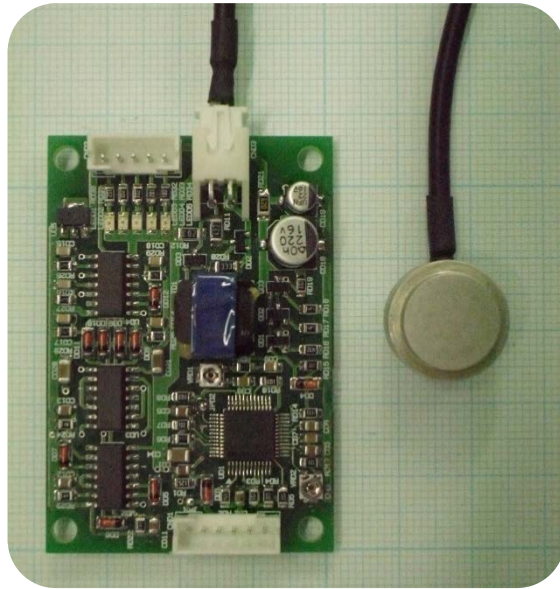


# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors (HG-MP40WP)



# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP



**HG-MP40WP  
(Water Proof Type)**

### ■ Features

- Multi-function transceiver model for water proof types of ultrasonic sensors
- Two types of transmit modes: Free Run and External Trigger modes
- Free voltage in power supply (DC 6 V ~ 15 V)
- Four kinds of simultaneous output signals
  - Ultrasonic waveform of a received and amplified signal
  - Squared signal in TTL level corresponding to ultrasonic waveform
  - Squared signal that its pulse-width is proportional to distance
  - Independent signal outputs for proximity detection corresponding to five step detection range setting of 1 m interval in distance
- Employing a high performance ASIC Chip
- Detection of obstacles located at a long distance

### ■ Specification

<b>Input DC (V)</b>	• <b>6 ~ 15</b> (12 V recommended)
<b>Frequency (kHz)</b>	• <b>40</b> (Nominal)
<b>Detectable Range in Distance (m)</b>	• <b>0.4 ~ 5</b> : Distance output • <b>0 ~ 6.5</b> : Output of proximity detection (five steps)
<b>Size (mm)</b>	• PCB : 56 x 39 x 15 • Sensor : $\Phi 16$ x 10
<b>Current Consumption (mA) for DC 12 V Input</b>	• <b>10</b> : standby mode • <b>13</b> : when an object is detected within the detection range setting • <b>Max. 22</b> : depending on detected distance
<b>Operating Temperature (°C)</b>	• <b>- 30 ~ + 85</b>

# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP

### ▣ Application

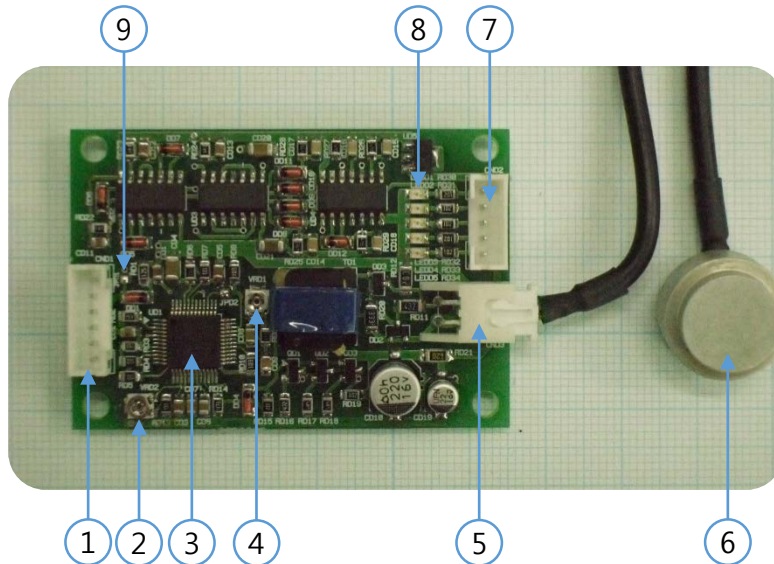
- Distance Measurement, Obstacle detection for AGV and robot, and industrial machinery etc., Outdoor parking lot management, Safety facility management and risk alerts, customers facilities, power saver, and automation equipment, etc.

### ▣ Description

- Using only a single sensor(transceiver sensor) unit for both transmittance and receiving ultrasonic waves
- Convenient for distance measuring and object detection.
- Two types of transmit mode for convenience
  - Free Run mode : with a power supply, sensor/module itself transmits trigger and burst signal – for basic & stand alone application
  - External Trigger : External system(a controller or processor circuit) controls the trigger signals – for advance application such as multi-sensor system
- Input DC voltage is applicable in the wide range from 6 V to 15 V
- Output signal of 5V TTL level is applicable to processor circuit usage or controllers of industrial system.
- Four simultaneous output signals
  - Ultrasonic waveforms of received and amplified signals
  - Squared signals in TTL level corresponding to detected ultrasonic waveforms
  - Squared signal that the pulse-width is proportional to distance
  - Independent signal outputs for proximity detection corresponding to five step detection range setting with the interval of 1 m in distance
    - The detection range setting is 1 m, 2 m, 3 m, 4 m, and longer than 4 m and the accuracy of distance setting is about  $\pm 10\%$  of distance. There are total five steps.
    - High level signals of DC 5 V are independently outputted at different terminals corresponding to distance when obstacles are detected, respectively.
    - also, lights are turned on at LEDs of the different quantity depending on distance.
    - Therefore, the detection of signals can be used at only one terminal or the combination of several distance setting.
  - ✘ The setting of a special detection range in distance is available for volume orders
- High performance ASIC Chip is mounted in the module for stable transmission and sensitive reception (Maximum amplification is about 5,000 times)
- Long distance detection is available by optimized design

# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP



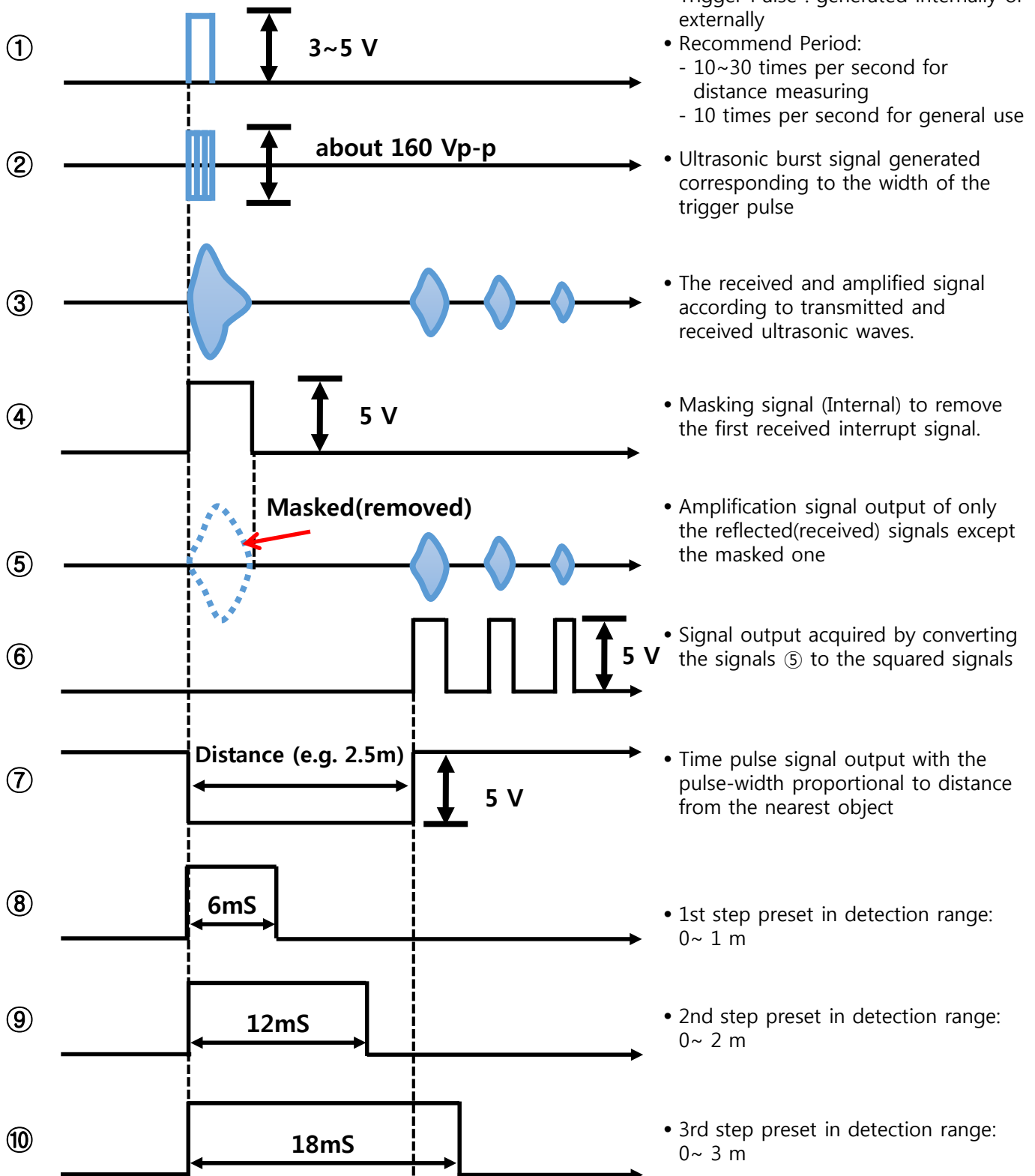
### ■ Part Name

- ① **Input/Output Terminal** : Power, External Trigger input, and three kinds of output signals
- ② **Ultrasonic frequency adjusting** : Factory tuned for unit for the best performance (Do not adjust it because it was optimized when released!)
- ③ **ASIC Chip** : 48 pin Chip with many useful functions. (Hagisonic Product)
- ④ **Volume resistance for sensitivity(Gain) control, VR** : The gain is ranging from 1,000 to 5,000 times. It is 3,000 times when released.
- ⑤ **Sensor Connection Terminal** : Coaxial cable is recommended (when longer than 10 Cm)
- ⑥ **Ultrasonic sensor unit** : the water proof type of sensor has conventional directivities (approx. 65~75°) and the diameter is 16 mm
- ⑦ Independent signal output terminals for proximity detection corresponding to five step detection range setting with the interval of 1 m in distance
- ⑧ **LEDs** : lighted at those of different quantity depending on distance.
- ⑨ **Transmit Mode selection PAD** :
  - Free Run Mode : With soldering; approx. 8 Burst per second is generated.  
(factory option : Soldered)
  - External Trigger Mode : Without soldering; External TTL level Pulse is needed for transmittance  
(1~100 times per second is available / Pulse width : 0.5 ~ 1 ms recommended)

# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP

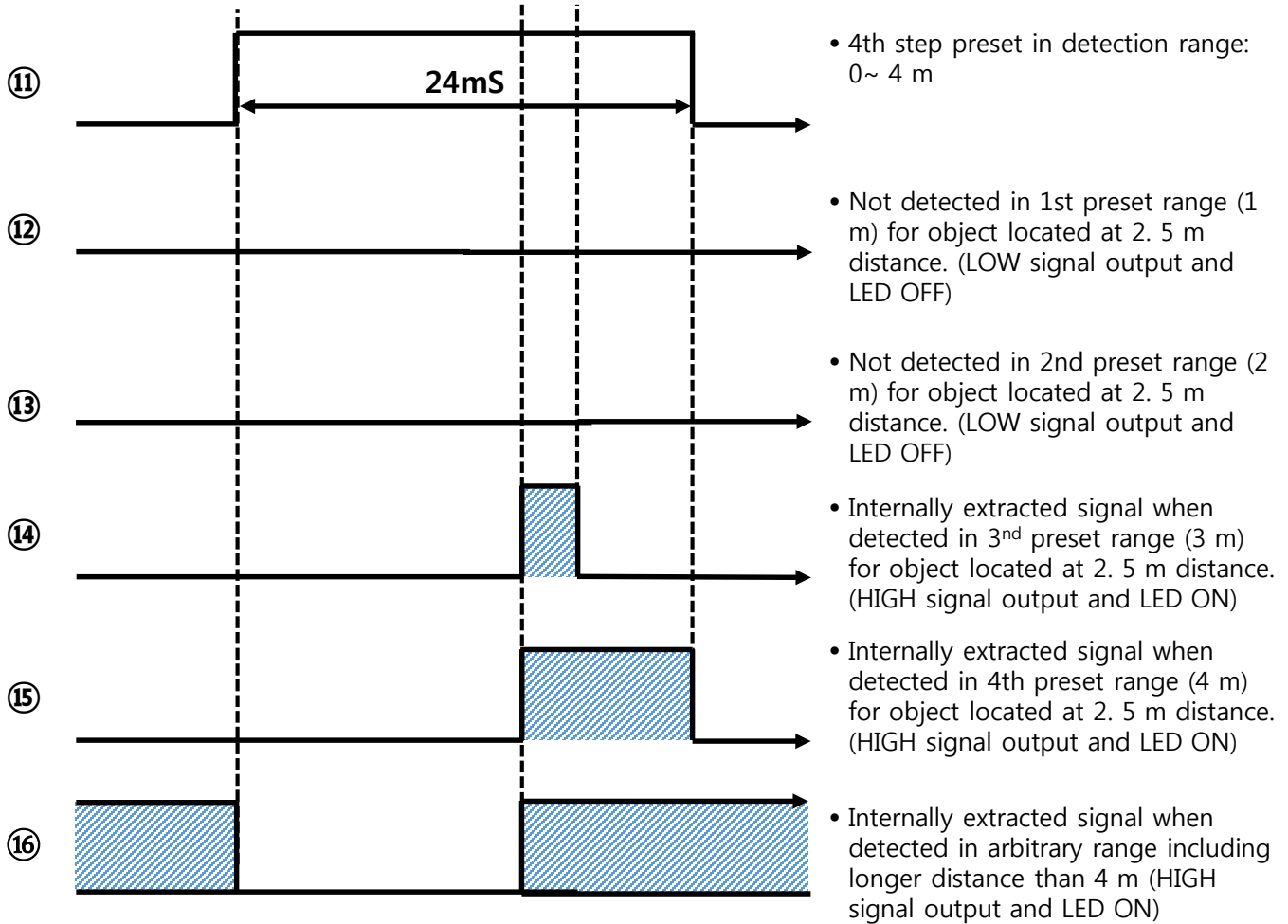
### ■ Timing Chart



# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP

### ■ Timing Chart



### ■ LED lighting status depending on distance of object (⑧ at a figure in 3 page)

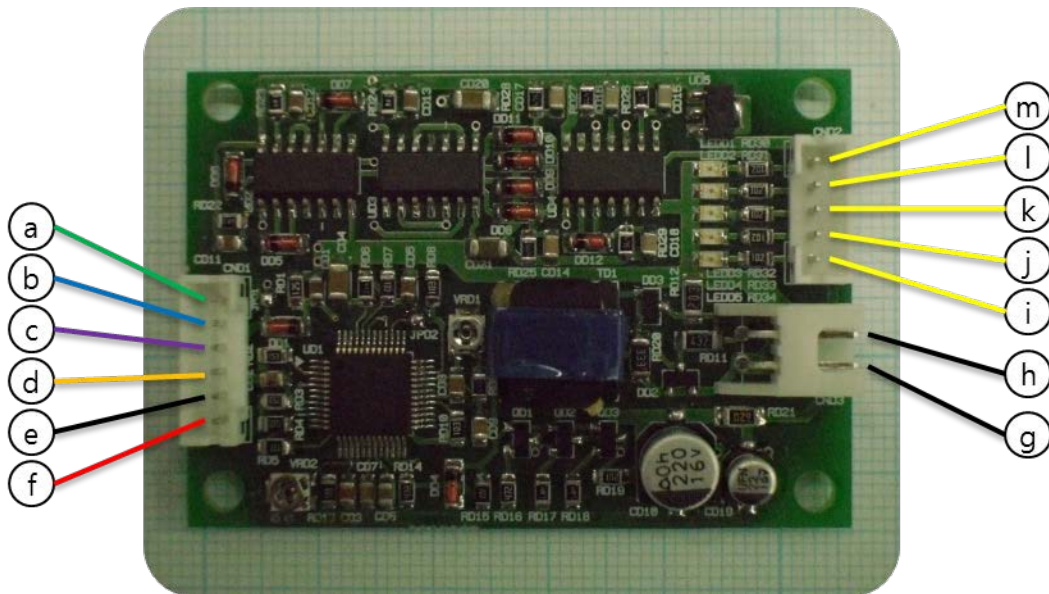
- □ □ □ □ • No detection
- ▨ □ □ □ □ • Detected in longer distance than 4 m
- ▨ ▨ □ □ □ • Detected in the range from 3 m to 4 m
- ▨ ▨ ▨ □ □ • Detected in the range from 2 m to 3 m
- ▨ ▨ ▨ ▨ □ • Detected in the range from 1 m to 2 m
- ▨ ▨ ▨ ▨ ▨ • Detected in shorter distance than 4 m



# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP

### ▣ Input / Output Terminal Configuration



### ▣ Parts Details

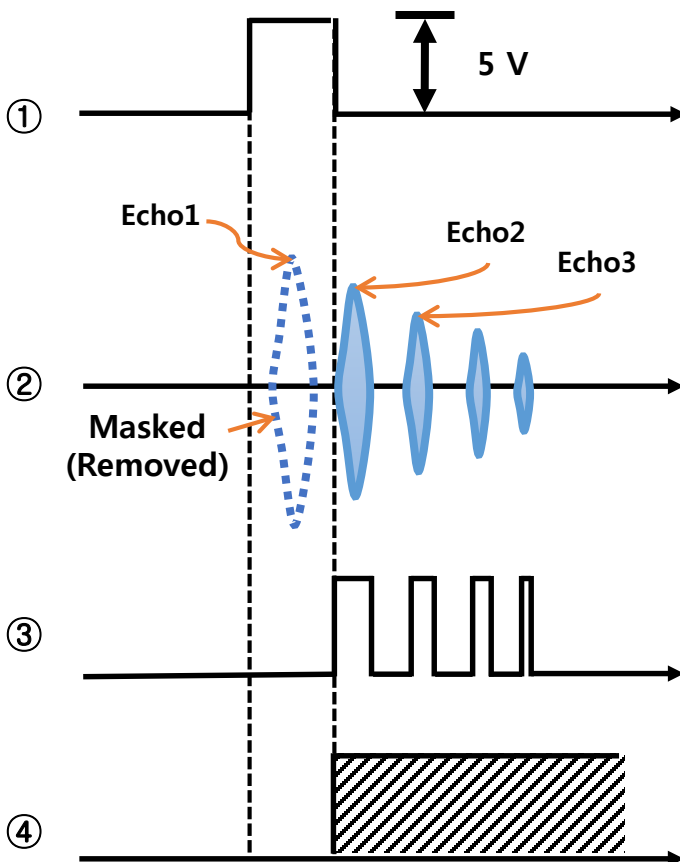
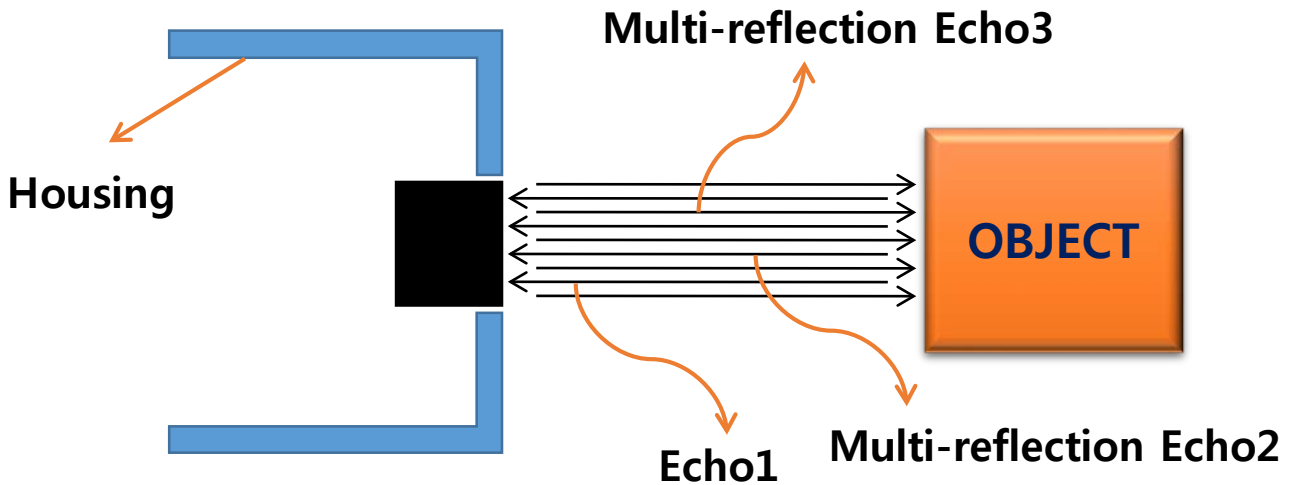
- Ⓐ The amplified signal output of received ultrasonic waves (#⑤ signal in Timing Chart)
- Ⓑ The squared signal output given by converting the signals #⑤ (#⑥ signal in Timing Chart)
- Ⓒ Time pulse signal output with the pulse-width proportional to distance from the nearest object(#⑦ signal in Timing Chart)
- Ⓓ External Trigger / Monitor Terminal
  - Signal input terminal for External Trigger Mode (the pulse width from 0.5 ms to 1 ms and TTL level recommended)
  - Monitor terminal for Free Run Mode to see the Trigger Timing. Internal trigger signal is automatically generated.
- Ⓔ GND
- Ⓕ +Power : 6V~15V range input
- Ⓖ Ultrasonic Sensor Terminal (Input terminal to and output terminal from a sensor)
- Ⓗ Ultrasonic Sensor Terminal (GND and shield line)
- Ⓘ 5V High signal output when a object is detected in arbitrary range
- Ⓙ 5V High signal output when detected in the range from 0 to 4 m
- Ⓚ 5V High signal output when detected in the range from 0 to 3 m
- Ⓛ 5V High signal output when detected in the range from 0 to 2 m
- Ⓜ 5V High signal output when detected in the range from 0 to 1 m

# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

## ■ Model : HG-MP40WP

### ▣ The principle to detect the object located within 40cm distance

- ※ Distance measurement is available only in the range longer than 40 cm. However, it is possible to get the on/off(existence or non-existence) signal even in the range shorter than 40 cm if multi-reflection wave signals are detected .



- Masking signal(Internal) to remove the first received interrupt signal.
- The multi-reflection echoes such as Echo2 and Echo 3 in figures can be detected even though the first echo is masked. Multi-reflection Echo signals generally appears when the object is close to sensors if the object is not too small.
- The echo signals of Echo2 or Echo3 are converted to the squared signals.
- Continuous current signal is outputted corresponding to the extracted squared signal(3). That means the object was detected in a short distance.



# Ultrasonic Multi-Step Proximity Sensor/Module for Water Proof Types of Ultrasonic Sensors

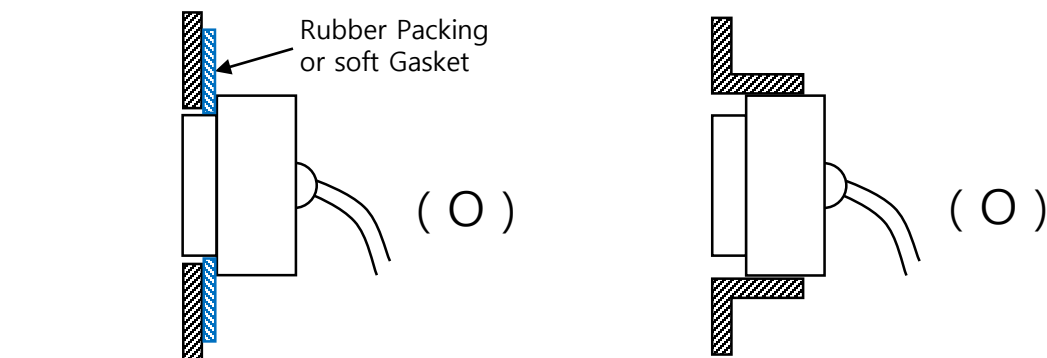
## ■ Model : HG-MP40WP

### ▣ Note : Sensor Mounting(Basic Type)



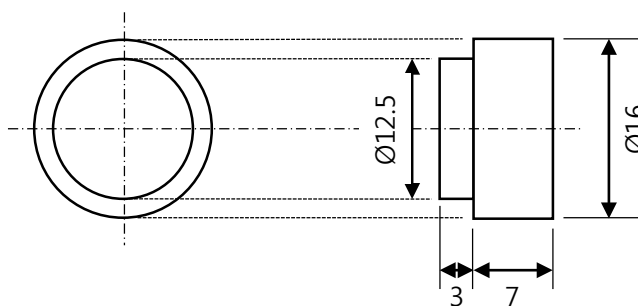
- Vibration area is extended to the side face as well as the top of a sensor

- The tight mounting of the side face in the top side of a sensor could interrupt normal vibration of the sensor.



- Use of a rubber packing or a soft gasket: Note not to interfere the vibration(acoustic sealing effect)

- In case of injection mold type platform, This structure is also good.



The drawing of sensor appearance