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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.

The TMA-60 is a microwave sensor for managing warnings and intersections. 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

Do not remove the labels

3 SETTINGS

The settings are done using 2 encoders with 16 positions each. See “Tune Up Procedure” for the parameter settings.

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.

WIRING

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

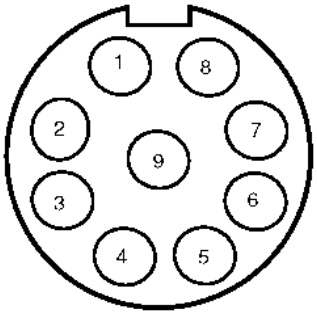


Figure 2 : TMA-60 LV & MV radar connector
Weipu SP1712/P9

HV (100-240 V AC)		
PIN nr	**Color**	**Function**
1	**BLUE**	**~ Power**
2	**BROWN**	**~ Power**
3	**YELLOW/ GREEN**	**EARTH**
4	**WHITE**	**Relay - COM**
5	**GREY**	**Relay – NO**
6	**YELLOW**	**Relay – NC**
7	**PURPLE**	**Do not connect**

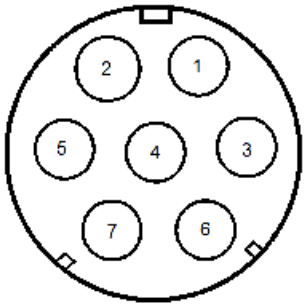


Figure 3 : TMA-60 HV radar connector
Weipu SP2112/P7

USER'S OUTPUTS

Resistive load:

- Default: 30 V AC 0.3 A – 60 V DC 0.3 A
- 250 V relay option: 250 V AC – 30 V DC – 0.3 A

- The green LED is switched on together with relay 1.

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.

PARAMETERS DESCRIPTION

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-60 configuration. Other parameters may apply to other TMA configurations.

1 SENSITIVITY

The factory setting fulfills the requirements of the majority of the installations. If the position or the size of the detection area is not satisfactory, change first the position of the radar (tilt angle and/or height of installation). On some products, the sensitivity threshold can be lowered to reduce detections beyond the FSK ambiguity distance (~250 m) and interfering movements at the edge of the detection area.

2 SELF-MONITORING

The self-monitoring applies to the following parts of the hardware:

- Micro-processor oscillator
- Code running

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).

3 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.

4 SPEED THRESHOLD

This parameter defines (a) minimum speed threshold(s) above which the relay is triggered.

5 DETECTION DISTANCE

This parameter defines the maximum detection range.

6 DETECTION DIRECTION

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

CONFIGURATION & TUNE-UP TMA-60

The TMA-60 is equipped with two encoding wheels allowing 16 positions for manual setting.

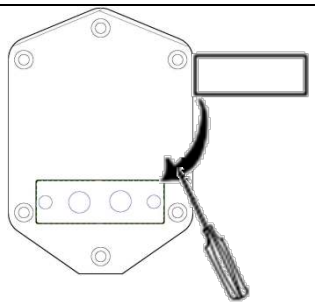


Figure 4: front face

Figure 5: encoders & LEDs

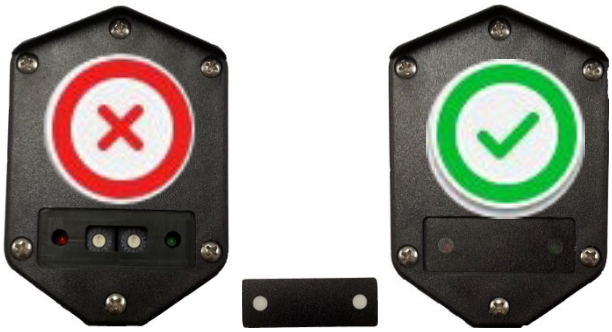


Figure 6: front face with/without sticker

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 ROTARY ENCODE 1

Besides red LED, at the left facing the housing:

Parameter	**Value**																**Unit**
Detection range	20				40				80				Max. (150 m)				m
Vmin	4	10	4	10	4	10	4	10	4	10	4	10	4	10	4	10	km/h
Sensitivity	Normal		Low		Normal		Low		Normal		Low		Normal		Low		
Encoder position	0	1	2	3	4	5	6	7	***8***	9	A	B	C	D	E	F	

Factory setting = 8

2 ROTARY ENCODER 2

Besides green LED, at the right facing the housing:

Parameter	**Value**															
Uni/bidirectional	Bidirectional								Unidirectional							
Direction	BI								IN				OUT			
RF channel	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Encoder position	0	1	2	3	4	5	6	7	***8***	9	A	B	C	D	E	F

Factory setting = 8

LED INDICATOR

1 AT START-UP

At start-up, the LEDs indicate the version number and the type of configuration:

- Green and red LEDs flash alternately: relay check
- Flashing green or red LED: version number

2 IN NORMAL OPERATION

The green LED lights up when a movement meeting the specified criteria is detected.

3 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):

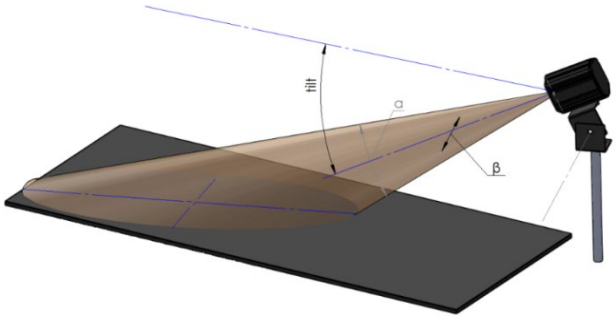
1. Type 1 failure: code execution and internal micro-controller state consistency. If a problem is detected, the system is reset.
2. Type 2 failure: micro-controller oscillator monitoring. If a problem is detected, the system enters in “fault mode”. The LEDs show a code by blinking twice followed by a 1 second pause.

The reset takes 1 500 milliseconds.

INSTALLATION GUIDE

1 GENERAL

- Installation height: typically 3 m. The greater the height, the longer the d dead zone (“no-detection” zone starting at the foot of the radar pole).
- Tilt or inclination angle: the smaller the angle (radar nearly horizontal), the longer the dead zone (“no-detection” zone starting at the foot of the radar pole). See title 0, p. 11, for specific use cases.



α = vertical radar opening angle (α = 45°)
β = horizontal radar opening angle (β = 38°)
tilt = Inclination angle compared to the horizon

Figure 7: tilt or installation angle

1.1 ASSEMBLY AND MOUNTING

1. Fix the radar on the bracket:

2. Set the appropriate parameter values

3. Place the radar on the pole pointing towards the approaching or receding vehicles

4. Firmly tighten the screws

2 DETECTION ZONE

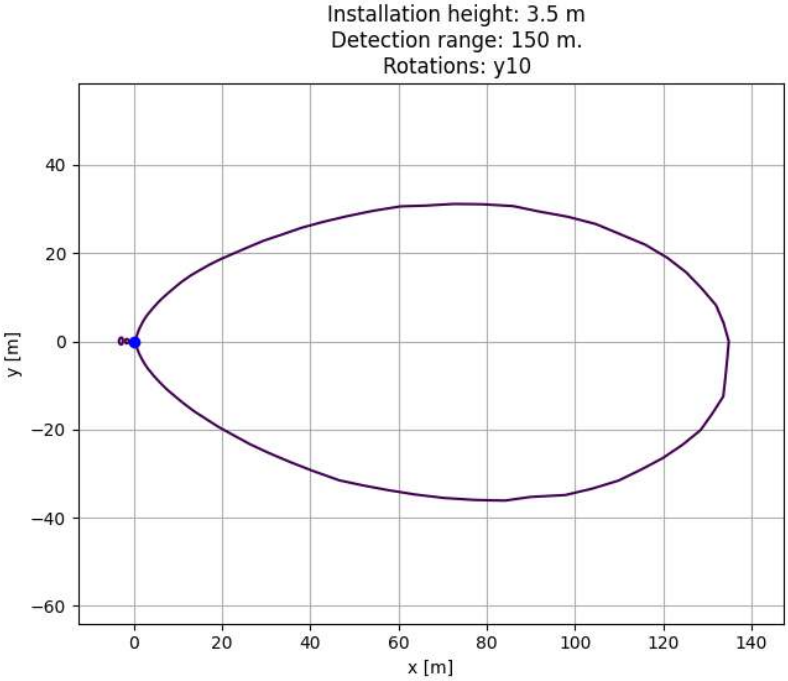


Figure 8: detection zone simulation for a downward tilt angle of 10°

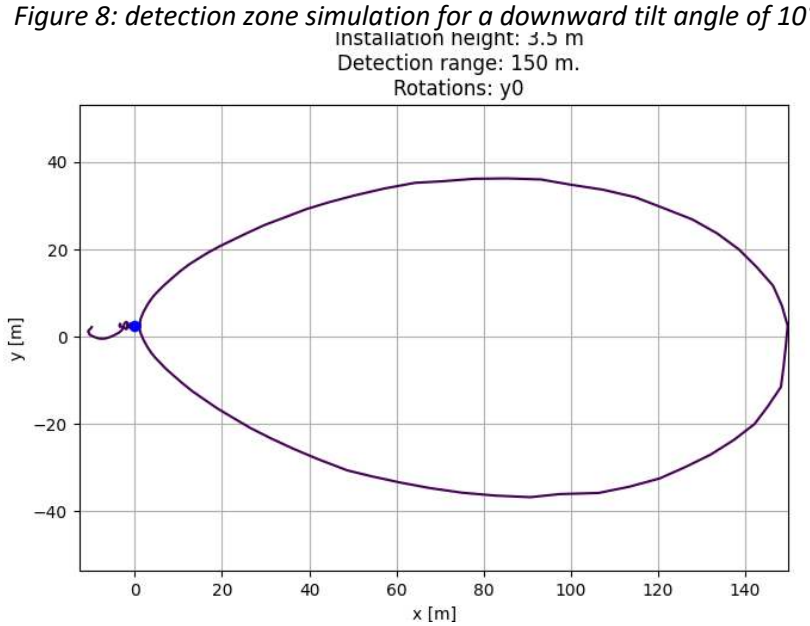


Figure 9: detection zone simulation for a downward tilt angle of 0°

USE CASES - REMARKS

1 DETECTING BICYCLES

- Normal sensitivity: bicycles are detected at +/- 20 m, regardless of the programmed maximum range.
- Low sensitivity: bikes are detected at +/- 12 m. We recommend setting the detection distance to 20 or 40 m.
- Tilt the radar to reduce the dead zone (point the radar towards the centre of the desired detection area, regardless of the maximum detection distance which can remain at 150 m with normal sensitivity)

2 DETECT VEHICLES AT 150 M

- Point at 150 m (inclination close to horizontal)
- Set the detection distance on 150 m
- Normal sensitivity
- It is possible that the radar detects highly reflective objects (excavator, snow plough...) at more than 250 m during a very short period of time. Setting the sensitivity to the "low" position will avoid this, but the overall detection distance will be slightly reduced for all objects.

TECHNICAL FEATURES

	TMA-60 LV	TMA-60 MV	TMA-60 HV
Environmental protection	IP 65		
Power	10-30 V AC, 50-60 Hz 12V-60 V DC	15-54 V AC, 50-60 Hz 21-75 V DC	100V –240 V AC, 50-60 Hz
Consumption	@12 V DC : < 1,2 W	@24 V DC : < 1,2 W	@230 V AC : < 2 W
User outputs	• Inverted relay contacts – Resistive load: ○ Default: 30 V AC 0,3 A – 60 V DC 0,3 A ○ 250 V relay option: 250 V AC – 30 V DC – 0.3 A • 2 LEDs on front face		
Temperature range	From -40° C to +60° C		
Dimensions	L 68 x H 99 x D 119 mm	L 68 x H 99 x D 205 mm	
Weight (excl. cable and mounting support)	320 gr	510 gr	543 gr
Connector	Weipu		

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 **R**eturn **M**aterial **A**uthorization 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, willful 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 – all configurations
- FCC Part 15B Class A – LV configuration 12 V DC
- IC ICES-003 issue 6 – LV configuration 12 V DC

2 VERSION

Issue n°	Date	Comment
V 2	June 24, 2022	First TMA-60 version
V 2.2	May, 24, 2023	Wiring clarification - layout

3 THE MANUFACTURER:

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