factory shipments has been set as "Hz."



(1) Push the 【FREQUENCY key】 to select the Menu screen.

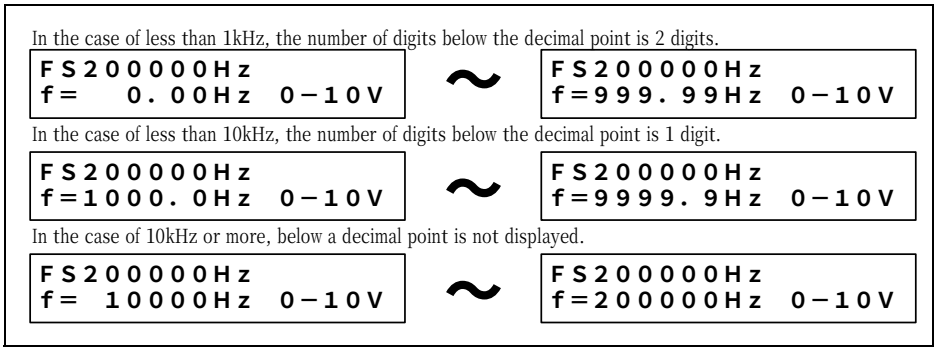
(2) Select【2】in F/V mode, select【3】in ⊿ F mode, and push the【ENT key】. A unit setting screen is displayed.

(3) The 【ENT key】is pushed after selecting a corresponding numerical value from 【1 - 2】.



(4) Then, after memorizing a setup, it returns to the Menu screen.

5. The display at the time of measurement.



A display is the auto range. The number of digits below the decimal point is 2. KAZ-723A cannot measure the frequency less than 0.04Hz. When the applied frequency is less than 0.04Hz the display in the units of hertz will be displayed as 0.00Hz.

6. Function key operation

6.1. FREQUENCY [in F/V (speed output) mode]

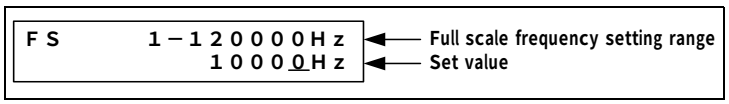
6.1.1 FS (full scale frequency)

In factory-setting full scale frequency is 10kHz and the output voltage remains proportional to the input frequencies.

(1) To select F/V mode push the 【F/V key】.

(2) To select Frequency setup screen push the 【FREQUENCY key】.

(3) Push the 【ENT key】, after inputting a numerical value. Then, after memorizing a setup, it returns to the Measurement screen.



【Figure 24】

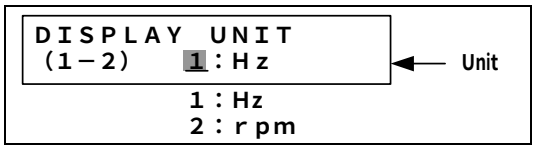
6.1.2 DISPLAY UNIT (Hz/rpm)

The unit at the time of factory shipments is set as "Hz."

(1) Push the 【FREQUENCY key】 to select the Menu screen.

(2) Select 【2】 in the Menu screen and push the 【ENT key】, a unit-setting screen will be displayed.

(3) To enter push 【ENT key】 after selecting a corresponding numerical value from 【1 - 2】.



【Figure 25】

(4) Then, after memorizing a setup, it returns to the Menu screen.

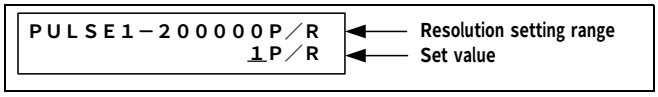
6.1.3 PULSE/ROTATION (resolution)

Set up resolution (the number of pulses per revolution), when 【rpm】 is selected as a measurement unit.

(1) Push the 【FREQUENCY key】 to select the Menu screen.

(2) Select 【3】 in the Menu screen, and push the 【ENT key】.

(3) The 【ENT key】 is pushed after inputting a numerical values.



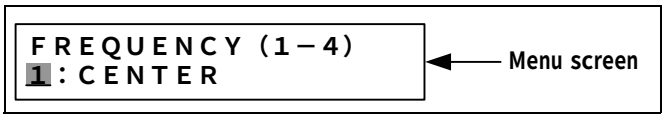
【Figure 26】

Attention

While making measurements in the units of "rpm", the full-scale setting value and the setting value of resolution should be adjusted in such a way that it may not exceed 200kHz by frequency conversion. When resolution is set up with 200000 pulses, the full-scale maximum can be set up to 60rpm. When a full scale is set as 200000rpm, the maximum number of pulses that can be set up is up to 60 pulses.

6.2. 1FREQUENCY [during (deviation output) mode]

Push the 【⊿ F key】 to select the ⊿ F mode.



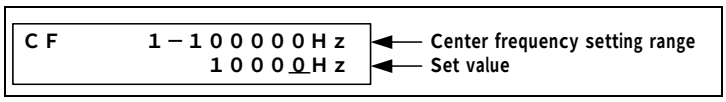
【Figure 27】

6.2.1 CENTER FREQ (center frequency)

Factory setting is 10kHz, while the out put voltage is proportional to the deviation on the basis of center frequency. The center frequency is made 10 kHz and ⊿ F corresponding to the ⊿ F range is output.

(1) To change the CENTER FREQ (center frequency), select 【1】 on the FREQUENCY (1−4) 1:CENTER, and then enter by pushing the 【ENT key】

(2) The 【ENT key】 is pushed after inputting a numerical value. Then, after memorizing a setup, it returns to FREQUENCY (1−4) 1:CENTER.



【Figure 28】

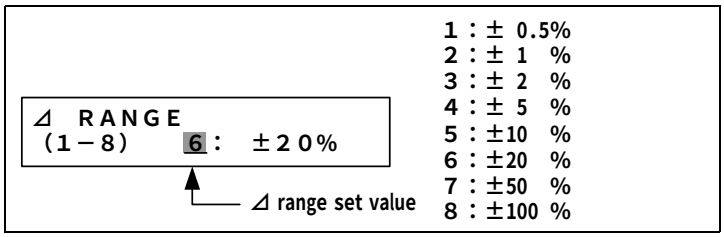
(3) On the FREQUENCY (1－4) 1:CENTER when the 【ESC key】 is pushed, it returns to the Measurement screen or mode.

6.2.2 ⊿ RANGE

Sets the center frequency , ⊿ range, and outputs voltage in proportion to the deviation on the basis of center frequency. For example, when center frequency is set as 10kHz and ⊿ range is set as ± 20%, a out put voltage will become +100%, if 12kHz is the input frequency. Moreover, when 8kHz is inputted, an out put voltage becomes -100%.

(1) To change the ⊿ RANGE, select【2】on the FREQUENCY (1－4) 2:⊿ RANGE, and then enter by pushing the【ENT key】.

(2) After inputting the numerical value corresponding to 【1-6】, 【ENT key】 is pushed to enter it. Then, after memorizing a setup, it returns to the FREQUENCY (1－4) 2:⊿ RANGE.



【Figure 29】

(3) On the FREQUENCY (1－4) 2:⊿ RANGE, when the 【ESC key】 is pushed, it returns to the Measurement screen.

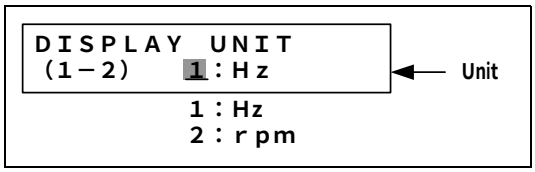
6.2.3 Setup of a unit (Hz/rpm)

The unit at the time of factory shipment is set as "Hz."

(1) Push the 【FREQUENCY key】 to select the Menu screen.

(2) Select 【3】 in the Menu screen, and push 【ENT key】. A unit-setting screen will be displayed.

(3) The 【ENT key】 is pushed after selecting a corresponding numerical value from 【1 - 2】.



(4) Then, after memorizing a setup, it returns to the Menu screen.

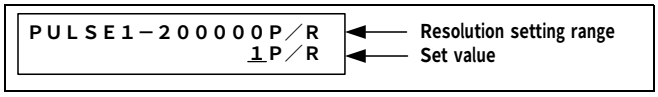
6.2.4 PULSE/ROTATION (resolution)

Set up resolution (the number of pulses per one revolution), when 【rpm】 is selected.

(1) Push the 【FREQUENCY key】 to select the Menu screen.

(2) Select 【4】 in the Menu screen, and push the 【ENT key】.

(3) The 【ENT key】 is pushed after inputting a numerical value.



【Figure 30】

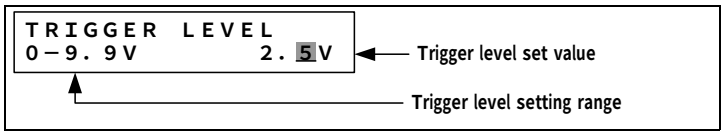
Attention

When a display is "rpm", the full-scale setting value and the setting value of resolution should be adjusted so that it may not exceed 200kHz by frequency conversion. When resolution is set up with 200000 pulses, the full-scale maximum that can be set is up to 60rpm. When a full scale is set as 100000rpm, the maximum of the number of pulses that can be set is up to 60 pulses.

6.3. TRIGGER LEVEL

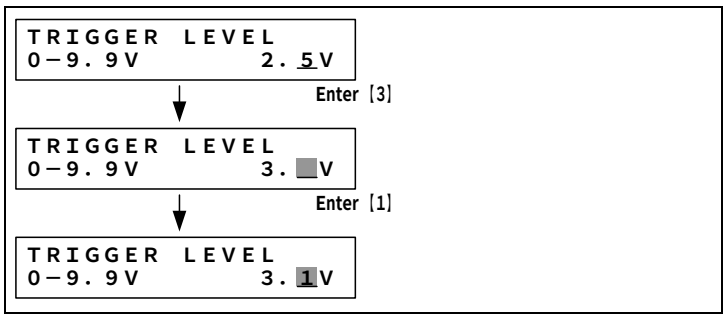
Set the trigger level in line with the input signal. The state of a trigger can be checked by TRIG'D LED. A factory-set value is 2.5 V. However, Trigger level screen can be selected by pushing the【TRIGGER LEVEL key】. Trigger level can be changed by increasing or decreasing numerical values by using numerical keypad and can be entered by pressing key】. Moreover, in fractions(from 0.1 to 1V) trigger level value can be changed by making use of arrow keys 【∧】【∨】without entering by pressing enter key. It may be noted that if you return to the Measurement screen without pushing the 【ENT key】, the setting will not be stored when you use numerical keypad to change the values.

Refer to "6.3.1 The trigger level input method by the numerical keypad" on P.19 and "6.3.2The trigger level input method by the arrow keys" on P.19 for the entry procedure.



【Figure 31】

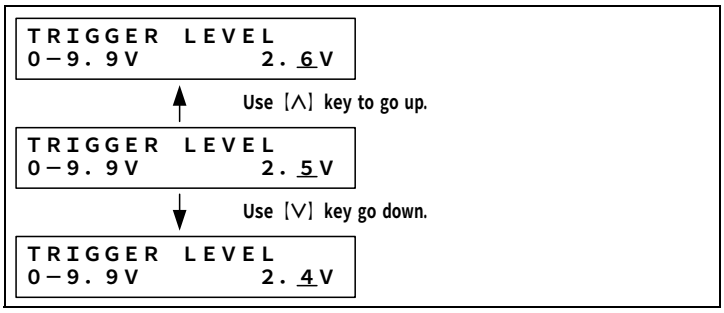
6.3.1 The trigger level input method by the numerical keypad



【Figure 32】

Again a numerical value can be inputted by using numeric keypad after pushing the【ESC key】if mistakenly entered wrong first time.

6.3.2 The trigger level input method by the arrow keys



【Figure 33】

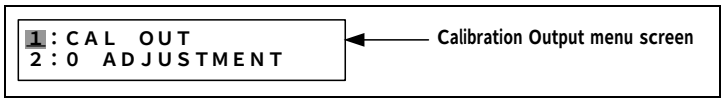
The input digits needed to change can be selected by arrow keys 【<】【>】. Again input a numerical value by using arrow keys 【∧】【∨】after pushing the 【ESC key】if mistakenly entered wrong first time.

6.4. CALIBRATION OUTPUT

In the F/V mode it outputs 0% and +100% analog voltage and in the ⊿ F mode it analog-output becomes 0% and ± 100%. For example is used for calibration of recorder.

(1) Push the 【CALIBRATION OUTPUT】 key to select the Calibration Output menu screen.

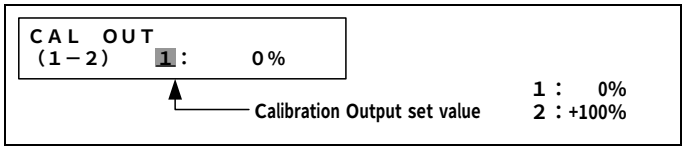
(2) When the 【ESC key】 is pushed, it returns to the Measurement screen.



【Figure 34】

6.4.1 CAL OUT (calibration output) [in F/V (speed output) mode]

(1) If the 【ENT key】 is pushed after choosing 【1】 on the 1:CAL OUT 2:0 ADJUSTMENT, the Calibration Output setting screen will be displayed.



【Figure 35】

(2) By selecting the voltage ranges from 0-10 V, and when 【1】 is selected output will be 0V and +10V when 【2】 is chosen.

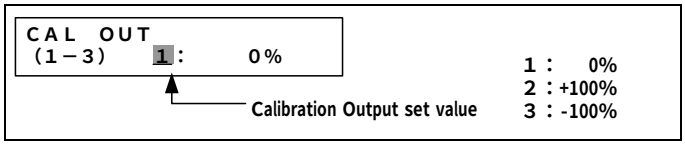
(3) Here, the voltage corresponding to the input chosen numerical value will be displayed as output even if the 【ENT key】 is not pressed.

(4) Push the 【ESC key】 to terminate the calibration output.

(5) On screen 1:CAL OUT 2:0 ADJUSTMENT, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.4.2 CAL OUT (calibration output) [in ⊿ F (deviation output) mode]

(1) If the 【ENT key】 is pushed after choosing 【1】 on the 1:CAL OUT 2:0 ADJUSTMENT, the Calibration Output setting screen will be displayed.



【Figure 36】

(2) When an output voltage range is set as ± 10V, if 【1】(0%) is chosen the out put will be 0Vand if 【2】(+100%) is chosen the out put will be +10V, and -10V when 【3】(-100%) is chosen.

(3) Here voltage corresponding to a chosen numerical value will be outputted even if the【ENT key】is not pushed.

(4) Push the 【ESC key】 to terminate the calibration output.

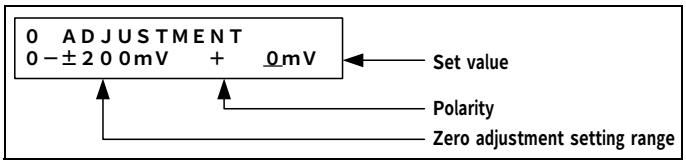
(5) On the 1:CAL OUT 2:0 ADJUSTMENT, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.4.3 0 ADJUSTMENT (zero adjustment)

Adjusts the output voltage for the analog output 0%. A span of 0% to 100% is fixed.

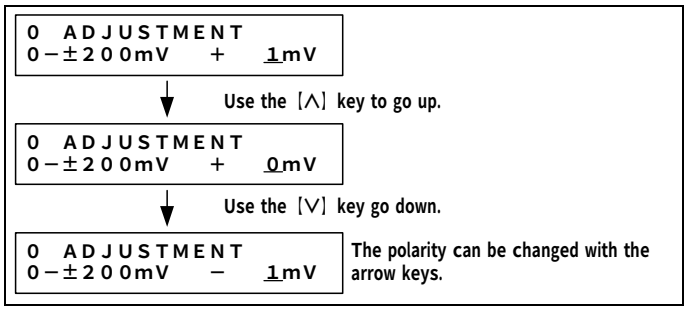
(1) After choosing 【2】 on the `1:CAL OUT 2:0 ADJUSTMENT` push the 【ENT key】 than a 0 adjustment setup screen will be displayed.

(2) The 【ENT key】 is pushed after inputting a numerical value. The polarity can be changed by the arrow key【∧】【∨】



【Figure 37】

(3) The input can also be adjusted by the arrow keys 【∧】【∨】

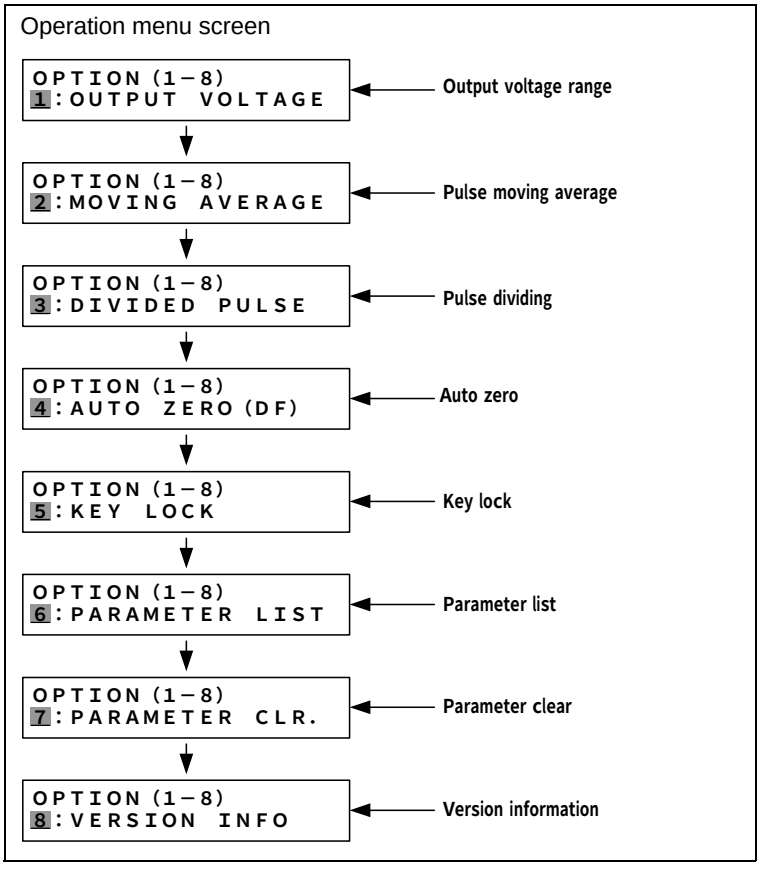


【Figure 38】

(4) On the `1:CAL OUT 2:0 ADJUSTMENT`, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.5. OPTION

Sets the output voltage range, the pulse moving average, the pulse dividing, and the auto zero.



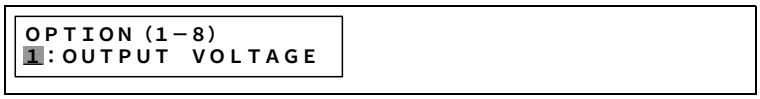
【Figure 39】

6.5.1 OUTPUT VOLTAGE (output voltage range)

6.5.1.1 F/V (speed output) output voltage range

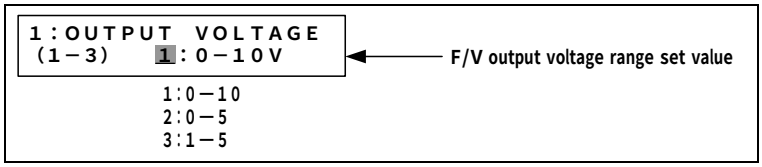
Set the output voltage range in the F/V mode.

(1) Push the 【OPTION key】 in the F/V mode and select 【1】, then push the 【ENT key】 the following screen will appear.



【Figure 40】

(2) The Output Voltage setup screen is displayed. Select a corresponding numerical value from 【1 - 3】, and then push the 【ENT key】 to store the setting, and return to the OPTION (1−8) 1:OUTPUT VOLTAGE.



【Figure 41】

(3) The【ENT key】is pushed after selecting a corresponding numerical value from【1 - 3】. Then, after memorizing the setup, it returns to the OPTION (1−8) 1:OUTPUT VOLTAGE.

(4) On the OPTION (1−8) 1:OUTPUT VOLTAGE, when the 【ESC key】 is pushed, it again returns to the Measurement screen.

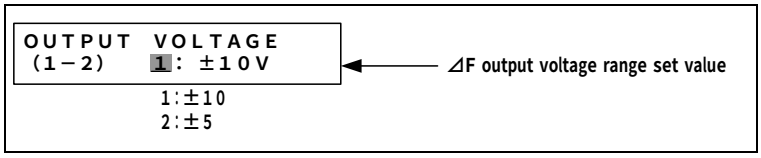
6.5.1.2 ⊿F (deviation output) output voltage range

Set the output voltage range in the ⊿F mode.

【Figure 42】

(1) Push the 【OPTION key】 in the ⊿F mode and select 【1】, and then push the 【ENT key】.

(2) The set value of the output voltage range will be displayed.



【Figure 43】

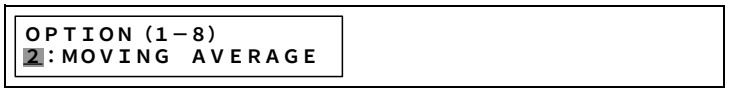
(3) The【ENT key】is pushed after selecting a corresponding numerical value from【1 - 2】. Then, after memorizing a setup, it returns to the OPTION (1−8) 1:OUTPUT VOLTAGE.

(4) On the OPTION (1−8) 1:OUTPUT VOLTAGE, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.6. MOVING AVERAGE (pulse moving average)

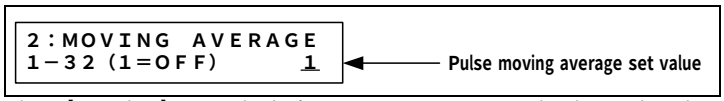
This is a pulse moving average function of 1 - 32 (optional settings). It outputs the average frequency of the set number of pulses with each pulse. A high precision deviation measurement is possible by using it in combination with the ⊿F mode. (Refer to "4. Output precision of ⊿F (deviation output) mode" on P.31)

(1) Push the 【OPTION key】, select 【2】, and then push the 【ENT key】.



【Figure 44】

(2) The Pulse Moving Average setup screen is displayed.



【Figure 45】

The 【ENT key】 is pushed after inputting a numerical value within the range.

Then, after memorizing a setup, it returns to the OPTION (1−8) 2:MOVING AVERAGE.

(3) On the OPTION (1−8) 2:MOVING AVERAGE, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.6.1 DIVIDED PULSE (pulse dividing)

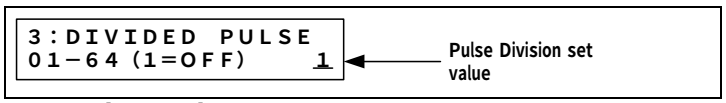
This is a pulse dividing function of 1 - 64 (optional settings). The pulse dividing is carried out with the set number of pulses. Since it is a software pulse dividing function, it does not affect the full-scale setting regardless of the measurement frequency.

Note:
Entering a frequency of 240 kHz will not result in 120 kHz, even if divided by 2.

(1) Push the 【OPTION key】, select 【3】, and then push the 【ENT key】.

【Figure 46】

(2) The Pulse dividing setup screen is displayed.



【Figure 47】

(3) The 【ENT key】 is pushed after inputting a numerical value within the range. Then, after memorizing a setup, it returns to the OPTION(1−8) 3:DIVIDED PULSE.

(4) On the OPTION(1−8) 3:DIVIDED PULSE, when the 【ESC key】 is pushed, it returns to the Measurement screen.

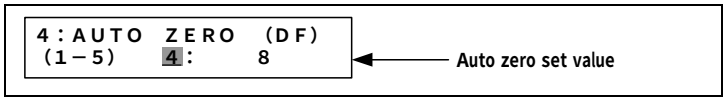
6.6.2 AUTO ZERO (DF)

In this mode stop forecast of F/V (speed output) is performed. Select timing for forecasting the stop from five stages. If smaller is the numerical value, faster will be the response. (Refer to P.30)
This function is effective only in F/V mode.

(1) Push the 【OPTION key】, select 【4】, and then push the 【ENT key】.

【Figure 48】

(2) The Auto Zero setup screen is displayed.



【Figure 49】

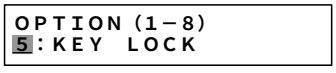
(3) The 【ENT key】 is pushed after inputting a numerical value. Then, after memorizing the setup, it returns to OPTION(1−8) 4:AUTO ZERO(DF).

(4) On the OPTION(1−8) 4:AUTO ZERO(DF), when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.6.3 KEY LOCK

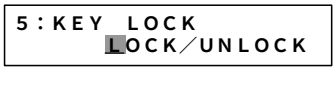
When the key lock is set up, operation of those other than the 【OPTION key】 cannot be performed.

(1) Push the 【OPTION key】, select 【5】, and then push the 【ENT key】.



【Figure 50】

(2) The Key lock setup screen is displayed.



【Figure 51】

(3) When the "LOCK" is selected, and the 【ENT key】 is pushed, it returns to a measurement screen and shifts to key lock mode.

(4) If keys other than the 【OPTION key】 are pushed during a key lock is active, it will display like

.

(5) If the 【OPTION key】 is pushed when key lock is active, the screen will display unlock option like.

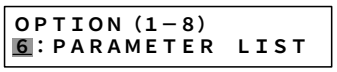
【Figure 52】

(6) If UNLOCK is chosen and the 【ENT key】 is pushed, it will return to a measurement screen and a key lock will be canceled.

6.6.4 PARAMETER LIST

Setting values are displayed in a list. Setup is impossible although a setting value is displayed.

(1) Push the 【OPTION key】, select 【6】, and then push 【ENT key】.



【Figure 53】

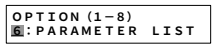
The guide number 【1-D】 are designed in this setup. In order to display a setting value, please select the corresponding numerical value.

Selection of 【A-D】 is as follows when operating with key pad.

A = 【FREQUENSCY key】
B = 【TRIGGER LEVEL key】
C = 【CALIBRATION OUTPUT key】
D = 【OPTION key】

No	Setting Item		Display name
1	MODE		MODE
2	DISPLAY UNIT (Unit)		UNIT
3	PULSE/ROTATION (Resolution)		PULSE
4	FULL SCALE	Hz	FS ･Hz
5		rpm	FS ･rpm
6	CENTER	Hz	CF ･Hz
7		rpm	CR ･rpm
8	⊿ RANGE		⊿ RANGE
9	TRIGGER LEVEL		TRIG'D Lv.
A	0 ADJUSTMENT		0 ADJ.
B	MOVING AVERAGE		MOVING Av.
C	DIVIDED PULSE		DIVIDED PLS.
D	AUTO ZERO(DF)		AUTO ZERO

(2) When the 【ESC key】 is pushed, it returns to the Menu screen.

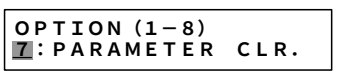
(3) On the 

, when the 【ESC key】 is pushed again, it returns to the Measurement screen.

6.6.5 PARAMETER CLR. (Parameter clear)

This is the function to return a setting value to the value at the time of factory shipments.

(1) Push the 【OPTION key】, select 【7】, and then push 【ENT key】

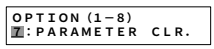


【Figure 54】

(2) The selection screen of a setting value clearance is displayed.

【Figure 55】

(3) If the 【ENT key】 is pushed after choosing "Yes", a setting value will return to a setup made at the time of factory shipment.

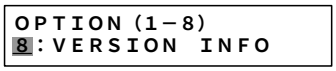
(4) On the 

, when the 【ESC key】 is pushed, it returns to the Measurement screen.

6.6.6 VERSION INFO (Version information)

The version checksum and manufacturing number of programs are displayed.

(1) Push the 【OPTION key】, select 【8】, and then push the 【ENT key】.

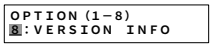


【Figure 56】

(2) The guide number of 【1-5】 is designed for this setup. In order to display a setting value, please select the corresponding numerical value by using keypad or arrow keys.

No	Display Item	Display name
1	MAIN CPU PROGRAM VERSION	MAIN Ver.
2	MAIN CPU ROM CHECKSUM	MAIN CSUM
3	SUB CPU PROGRAM VERSION	SUB Ver.
4	SUB CPU ROM CHECKSUM	SUB CSUM
5	SERIAL NUMBER	Ser.No

(3) When the 【ESC key】 is pushed, it returns to the Menu screen.

(4) On the 

, when the 【ESC key】 is pushed, it returns to the Measurement screen.

Chapter3 Functions

1.Function list

2.Function explanations

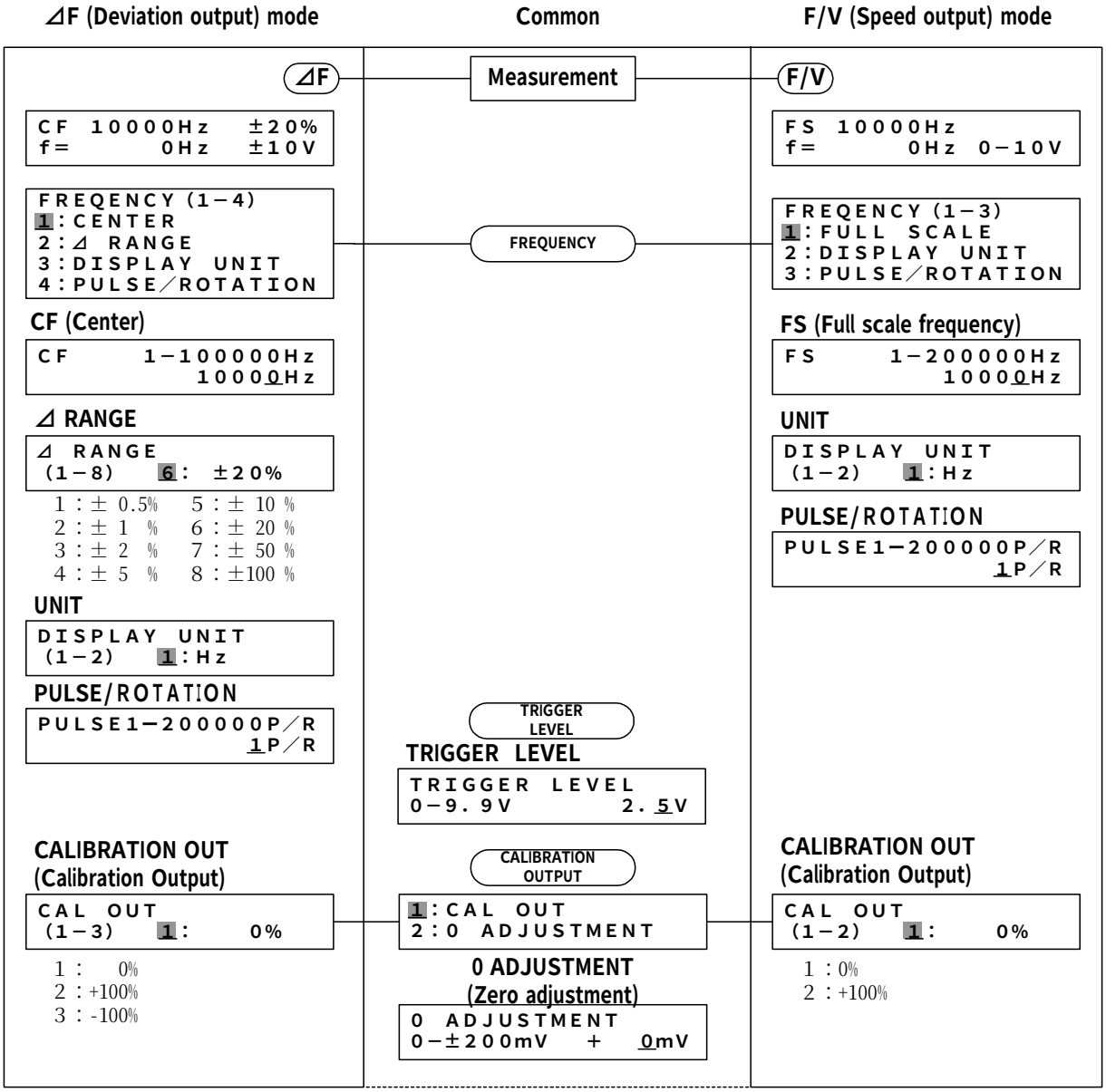
3.F/V (speed output) mode

4.Output precision of ⊿ F (deviation output) mode

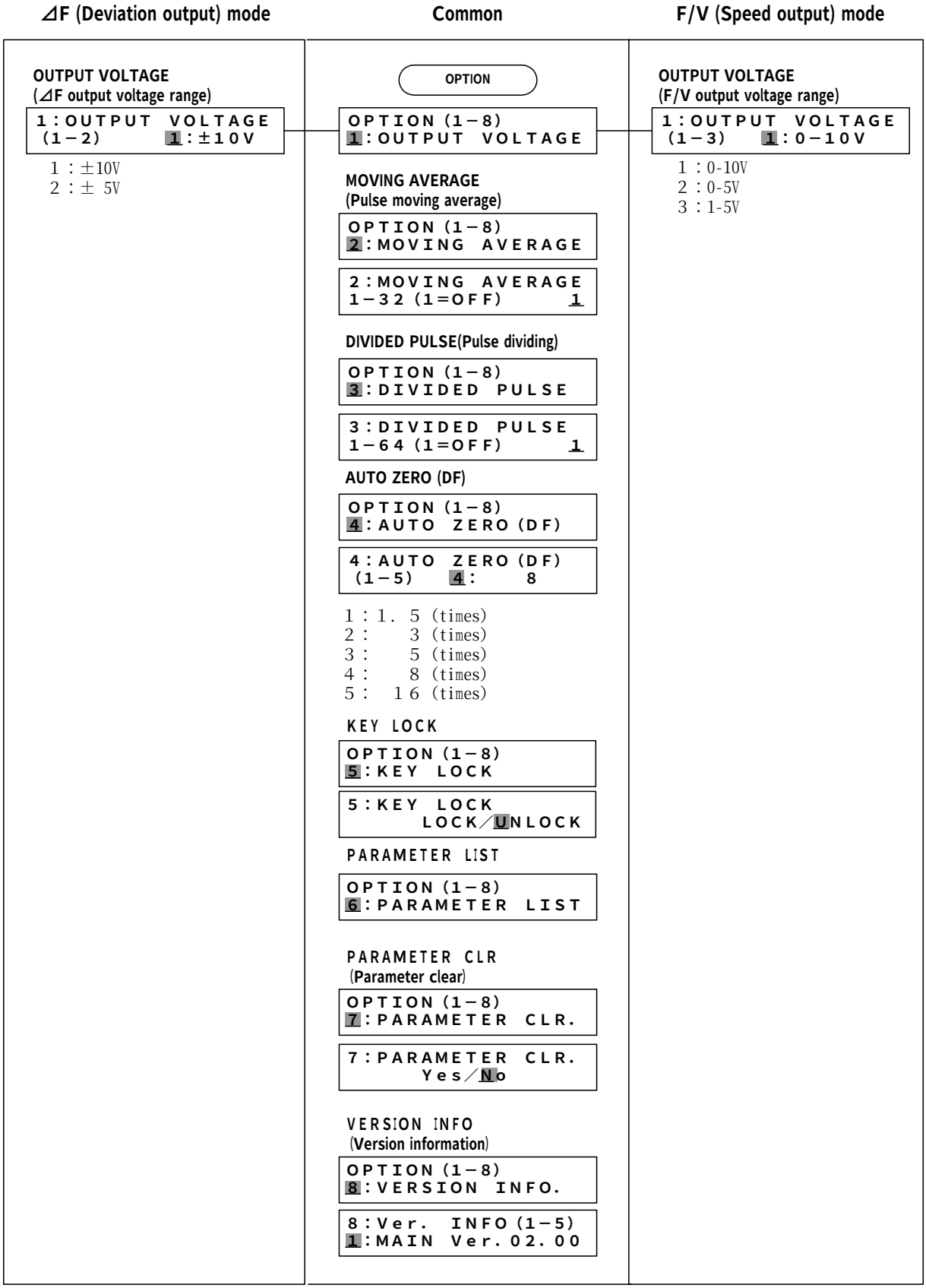
5.PERIOMATIC ™ method

1. Function list

The F/V (speed output) mode and áô F (deviation output) mode are changed by using the measurement mode key on the front panel.



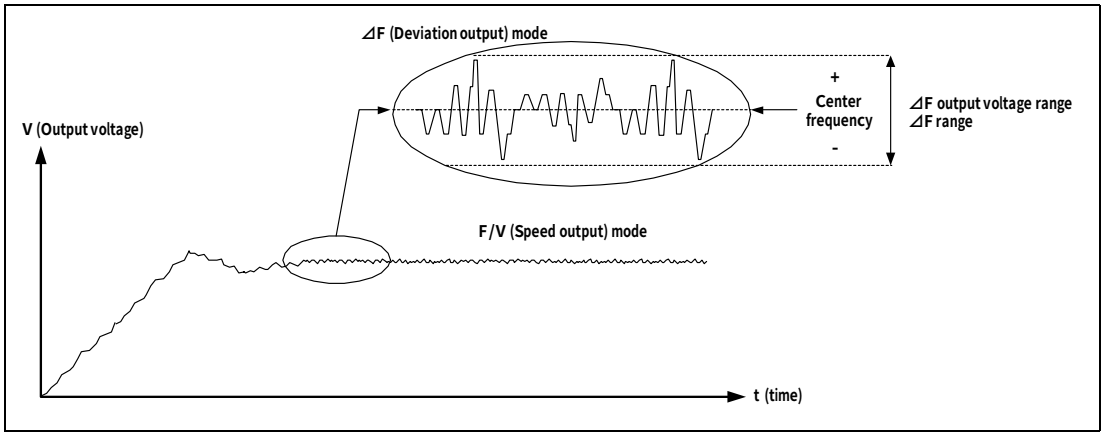
【Figure 57】


⊿F (Deviation output) mode
Common
F/V (Speed output) mode
OUTPUT VOLTAGE
(⊿F output voltage range)
1:OUTPUT VOLTAGE
(1-2) 1:±10V
1 : ±10V
2 : ± 5V
OPTION
OPTION(1-8)
1:OUTPUT VOLTAGE
MOVING AVERAGE
(Pulse moving average)
OPTION(1-8)
2:MOVING AVERAGE
2:MOVING AVERAGE
1-32 (1=OFF) 1
DIVIDED PULSE(Pulse dividing)
OPTION(1-8)
3:DIVIDED PULSE
3:DIVIDED PULSE
1-64 (1=OFF) 1
AUTO ZERO (DF)
OPTION(1-8)
4:AUTO ZERO(DF)
4:AUTO ZERO(DF)
(1-5) 4: 8
1 : 1. 5 (times)
2 : 3 (times)
3 : 5 (times)
4 : 8 (times)
5 : 16 (times)
KEY LOCK
OPTION(1-8)
5:KEY LOCK
5:KEY LOCK
LOCK/UNLOCK
PARAMETER LIST
OPTION(1-8)
6:PARAMETER LIST
PARAMETER CLR
(Parameter clear)
OPTION(1-8)
7:PARAMETER CLR.
7:PARAMETER CLR.
Yes/No
VERSION INFO
(Version information)
OPTION(1-8)
8:VERSION INFO.
8:Ver. INFO(1-5)
1:MAIN Ver.02.00
OUTPUT VOLTAGE
(F/V output voltage range)
1:OUTPUT VOLTAGE
(1-3) 1:0-10V
1 : 0-10V
2 : 0-5V
3 : 1-5V

2. Function explanations

2.1. Two measurement modes

There are two measurement modes, the F/V (speed output) mode and the áô F (deviation output) mode.

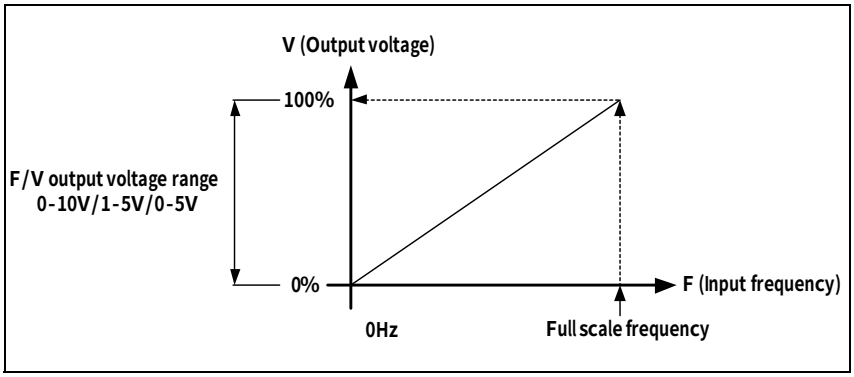


【Figure 58】

The F/V mode is suitable for measurements where the input-frequencies have a wide range.
The ⊿ F mode is suitable for measurements where the input-frequency has considerably low fluctuations.

3. F/V (speed output) mode

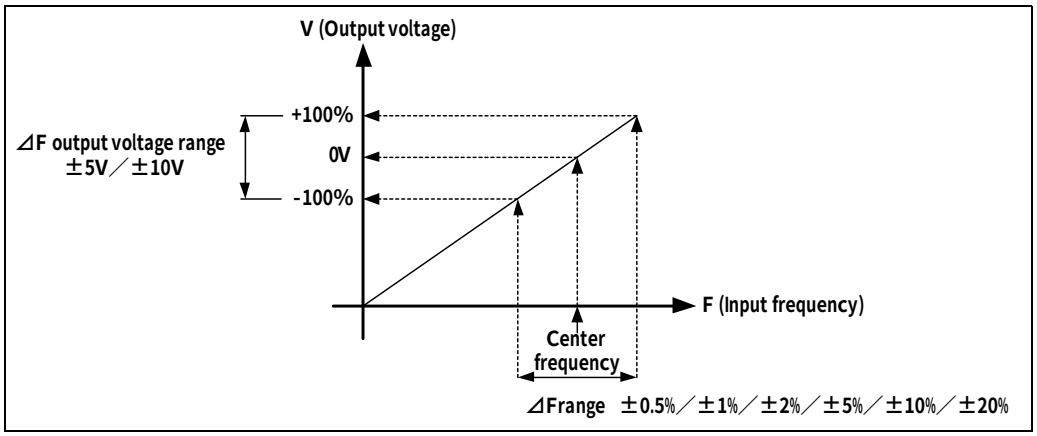
Makes the set full-scale frequency 100% and outputs voltage in proportion to the input-frequency.



【Figure 59】

3.1. ⊿ F (deviation output) mode

Sets the center frequency, ⊿ F range, and outputs the voltage proportional to the deviation on the basis of center frequency. For example, when center frequency is set as 10kHz and F range is set as a ± 20% than the output voltage becomes +100% at 12kHz (+20% of 10kHz) input and -100% at 8kHz (-20% of 10kHz) input.

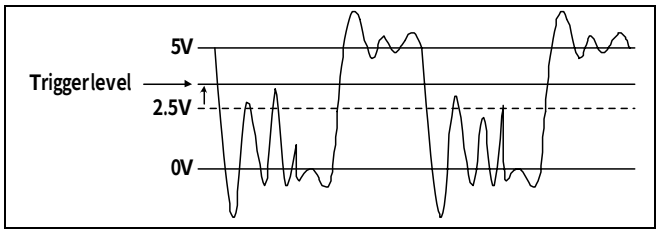


【Figure 60】

3.2. TRIGGER LEVEL

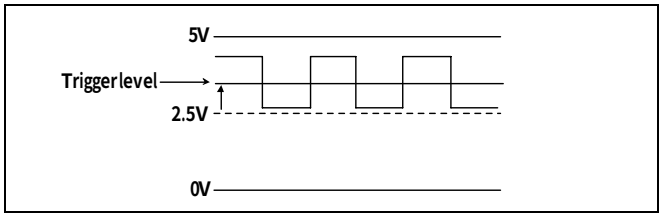
The trigger level can optionally be set from 0.0 to 0.9 V. However, factory setting is 2.5 V. When the waveforms of the kind shown below are displayed, correct signal measurement becomes impossible. In such case, the adjustment of the trigger level to a position where a stable measurement result can be obtained is of great importance. If the TRIG'D LED flashes or lit continuously, it will be triggered.

When the waveform is irregular.



【Figure 61】

When the L level of the waveform is not around 0 V.

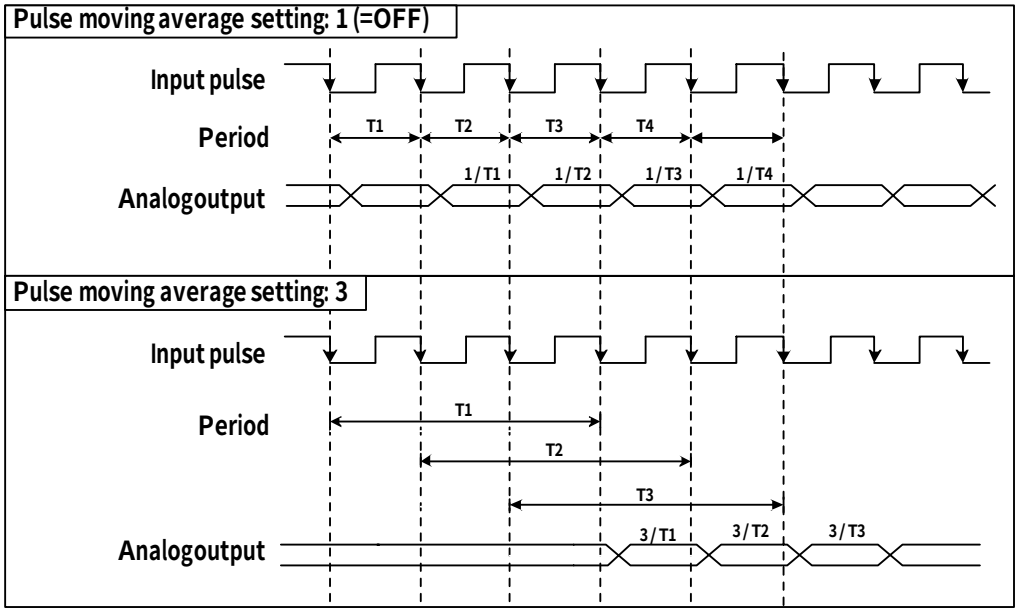


【Figure 62】

3.3. MOVING AVERAGE (pulse moving average)

The analog output when a pulse moving average has been set so that the computation has been carried out by taking the average of periods equivalent to the number of pulses that have been set as the input (Period = time between input pulses). Incorporating the latest period and discarding the oldest period can take out moving average. In case of using in combination with the ⊿ F mode a higher accuracy deviation measurement is also possible. For example when minor fluctuations in the input frequency need to be measured.
(Refer to "4. Output precision of ⊿ F (deviation output) mode" on P.31)

Figure 65 shows the timing when the pulse moving average has been set to 1 and 3.



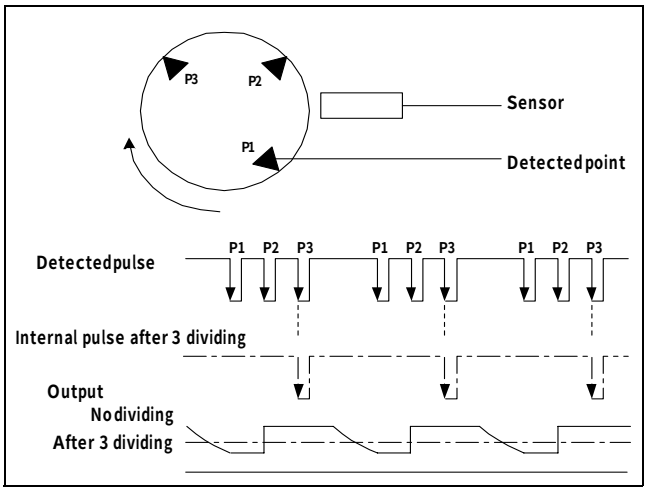
【Figure 63】

Attention

An output is not updated until the pulse of the set-up number of moving average is inputted, when the time of a power supply injection is carried out and a setting change is made.

3.4. DIVIDED PULSE (pulse dividing)

The following is the example, which is effective to understand the concept of dividing pulse.



This is the case when the pulse needs to be divided into three segments. The pulse division is carried out with the set number of pulses. Since it is a software pulse dividing function, it does not affect the full-scale setting regardless of the measurement frequency.

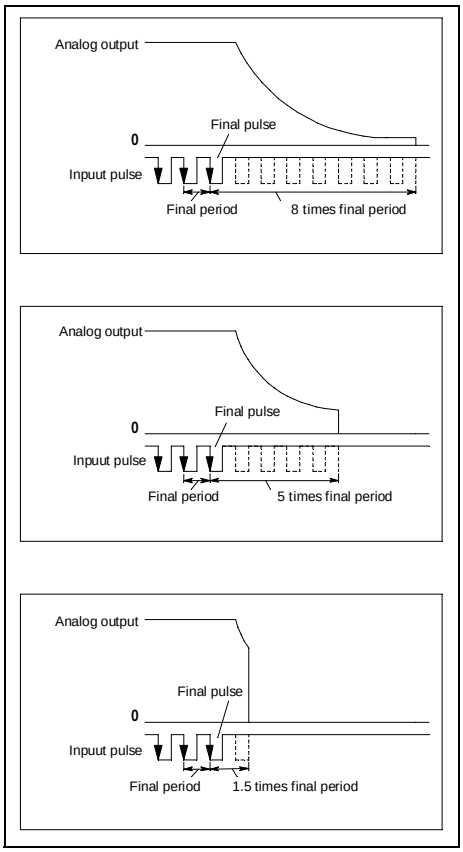
Note:
Entering a frequency of 240 kHz will not result in 120 kHz; even is divided by 2.

【Figure 64】

3.5. AUTO ZERO (DF) (DYNAMICFORECAST ™)

Forecasts the stop of the F/V operation (speed output). From five stages the timing for stop forecasts can be chosen. However, smaller is the set value faster will be the response time. In case if it does not out put 0% when the input pulse stops make the numerical value smaller and in the opposite case make it larger. For example, when the set value is 8 (times) and the final period is 0.01s (100 Hz), it forecasts the stop after 0.01s x 8 times = 0.08s, when the last pulse will be the input and an analog output becomes 0%.

Setting Number	Set Value
1	1.5 (times)
2	3 (times)
3	5 (times)
4	8 (times)
5	16 (times)



Example 1
AUTO ZERO = 4 (8 times)
In case of final period = 0.01s (100 Hz)
0.01s x 8 = 0.08s
(Stop after 0.08s from final pulse input (= 0% output)

Example 2
AUTO ZERO = 3 (5 times)
In case of final period = 0.01s (10 Hz)
0.01s x 4 = 0.04s
(Stop after 0.04s from final pulse input (= 0% output)

Example 3
AUTO ZERO = 1 (1.5 times)
In case of final period = 0.01s (10 Hz)
0.01s x 1.5 = 0.15s
(Stop after 0.15s from final pulse input (= 0% output)

【Figure 65】

4. Output precision of ⊿ F (deviation output) mode

The output accuracy of the ⊿ F mode depends on the center frequency, the input-frequency, the ⊿ F range, and the pulse moving average.

Output precision of ⊿F (deviation output) mode

⊿F range	Pulse moving average	Cnter 100000Hz	10000Hz	1000Hz	100Hz	10Hz	1Hz
±0.5%	1	6.41%	0.73%	0.16%	0.11%	0.10%	0.10%
	2	3.26%	0.42%	0.13%	0.10%	0.10%	0.10%
	4	1.68%	0.26%	0.12%	0.10%	0.10%	0.10%
	8	0.89%	0.18%	0.11%	0.10%	0.10%	0.10%
	16	0.49%	0.14%	0.10%	0.10%	0.10%	0.10%
	32	0.30%	0.12%	0.10%	0.10%	0.10%	0.10%
±1%	1	3.29%	0.42%	0.13%	0.10%	0.10%	0.10%
	2	1.69%	0.26%	0.12%	0.10%	0.10%	0.10%
	4	0.90%	0.18%	0.11%	0.10%	0.10%	0.10%
	8	0.50%	0.14%	0.10%	0.10%	0.10%	0.10%
	16	0.30%	0.12%	0.10%	0.10%	0.10%	0.10%
	32	0.20%	0.11%	0.10%	0.10%	0.10%	0.10%
±2%	1	1.72%	0.26%	0.12%	0.10%	0.10%	0.10%
	2	0.91%	0.18%	0.11%	0.10%	0.10%	0.10%
	4	0.51%	0.14%	0.10%	0.10%	0.10%	0.10%
	8	0.30%	0.12%	0.10%	0.10%	0.10%	0.10%
	16	0.20%	0.11%	0.10%	0.10%	0.10%	0.10%
	32	0.15%	0.11%	0.10%	0.10%	0.10%	0.10%
±5%	1	0.79%	0.17%	0.11%	0.10%	0.10%	0.10%
	2	0.44%	0.13%	0.10%	0.10%	0.10%	0.10%
	4	0.27%	0.12%	0.10%	0.10%	0.10%	0.10%
	8	0.19%	0.11%	0.10%	0.10%	0.10%	0.10%
	16	0.14%	0.10%	0.10%	0.10%	0.10%	0.10%
	32	0.12%	0.10%	0.10%	0.10%	0.10%	0.10%
±10%	1	0.48%	0.14%	0.10%	0.10%	0.10%	0.10%
	2	0.29%	0.12%	0.10%	0.10%	0.10%	0.10%
	4	0.19%	0.11%	0.10%	0.10%	0.10%	0.10%
	8	0.15%	0.10%	0.10%	0.10%	0.10%	0.10%
	16	0.12%	0.10%	0.10%	0.10%	0.10%	0.10%
	32	0.11%	0.10%	0.10%	0.10%	0.10%	0.10%
±20%	1	0.32%	0.12%	0.10%	0.10%	0.10%	0.10%
	2	0.21%	0.11%	0.10%	0.10%	0.10%	0.10%
	4	0.16%	0.11%	0.10%	0.10%	0.10%	0.10%
	8	0.13%	0.10%	0.10%	0.10%	0.10%	0.10%
	16	0.11%	0.10%	0.10%	0.10%	0.10%	0.10%
	32	0.11%	0.10%	0.10%	0.10%	0.10%	0.10%

Calculation example of output accuracy for the output ranges

When the output voltage range is ± 10 V

± 10 V x (accuracy -0.05%) = output accuracy

※ Since analog accuracy (0.1% for the 10 V scale) is included, in the case of ± 10V, it subtracts 0.05%. When the output voltage range is ± 5 V

± 5 V x (accuracy) = output accuracy

⊿ F output voltage range : ± 10 V

Pulse moving average: 1

Center frequency: 100 kHz

⊿ range : ± 20%

In case of the above conditions,

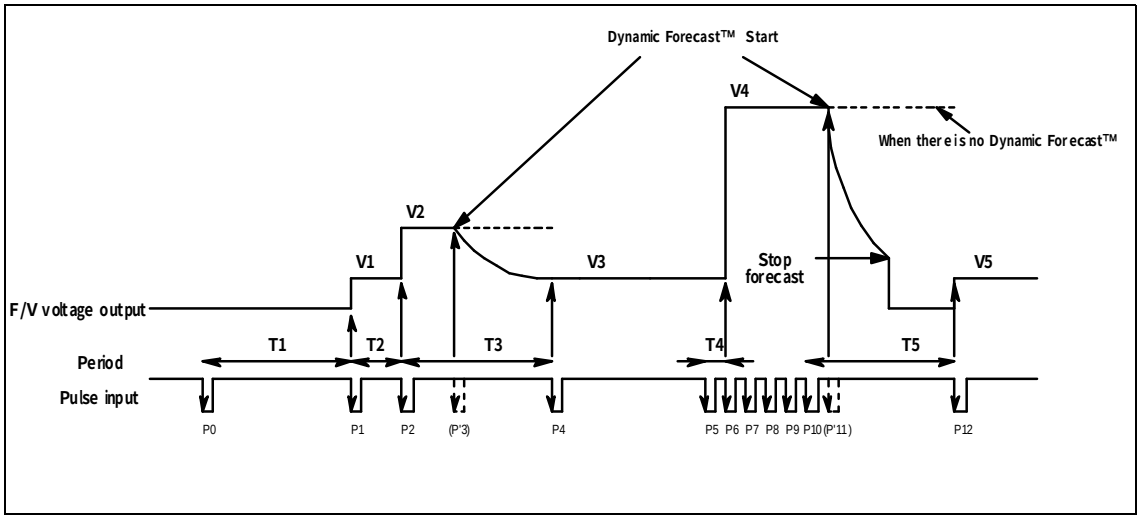
± 10 V ⇒ 20 V x (0.4 - 0.05%) = ± 70 mV

5. PERIOMATIC ™ method

The PERIOMATIC TM method is a frequency measurement technology that utilizes a periodic calculation including the DYNAMICFORECAST developed by Coco Research Inc. The DYNAMICFORECAST is an original forecast computation included/applied to input frequencies that includes stop forecasts.

What's PERIOMATIC ™

- Initially when the first pulse P0 appears, the period is undefined. So it outputs zero.
- For next pulse P1 it outputs V1 for the period T1. The value of V1 is calculated by reciprocal computation in proportion to the reciprocal value or the period T1.
- At the input of next pulse P2 it outputs V2 for the period T2.
- If the next input pulse (P'3) has the same period as that of pulse P2(i.e. T2), output V2 will also remain same.
- However, if the following pulse is delayed the measurement starts functioning on the basis of hyperbolic forecast computation from the fall of the imaginary pulse P-3. Indeed it can compute the fall of input frequency behind P-4 and on the basis of hyperbolic computation keeps lowering the output from p-3.
- At the input of P4, the period T3 is defined, and the output becomes V3.
- When a uniform high frequency pulse train T4 is input, the output rises to ripple free V4.
- Assuming the pulse train has suddenly disappeared and in the absence of input pulse after waiting the period equivalent to P9 to P10, the forecast computation starts from the time of (P'11) (DYNAMICFORECAST).
- Since with mechanical phenomena a sudden 10-fold increase in period such as T4 makes normal deceleration impossible, it forecasts the stop and makes the output zero (Stop forecast).
- Since it is a stop forecast predicted from the final period, an output that is also suitable for a long period of pulse is obtained and a quick response to a sudden stop from high speed is also possible.
- Subsequently, when a P12 will be the input, it will output V5 for the period T5.



【Figure 66】

* Explanation *
Period = time between input pulses
Frequency = 1/period

Chapter4 Appendix

1.Specifications

2.Installation onto the panel

3.Outside dimensional drawing

4.The example of connection according to input signal and the DIP switch explanation label

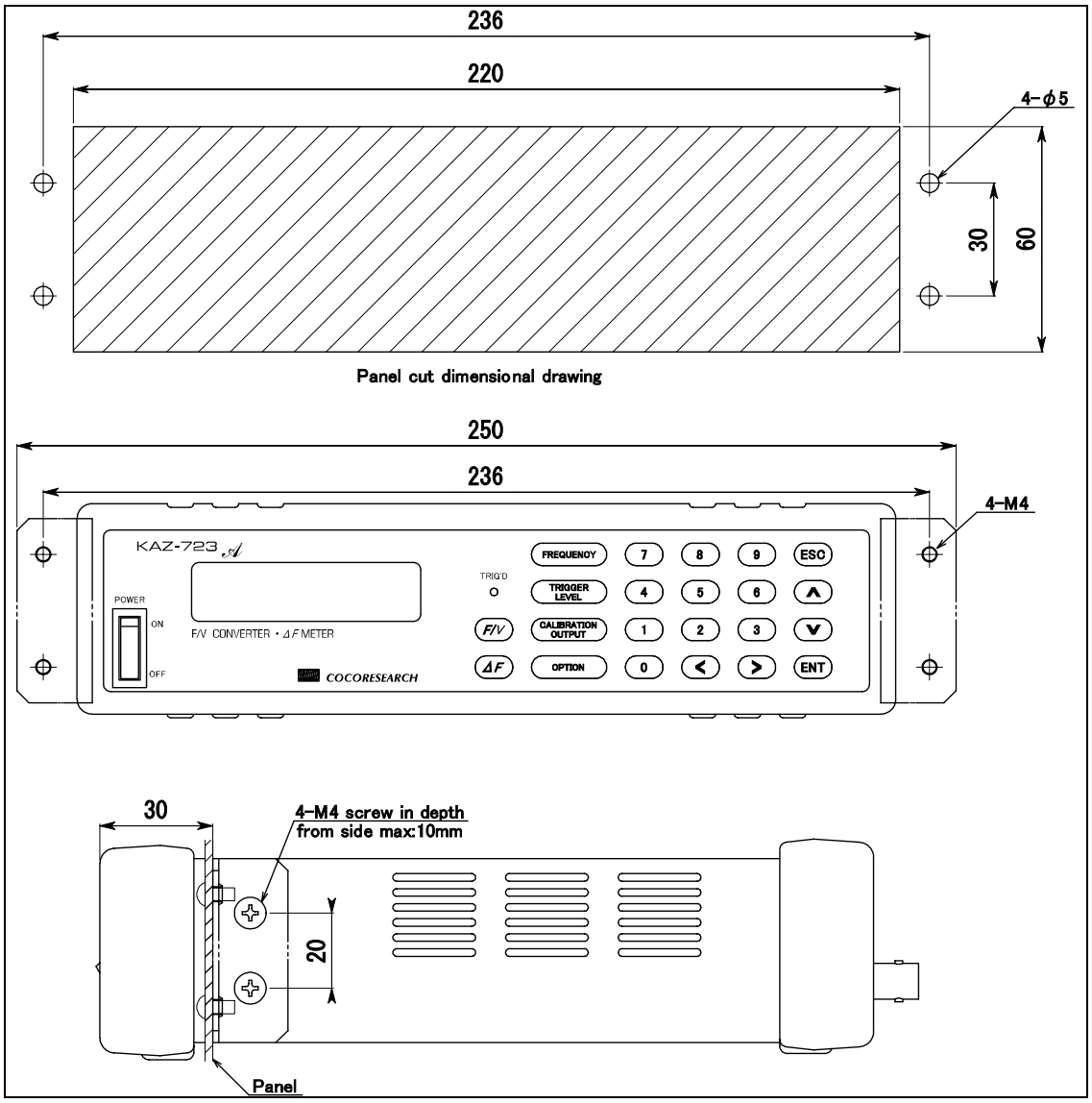
1. Specifications

Name	F/V Converter	
Model	KAZ-723A	
Measurement method	PERIOMATIC ™ method	
Input Section		
Number of inputs	1	
Input frequency range	0.04 Hz - 200 kHz	
Measurement resolution	6.25ns (160 MHz)	
Input circuit characteristics		
(1) General input signals	Input signal	: Logic / zero cross (AC)
	Trigger level	: 0.0 to 9.9 V (accuracy ± 0.1 V max.)
	Input sensitivity	: Min. 0.2 V p-p
	Input withstand voltage	: ± 80 V
	Input resistance	: When non-pull-up 10 kΩ/ when pull-up to +5V : 6kΩ
	Input coupling	: DC/AC
	AC coupling frequency characteristic	: 35 Hz (-3 dB, 6 dB/oct)
	Low-pass filter	: None/15 kHz (-3 dB, 6 dB/oct)/ : 1.5 kHz (-3 dB, 6 dB/oct)
	Input connector	: BNC connector/screwless terminal block (internal short circuit)
(2) Line driver input	Input signal	: Line driver signal
	Input sensitivity	: Min. 1 V (differential voltage)
	Input withstand voltage	: ± 25 V (for PULSE GND) : ± 25 V (differential voltage)
	Recommended line driver	: AM26LS31 or equivalent
	Input resistance	: 340 Ω
	Input connector	: Screwless terminal block
Input pulse width	Min. 1.5 μs (both H level and L level)	
Trigger edge	Rise/fall	
Input indicator	TRIG'D LED	: Flashes during pulse input (continuously lit for high-speed pulse)
Sensor power output	+5 V	: Max. 150 mA
	+12 V	: Max. 120 mA
Display Section		
Display	16 x 2 character dot matrix LCD (LED backlight illumination)	
Displayed digits	6 digits	
Zero display	Leading zero suppressed	
Display update time	0.3s	
Frequency display accuracy	± 100 ppm/ °C ± 1 digit @ 23 °C	
Arithmetic Operation Section		
Measurement mode	F/V (speed output)/ ⊿ F (deviation output)	
Operation time	Max. 3 μs	
Input pulse divisions	1 to 64 (software division)	
Output moving average	1 to 32 (average of input pulse number)	
Auto-zero	5 stages (DYNAMICFORECAST ™)	
Set value storage	Non-volatile memory (EEPROM)	

Analog Output Section	
Number of outputs	1
· F/V mode	Frequency setting range : 1 Hz to 200 kHz Output voltage range : 0 to 10 V/0 to 5 V/1 to 5 V
· ⊿F (deviation output) mode	Frequency setting range : 1 Hz to 100 kHz Output voltage range : ± 10 V/ ± 5 V ⊿F measurement range : ± 0.5%/ ± 1%/ ± 2%/ ± 5%/ ± 10% / ± 20% / ± 50%/ ± 100%
Output resolution	16 bit (about ± 10.8 V)
Calibration output	+100% / 0% / -100% (-100% in ⊿F mode only)
Output response time	Max. 5 μs (input 0 a output 0 for full scale a 90% response)
Temperature fluctuation	Max. ± 200 ppm/ °C
Output accuracy	Max. ± 0.1% full scale @ 23 °C (F/V mode, range 0 to 10V)
Linearity	Max. ± 0.1%
Load resistance	Min. 4.7 kΩ
Output zero adjustment range	± 200 mV
Output connector	BNC connector / screwless terminal block (internal short circuit)
General Specifications	
Power supply input	AC 85 V to 250 V (50 Hz/60 Hz)
Power consumption	Max. 30 VA
Isolation	Sensor power source and signal input / analog output / power supply input / housing
Dimensions	57mm(H) x 218mm(W) x 218mm(D) (including protrusions)
Weight	Approximately 1.8 kg
Ambient temperature	Operating : 0 °C to +40 °C , Storage : -10 °C to +60 °C
Ambient Humidity	Max. 85%HR (no dewing)
Ambient conditions	No corrosive gas

2. Installation onto the panel

2.1. Panel cutout



【Figure 67】

2.2. Installation

Figure 59 shows the panel cutout.

(1) Open the square hole (220 (W) x 60 (H)) and the hole of screw fixation (4 - φ5) for installation onto the panel.

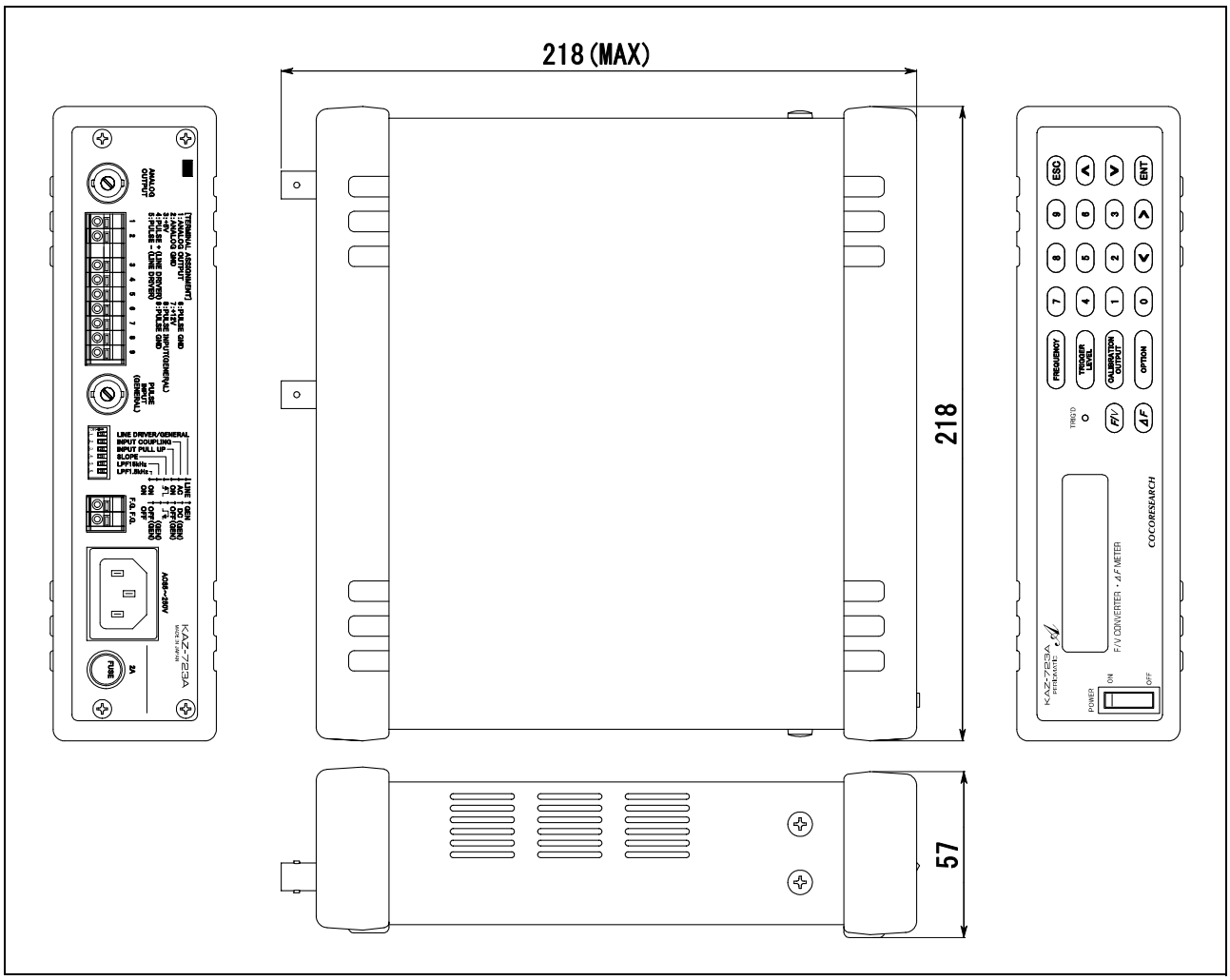
(2) Install the (two) attachments, after removing the side screws of the unit.

(3) Use the M4 screws to install the unit onto the panel.

⚠ Attention

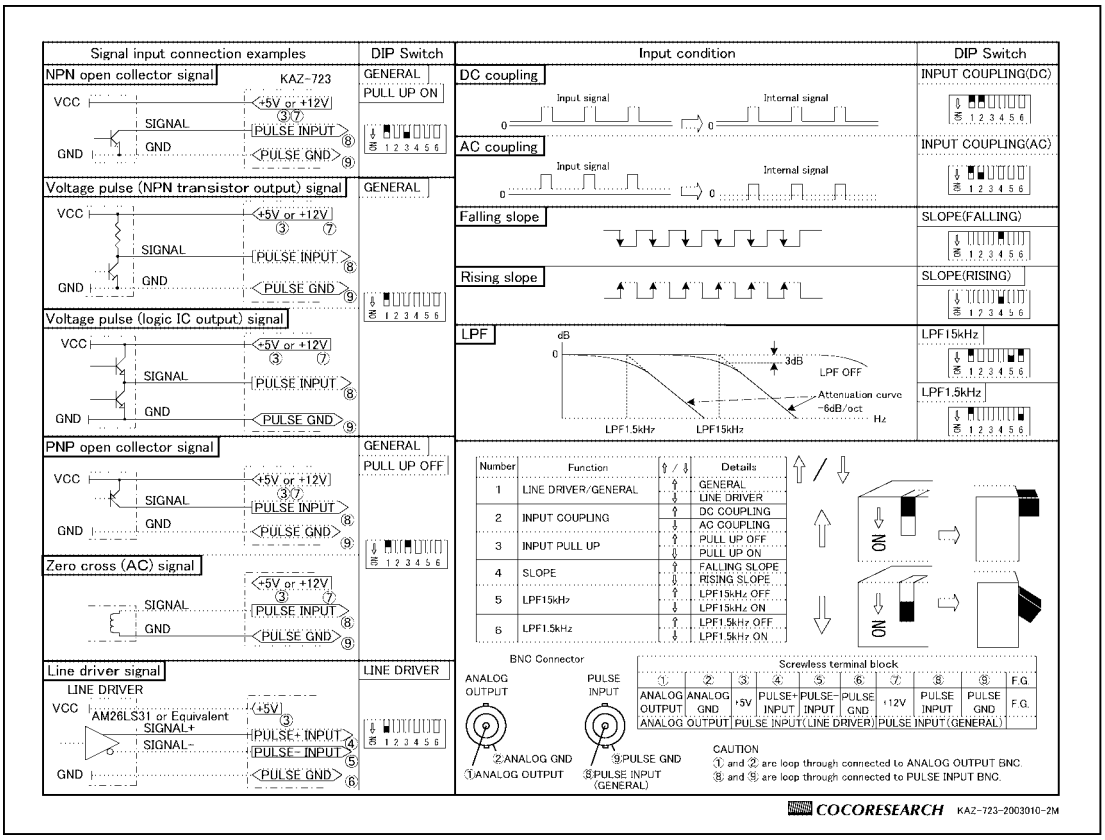
The attachments (model ATC-1) are sold separately. They are not included in the accessories.

3. Outside dimensional drawing



【Figure 68】

4. The example of connection according to input signal and the DIP switch explanation label



【Figure 69】

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