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# THEORY OF OPERATION

The TMA is a microwave sensor for traffic management (traffic data collection, intersection management, warnings, public lighting management), available in different configurations according to the applications.



**intersection** The TMA-11 is a microwave sensor for managing intersections, specifically designed for pedestrians detection. The output consists of 1 relay which can be triggered on different speed and range thresholds.

1. Unpack the unit and check the following items are in the box:
  - A. Radar with rear side socket
  - B. Sticker for front face
  - C. Cable with connector
  - D. Mounting bracket
  - E. User's guide and tune up procedure
2. Set the encoders according to your choice for the different parameters (see "Tune up procedure").
3. Place the sticker on the front face.
4. Assemble the unit with the bracket (see "Tune up procedure").
5. Place the radar on the field according to configuration and to the specific tune-up procedure.
6. Connect the cable according to the wiring described at p. 6.
7. Power the radar.
8. The LEDs will come on when a vehicle is detected and matches the conditions of the chosen parameters.

# PRODUCT DESCRIPTION

## 1 DELIVERY

Some configurations may have a different cable and/or bracket. See tune up procedure for more details.



Figure 1: delivery

## 2 LABELS LOCATION

### 2.1 IDENTIFICATION LABEL



### 2.2 SERIAL NUMBER



## 3 SETTINGS

You can set different parameters through 2 encoders allowing 16 positions each (see Tune Up procedure for further information).

# SAFETY PRECAUTIONS

Only skilled and instructed persons should carry out work with the radar product. Experience and knowledge about safety procedures in the following areas may be relevant:

- Working with mains power
- Working with modern electronic and electric equipment
- Working at height
- Working at the roadside or highways

Please follow these safety precautions:

- Make sure the electricity supply is within the range shown on the label and the manual of the product.
- All connections must be made whilst the power supply is switched off.
- Ensure the wiring is correct as shown in the manual before switching on the power supply.
- Never use a damaged radar or cable.
- Opening the outer casing is deemed dangerous and will void all warranties.
- Ensure the radar is mounted correctly. The screws and bolts of both radar and bracket must be firmly tightened. The radar needs to point to the region of interest for proper detection.
- Ensure the radar is configured properly.

**WARNING:** For the HV version of the radar, a Residual Current Device (RCD), also known as the Residual Current Circuit Breaker (RCCB), with a tripping current not exceeding 30 mA must be installed in the supply circuit.

# CABLING



**CAUTION:** positive security/fail safe relays - contacts given for powered radar.

LV (12-60 VDC – 10-30 VAC) & MV (21-75 VDC – 15-54 VAC)		
PIN nr	Color	Function
1	<b>RED</b>	<b>Power ~ (AC), + (DC)</b>
2	<b>BLUE</b>	<b>Do not connect</b>
3	<b>BLACK</b>	<b>Power ~(AC), - (DC GND)</b>
4	<b>BROWN</b>	<b>Do not connect</b>
5	<b>WHITE or PURPLE</b>	<b>Relay - COM</b>
6	<b>GREY</b>	<b>Relay - NO</b>
7	<b>YELLOW</b>	<b>Relay - NC</b>
8	<b>GREEN</b>	<b>Do not connect t</b>
9	<b>PINK or ORANGE</b>	<b>Do not connect</b>

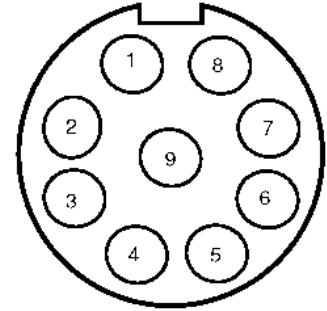


Figure 2: TMA-011 LV and MV radar connector - Weipu SP1712/P9

HV (100-240 VAC)		
PIN nr	Color	Function
1	<b>BLUE</b>	<b>~ Power Supply</b>
2	<b>BROWN</b>	<b>~ Power Supply</b>
3	<b>YELLOW/GREEN</b>	<b>EARTH</b>
4	<b>WHITE</b>	<b>Relay - COM</b>
5	<b>GREY</b>	<b>Relay - NO</b>
6	<b>YELLOW</b>	<b>Relay - NC</b>
7	<b>PURPLE</b>	<b>Do not connect</b>

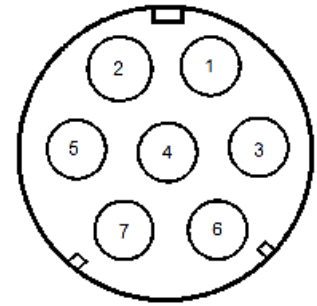


Figure 3: TMA-011 HV radar connector - Weipu SP2112/P7

USER'S OUTPUTS

Resistive load: 30 V AC 0.3 A - 60 V DC 0.3 A  
 Option 250 V relay: 250 V AC - 30 V DC – 0.3 A

REMARKS

- Make sure the plug is fully inserted in the socket and the cap is firmly tightened on the socket.
- Please disconnect the radar from power before maintenance intervention.

# DESCRIPTION OF PARAMETERS

Depending on the chosen TMA configuration, the settings are made using two encoding wheels with 16 positions each and/or using an RS-232 link.

The parameters described here are for the TMA-011 configuration. Other parameters may apply to other TMA configurations.

## 1 SELF-MONITORING

The self-monitoring applies to the microwave sender/receiver.

When a failure is detected, the relays are permanently actuated and the flashing LEDs show an error code (see Tune up procedure for further information).

## 2 RF CHANNEL

This parameter allows to shift the radar's frequency. If two units face each other, they must be put on different channels as to not interfere with each other.

## 3 DETECTION DISTANCE

The TMA-011 detects movements up to a distance of about 30 m from the installation point. This distance can be limited to 8 m, 12 m or 16 m by using the encoder nr 1 (see p. 8). When motion is detected in this area, the radar activates the relay. When there is no vehicle or vehicles are stationary, the relay is not activated.

## 4 DETECTION DIRECTION

This parameter defines the direction of the movements which will trigger the relay: approaching, receding or bidirectional.

# TMA-011 – SET-UP & INSTALLATION

The TMA-011 is equipped with two encoding wheels with 16 positions each for manual adjustment.

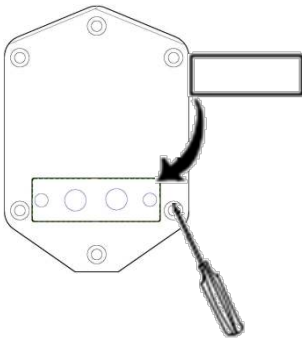


Figure 6: front face

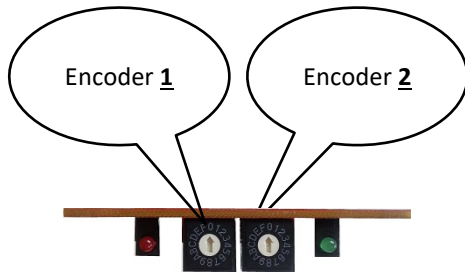


Figure 7: encoders & LEDs

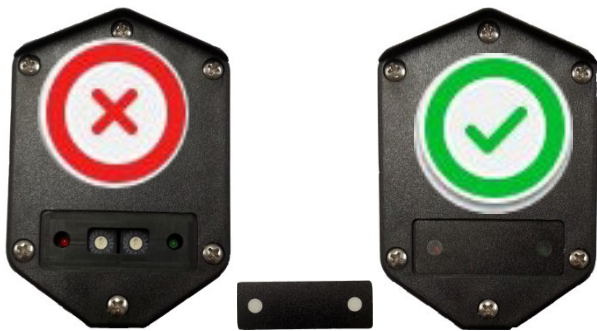


Figure 8: front face without/with sticker

Once you have set the requested radar parameters, place the sticker on the front face to guarantee its water tightness.

**ATTENTION:** manufacturer's warranty does not cover radars without sticker.

## 1 ENCODER 1

Besides red LED, at the left facing the housing

Parameter	Value															Unit	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E		F
Encoder position																	
Detection distance		8				12				16				30			m

Factory setting = 0

## 2 ENCODER 2

Besides green LED, at the right facing the housing

Encoder position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Uni/bi-directional	Bi-directional								Uni-directional							
Direction	BI				BI				IN				OUT			
RF channel	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Factory setting = 0



# RADAR BOOT UP

## 1 TEST MODE

During the boot up, the radar operates in test mode during the first 50 seconds. The radar behaviour can be erratic due to an evolving calibration procedure.

## 2 NORMAL OPERATION

Once the calibration is done, the radar will automatically switch over to normal operation mode. Only detections beyond 2.5 meters distance from the radar are validated.

# LED INDICATOR

## 1 IN NORMAL OPERATION

The LEDs are activated when the relay is activated and are turned on for a minimum of 750 milliseconds.

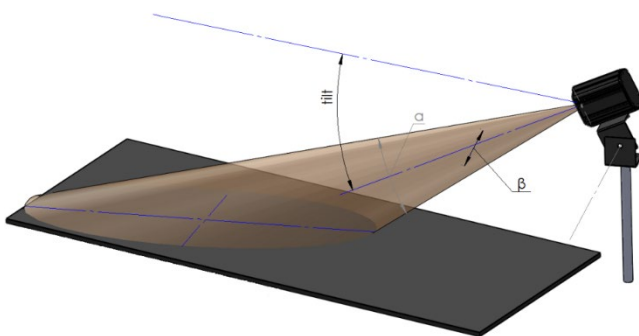
## 2 WHEN THE SELF-MONITORING DETECTS AN ERROR

The two LEDs blink quickly (2 or 4 quick flashes followed by a 1 sec break, depending on the detected error).

# INSTALLATION GUIDE

## 1 GENERAL

- Installation height: min. 3.5 m - max. 4.5 m
- Tilt or inclination angle: The smaller the angle, the further the radar detects but the larger the “no-detection” zone starting at the foot of the radar pole.



$\alpha$  = vertical radar opening angle ( $\alpha = 45^\circ$ )  
 $\beta$  = horizontal radar opening angle ( $\beta = 38^\circ$ )  
 tilt = Inclination angle compared to the horizon

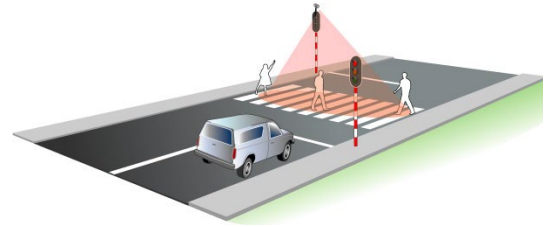
Figure 9: Tilt or installation angle

## 2 ASSEMBLY AND MOUNTING

1. Set the appropriate parameter values with the encoders **and place the sticker.**
2. Fix the radar on the bracket:



3. Place the radar on the top of the traffic light, aiming the on-crossing:



4. Firmly tighten the screws.

### 3 DETECTION ZONE

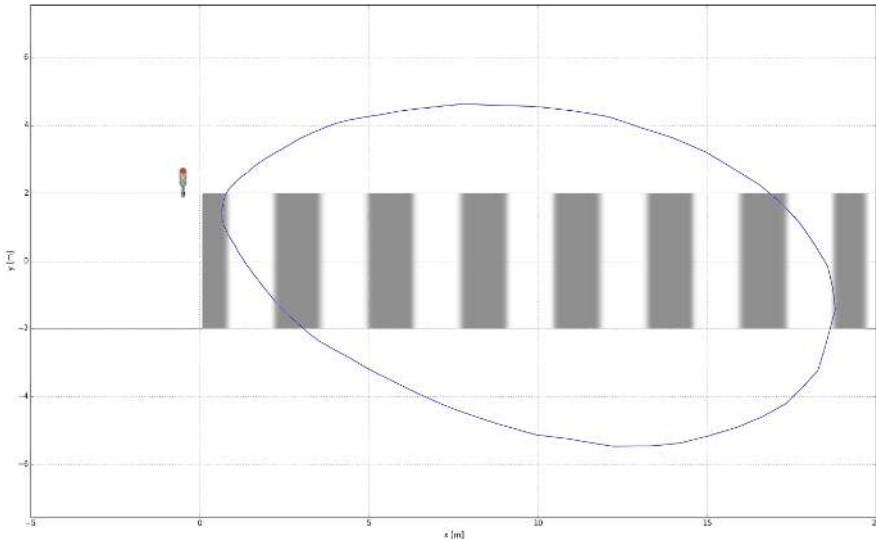


Figure 10: Detection zone at 0.5m distance from the pavement,  $H = 3,5m$ ,  $10^\circ$  tilt angle, detection distance 16 m.

This drawing shows the theoretical radar lobe and does not consider environmental variables. This drawing is for indication purpose only.

## TECHNICAL FEATURES

	TMA-011-LV	TMA-011-MV	TMA-011-HV
Protection level	IP 65		
Power supply	10-30V AC, 50-60 Hz 12V-60V DC	15-54V AC, 50-60 Hz 21-75V DC	100V –240V AC, 50-60 Hz
Power consumption	@12V DC: < 1.2 W		@220V AC: < 2 W
User output	<ul style="list-style-type: none"> <li>Inverted relay contact - Resistive load: 30V AC 0.3 A – 60V DC 0.3 A</li> <li>Option 250 V relay: 250 V AC - 30 V DC – 0.3 A</li> <li>2 LED outputs on front face</li> </ul>		
Temperature range	-40° C to +60° C		
Dimensions	68 mm x 99 mm x 119 mm	68 mm x 99 mm x 180 mm	
Weight	350 g	460 g	485 g
Wiring & connectors	Weipu connector		

## WARRANTY

Icoms Detections warrants its hardware products to be free from defects in workmanship and materials, under normal use and service, for a period of two (2) years from the date of dispatch from Icoms Detections premises, except for the batteries for which a warranty period of six (6) months applies.

If a product does not operate as warranted during the applicable warranty period, Icoms Detections shall, at its option, either repair the defective unit, or deliver an equivalent product or part to replace the defective item. All products that are replaced become property of Icoms Detections.

The defective product must be returned to Icoms Detections within the applicable warranty period. The defective product must be shipped DDP (delivered duty paid) back to Icoms Detections, wrapped in the original or similar shipping package to ensure that it will not be damaged during transportation. It must be accompanied by appropriate paperwork (ask first for a **Return Material Authorisation** number) detailing the nature of the defect experienced.

Icoms Detections shall be under no liability in respect of any defect arising from normal wear and tear, wilful damage, negligence, damage due to inappropriate packaging, abnormal working conditions, failure to follow Icoms Detections instructions (whether oral or in writing), misuse, improper installation, alteration or repair without Icoms Detections approval.

## DECOMMISSIONING

We encourage customers to send back decommissioned equipment to the manufacturer for recycling. To differentiate between equipment to be recycled and equipment to be repaired, please inform your reseller or the manufacturer about the decommissioned equipment.

Icoms Detections will take care of the recycling for a sustainable end-of-life of the product.

## FURTHER INFORMATION

### 1 LEGAL NOTIFICATION

Hereby, Icoms Detections declares that this TMA range of products is in compliance with the requirements and other relevant provisions of

- Directive 2014/53/EC.
- FCC Part 15B Class A
- IC ICES-003 issue 6

### 2 VERSION

Issue n°	Date	Comment
V 1.1	02 May 2019	First release
V 1.3	03 June 2019	Update on encoder settings
V 1.4	15 July 2019	Update on detection distance
V 1.5	07 Nov 2019	Update on power supply and heating option
V 1.6	31 Aug. 2020	Update relay cabling
V 1.7	08 Mar. 2021	Layout update – Temperature
V 1.7.2	27 May 2021	Update on test and normal mode and “do not connect” connector pins
V 1.7.3	April 5, 2022	Update on wire colours for molded cable
V 1.7.4	May 19, 2022	Update 250 V relay
V 1.7.5	October 19, 2022	Added “Decommissioning” section
V 1.7.6	January 27, 2023	Layout

### 3 THE MANUFACTURER



Icoms Detections S.A.  
 Avenue Albert Einstein 11/B ▪ B-1348 Louvain-la-Neuve ▪ BELGIUM  
 Tel.: +32 (0) 10 45 41 02 ▪ Fax: +32 (0) 10 45 04 61  
 info@icomsdetections.com ▪ www.icomsdetections.com