USER's GUIDE MANUAL

Radar Object Detection system
with 3 pre-set detection patterns

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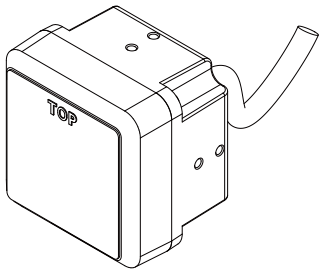
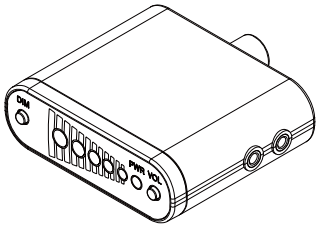
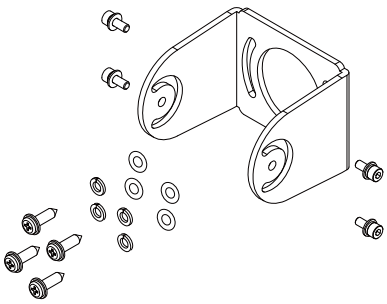


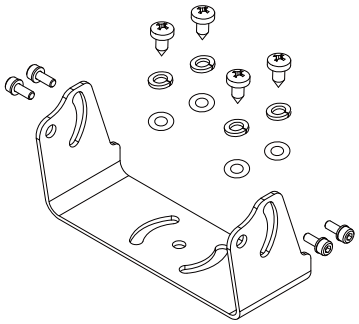
- Display unit



- Wall Mount
  Included screw pack

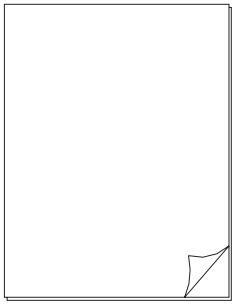


- Bracket for Display unit
  Included screw pack



- Extension Cable

- User's Guide



III System Description

- The Smallest Radar Sensor Active Blind Spot Detection System for Light-Duty Vehicle.
- The Radar Object Detection System uses FMCW (frequency modulated continuous wave) radar technology to detect stationary objects and people in blind spots.
- This advanced system alerts the operator with both visual and audible warnings.
- The system's capability of being able to determine whether an object is approaching or moving away from the sensor, helps to limit the number of false detections caused by objects of no concern encroaching on the detection area.
- The commercial grade heavy-duty system has an IP69K waterproof rating and works perfectly in all weather conditions.

IV Object Detection Capability

The radar sensor transmits and receives 24 GHz radar signal.
It then process the returned signals to determine if an object has reflected any energy back to the sensor .

Our test condition is Radar sensor (height 1 meter location) with adult person at open side.
1dBsm (dB square meter), "Person reflection" approx.at 1dBsm, "Car reflection" at 10dBsm.
The detection range test should be proceeded at outdoor. The detection zone should be cleared of all obstacles.
Any obstacles in the detection zone will interfere with the test.
All dimensions for detection of objects are nominal and very significantly depending on many parameters.
In the case where there are multiple objects in the detection area at various distance and/or angles, the sensor detects the closest object, which is the most important one for collision avoidance.

Factors Influencing the Detection of Objects
The object properties, location and direction influences in deterring if an object is detected or not.

Size: A large object usually reflects more energy than a smaller object.

Composition: Metal is detected better than non-metal materials

Shape: A flat object is better detected than a complex shape. Variation in relative location and direction can influence detection.

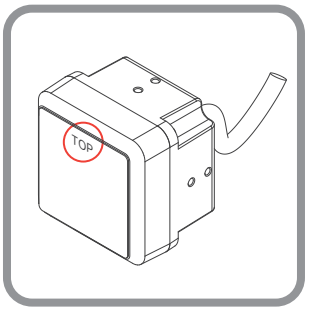
Angle: An object facing directly towards the sensor is detected better than an object that is located towards the edges of the detection area or at an angle.

Ground condition: Objects on flat, mineral material ground are better detected than on rough or metal surfaces.

V Installation

◈ *Sensor Mounting*

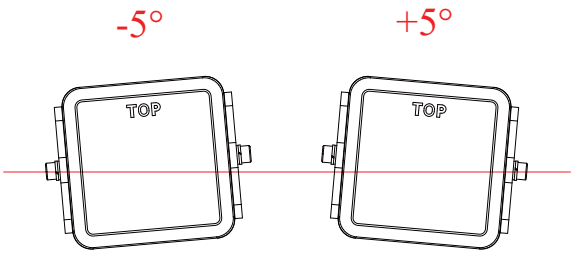
The installation site should be flat. Ideally the radar sensor should be mounted on the rear of the vehicles as close to the center as possible at roughly 1 meter above the ground.
The sensor should be mounted in the upright position.

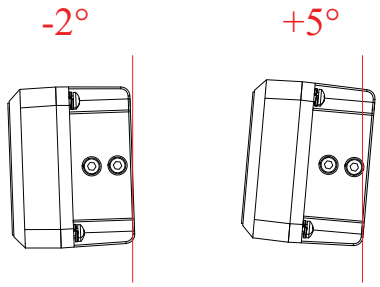


◈ *Mounting angle*

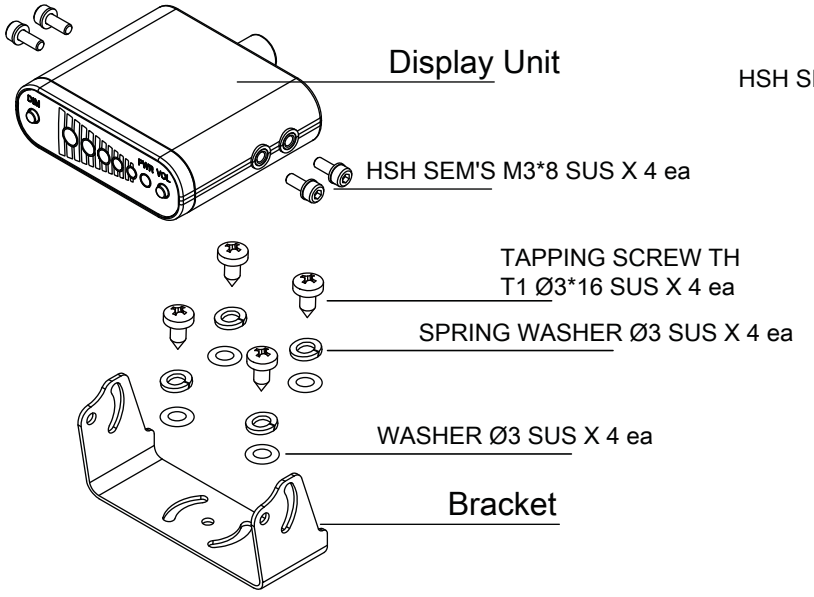
Select the appropriate location to mount the sensor.
a. Height tolerance (from ground), 1m +/- 0.3m
b. Vertical angle tolerance +5° (up), -2° (down)
c. Horizontal angle tolerance +/- 5°

Note:
Before permanently installing the RODS(Radar object detection sensor) on the vehicle, verify that the selected sensor mounting location provides a clear detection zone.
Take the machine to a clear area, temporarily attach the sensor in the proposed mounting location, apply power to the system, and verify that nothing is being detected.
Our system is not affected if multiple systems are operating in the same area or on the same vehicle, even if they are installed in close proximity with overlapping detection ranges.

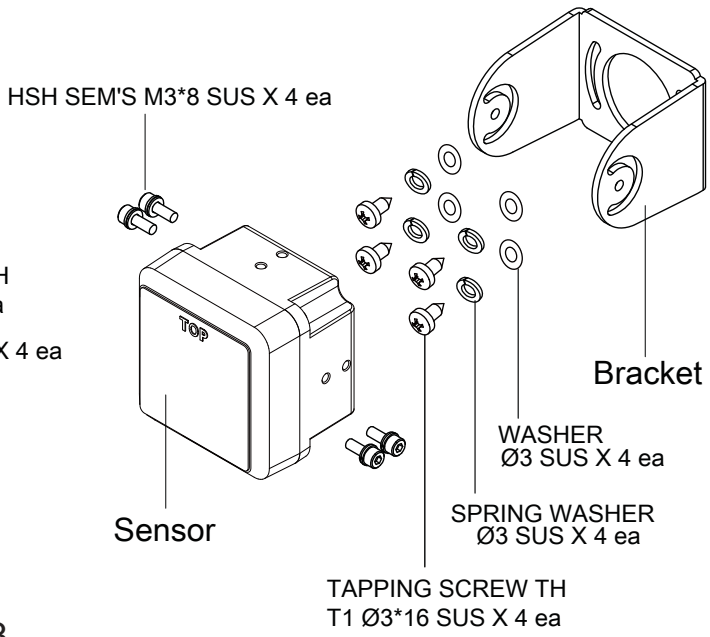




Display Unit install



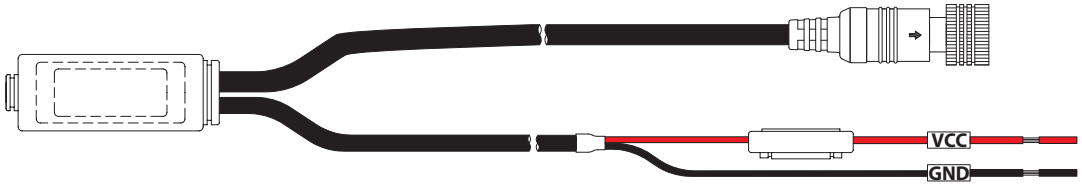
RADAR Sensor install



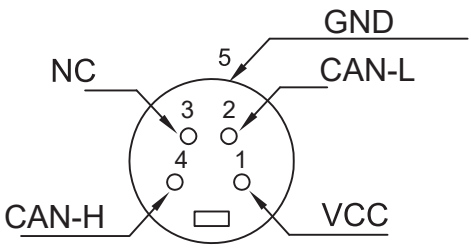
VI Radar Sensor

Radar Object Detection Sensor

● Rear Cable



● Connector Pin out



● Cable connection

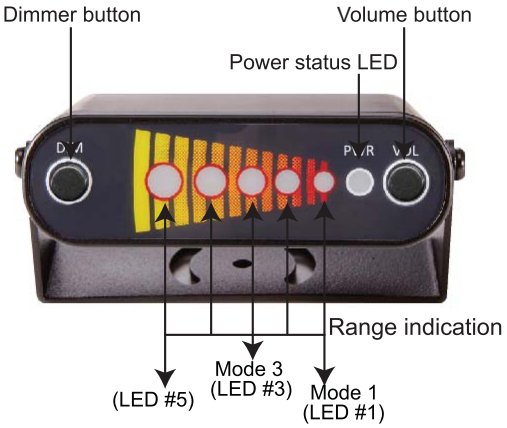
Red : + Vehicle power supply or Reverse Power (3A fuse)
Black : Ground (Supply negative)

● Radar Sensor Technical Specification

PARAMETER	Value	Units	Condition
Transmit frequency	24.00 ~ 24.25	GHz	FCC, CE, KC
Modulation	FMCW (Frequency Modulated Continuous Wave)		
Supply voltage	12 ~ 32	V dc	
Current	93	mA@12V	
Power on time	300	ms	
Detection time	200	ms	
Communication	CAN-Bus		
Operating temperature	-40 ~ 85	℃	
IP protection rate	69K		
Vibration	15	G	
Housing material	Polycarbonate		
Dimension	43.6(W) x 43.6(L) x 33.1(H)	mm	
Weight	175	g	W/O Bracket
	240	g	with bracket

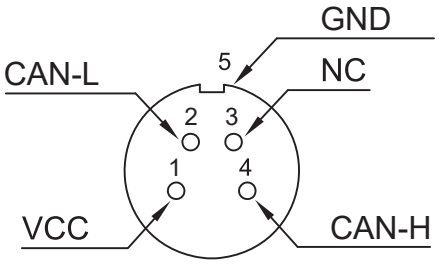
VII Display units

Display units



- Rear Cable

- Connector Pin out



Volume button : Press volume button for 3 seconds to switch silence (3 steps)

Power Status LED : Illuminates green continuously after power is applied to the system

Range Indications : Illuminates to give operator a distance zone to the closest detected object. LED's operate from the left to right, with a closer object resulting in more LED's illuminated.

Dim Button : Press Dim button to adjust LED (2 steps)

(1) Press Dim button to verify the current mode for 3 seconds.

(LED 1 is less bright and LED 3 is the most bright)

⚠ **When led #1,#3 and #5 turn on, the system has malfunction. Please contact factory.**
When led #2 and #5 turn on, communication has error.

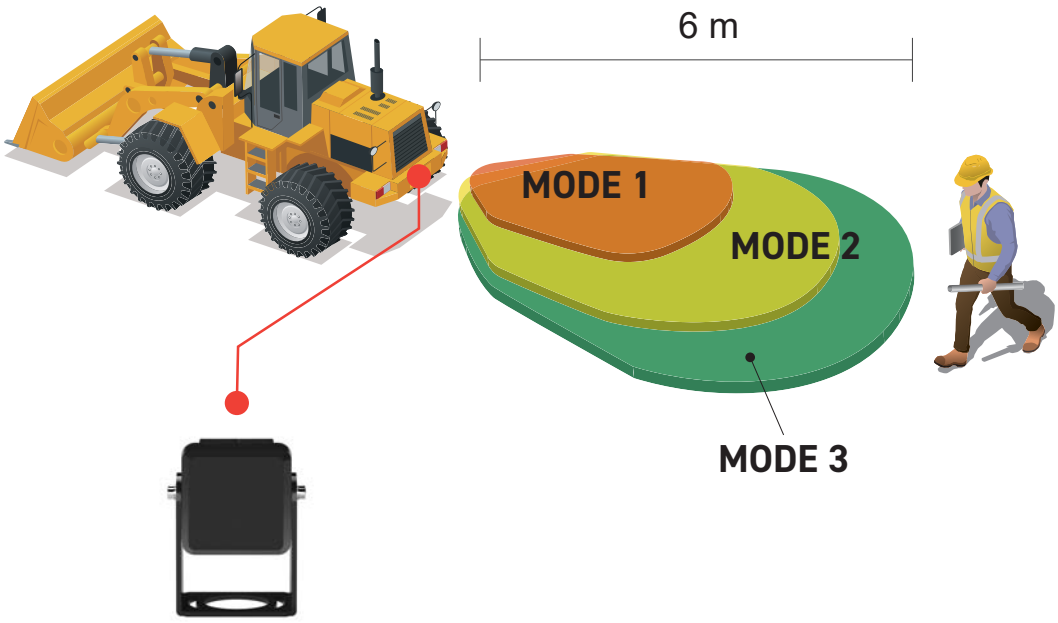
Before testing the system, make sure the sensors have a clear field of view.
This is the most important when testing indoors because the system may detect walls, posts, etc.
Verify the green LED on the display is illuminated and the system indicates.
No objects are detected. (Indicator LEDs are off).

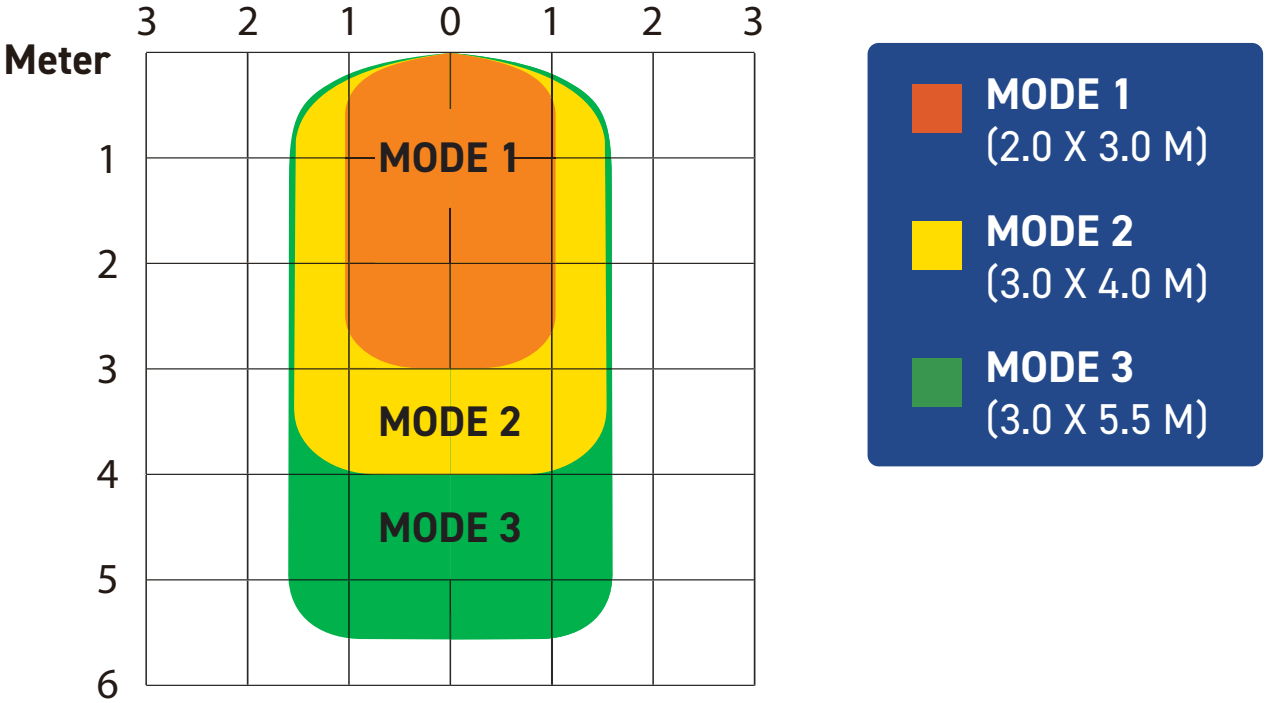
● Display units Technical Specification

Detection Zone	3 Zones
Speaker	3 x different volume level to be selected
Operating Temp.	-30°C ~ +70°C
Cable Length	0.7 Meter
Connector	4P Screw Lock type
Housing Material	Polycarbonate
Dimension	20(W) x 65(L) x 54(H) mm
Weight	220g with Bracket

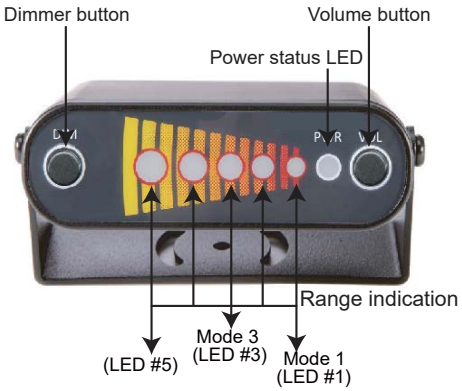
VIII Radar Detection Patterns

▶ Three Pre-Set Detection Patterns





IX Changing Detection Mode



- ◆ LED # 5,4,& 3 are flashing (Furthest Detection zone 3)
- ◆ LED # 5 ~ 2 are flashing (Detection zone 2)
- ◆ All LEDs are flashing (Closest Detection zone 1)

Mode Adjustment.

1) Press both “Dim” and “Vol” to enter hidden menu simultaneously for 3 seconds.
(You can find all LEDs are flashing at 3 times then power LED is blinking.)

2) Press Dim button to select Mode 1 ~ Mode 3. (Mode 1, Mode 2 and Mode 3 are available)
Mode 1 : 2.0 x 3.0 (L) meter (3 zones)
Mode 2 : 3.0 x 4.0 (L) meter (3 zones)
Mode 3 : 3.0 x 5.5 (L) meter (3 zones)

3) Press Vol button to save the required Mode. After 2 seconds, you can find all LEDs are flashing at over 5 times then Power LED on
(When fail to select the required mode, please press Vol button again)

Button Explanation

1) Dim Button : Press Dim button to adjust LED (2 steps) / Press Dim button to verify the current mode for 3 seconds.
(LED 1 is less bright and LED 2 is the most bright)

Dim button for long key (press it for over 3 seconds), you can verify the saved current mode 1 ~ 3.

2) Volume button : Press Volume button for 3 seconds to switch silence (3 Steps)

⚠ **When #1,#3 and #5 turn on, the system has malfunction. Please contact factory.**
When LED #2 and #5 turn on, communication has error.

Factory Default Mode

- Detection mode : Mode 1 (2.0 x 3.0 meter, 3 Detection zones)
- Audio : Max
- LED Bright : Max

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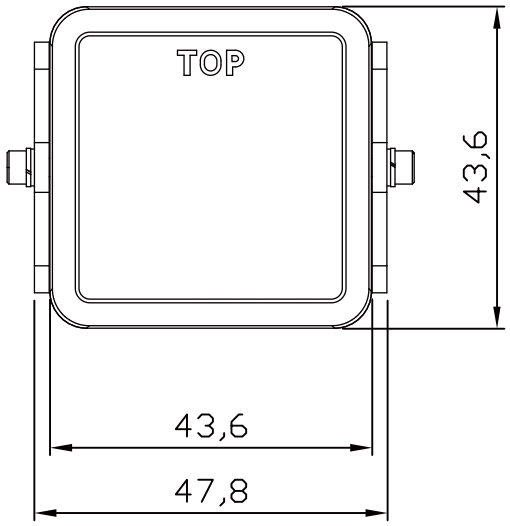
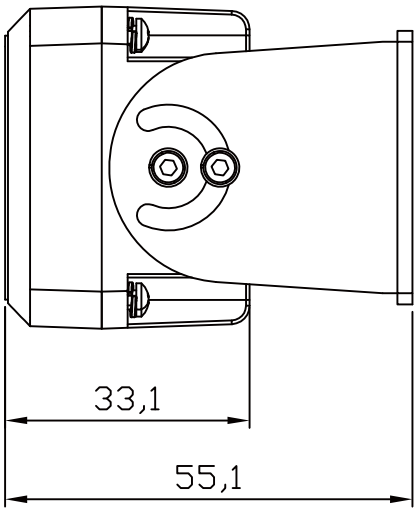
This is the most important when testing indoors because the system may detect walls, posts, etc.
Verify the green LED on the display is illuminated and the system indicates .
NO objects are detected. (Indicator LEDs are off).

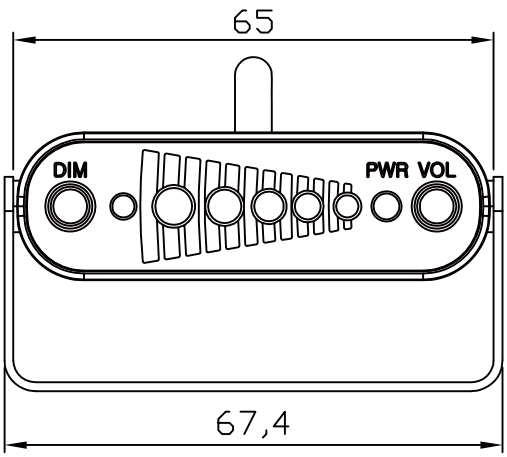
X Dimension

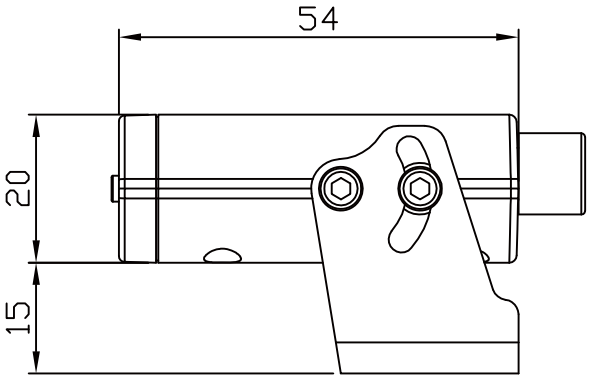
- Radar Sensor (mm)



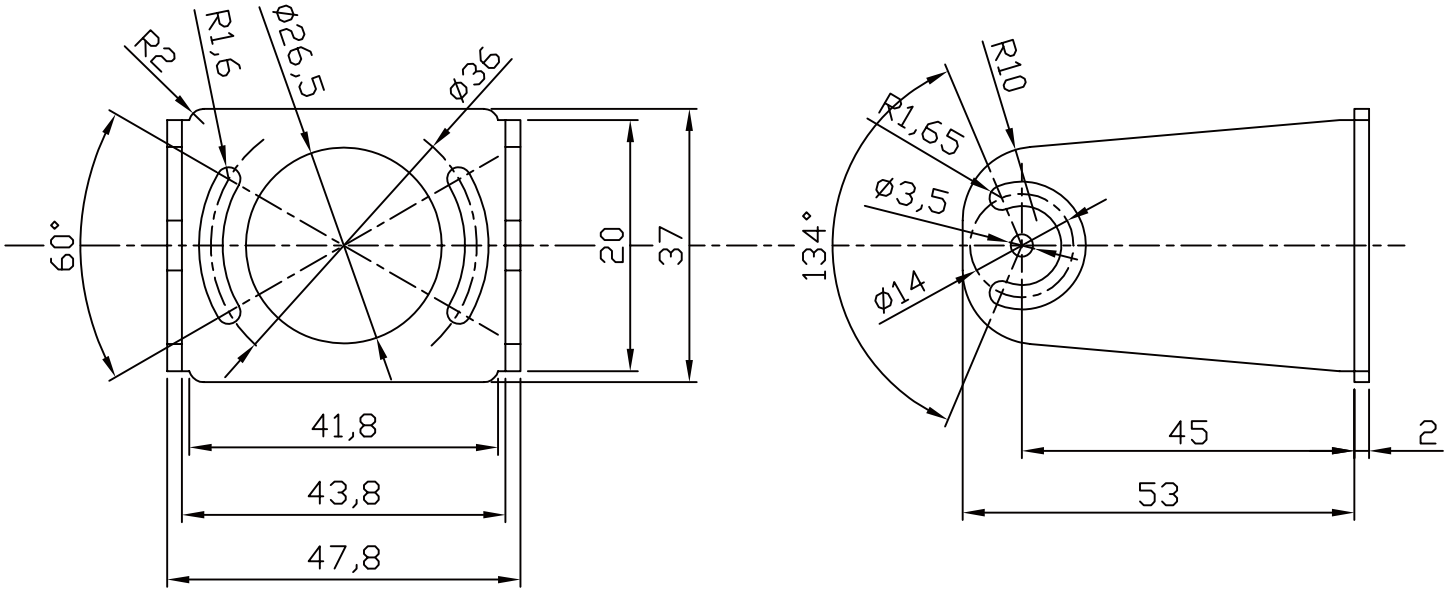


- Display units (mm)

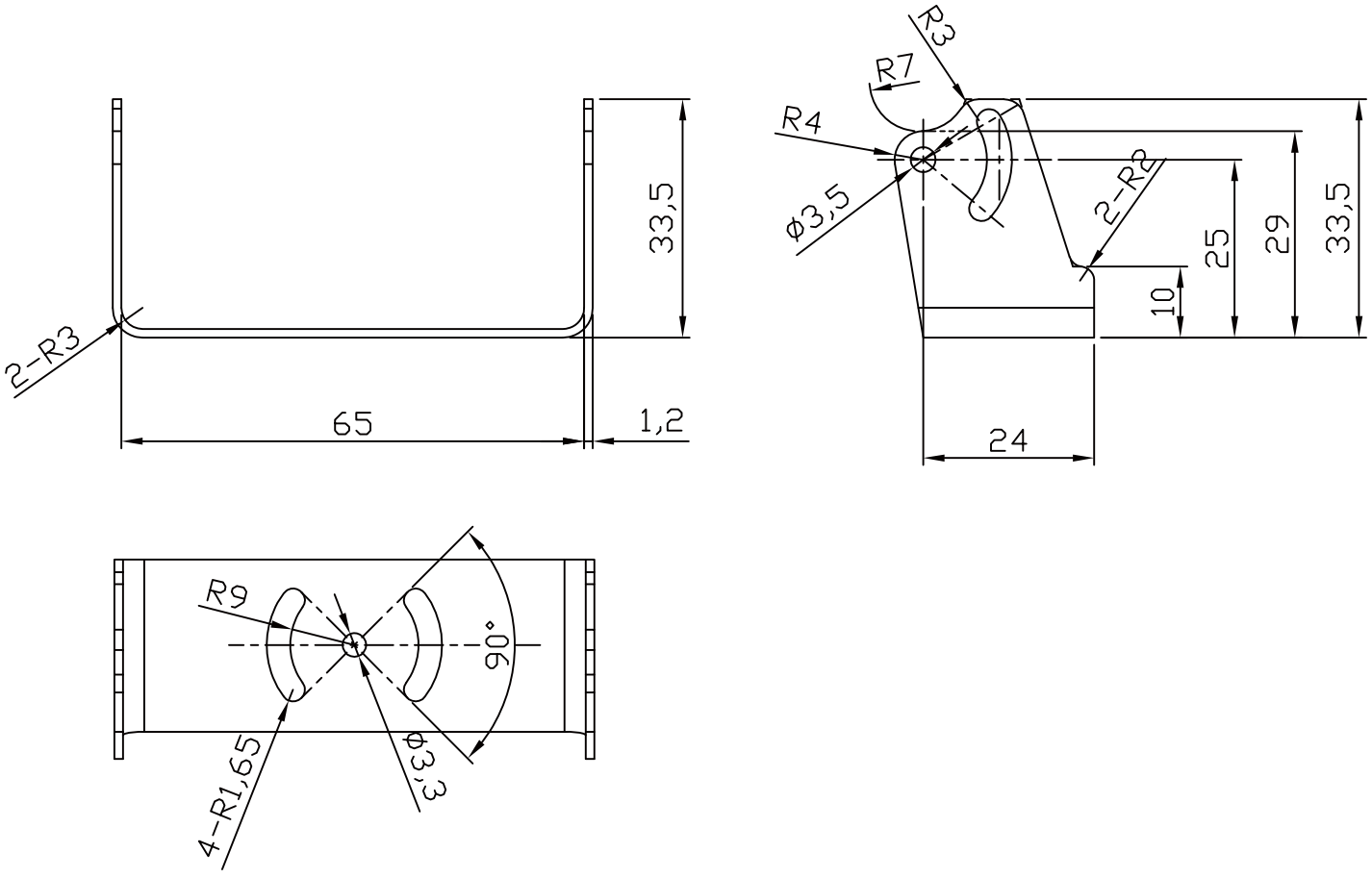




● Radar Bracket (mm)



● Display Bracket (mm)



Memo

Any Changes expressly or modifications not approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference,
and (2) this device must accept any interference received, including interference that may cause undesired operation.

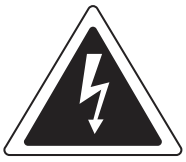
Note: This equipment has been tested and found to comply with the limits for a Class B digital device,
pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .
This transmitter must not be co‑located or operating in conjunction with any other antenna or transmitter.
This equipment should be installed and operated with minimum distance 20cm between the radiator &you body.

Memo

WARNING
RISK OF ELECTRIC SHOCK DO NOT OPEN

To reduce the risk of electric shock, do not remove the cover(or back)
No user serviceable parts inside. Refer servicing to qualified service personnel.



The lightning flash with arrowhead symbol,within an equilateral triangle,is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Design and specification are subject to change without notice.