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TMA User guide

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.

1 THEORY OF OPERATION

- Unpack the unit and check the following items are in the box:
 - Radar with rear side cable gland, cable and connector
 - Sticker for front face closure
 - Mounting bracket
 - User's guide and tune up procedure
- Set the encoders according to your choice for the different parameters (see "Tune up procedure"). For specific TMA configurations, the setup is made through RS-232. The encoders are then inoperable.
- Place the sticker on the front face.
- Assemble the unit with the bracket (see "Tune up procedure").
- Place the radar on the field according to configuration and to the specific tune-up procedure.
- Connect the cable according to title 4, CABLING, p. 5.
- Power the radar.
- The LEDs will come on when a vehicle is detected and matches the conditions of the chosen parameters.

2 PRODUCT DESCRIPTION

2.1 DELIVERY

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

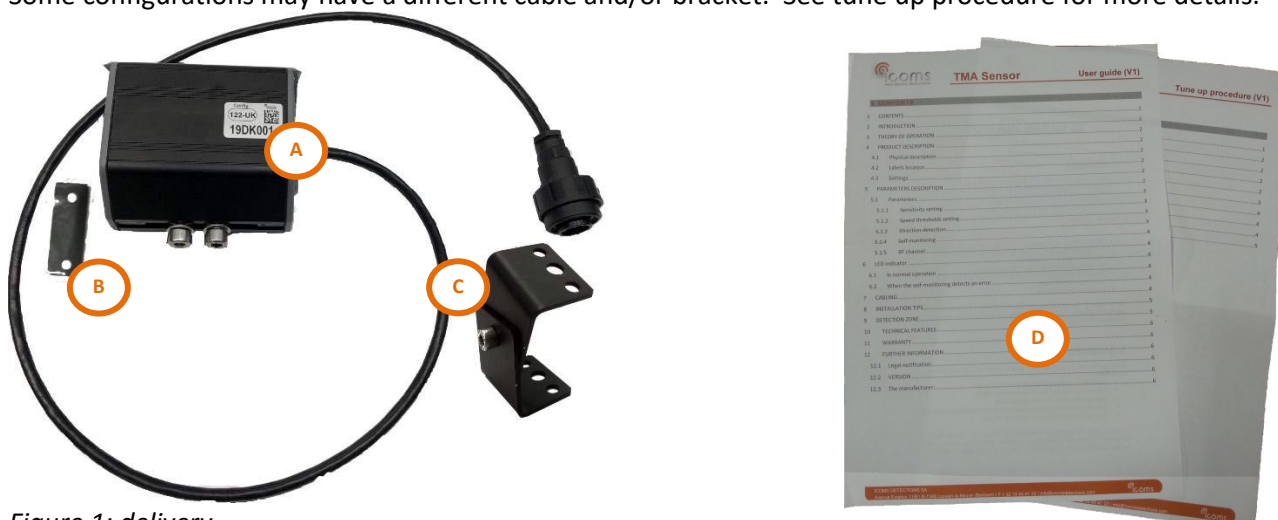


Figure 1: delivery

2.2 LABELS LOCATION

2.2.1 Identification label



2.2.2 Serial number



**Do not remove
the labels!**

2.3 SETTINGS

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

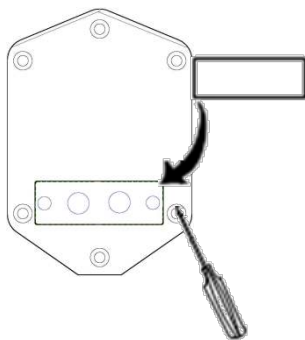


Figure 2: front face



Figure 3: encoders & LEDs

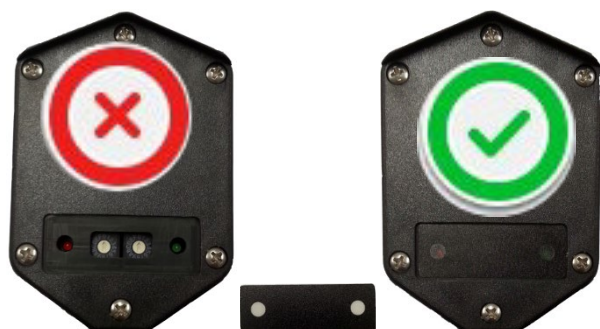


Figure 4: front face without/with sticker



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!

3 PARAMETERS DESCRIPTION

See tune up procedure for specific parameters configuration.

3.1 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).

3.2 SELF-MONITORING

The self-monitoring monitors the following parts of the hardware:

- Micro-wave device (VCO)
- Mixers
- Analogic format channel
- Analogic/digital converter
- Micro-processor oscillator
- Code running

When a failure is detected, the relays are permanently actuated and the LEDs flashing show an error code (see Tune up procedure for further information). The radar is reset after 1 hour.

3.3 RF CHANNEL

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

4 CABLING

12-60 VDC – 10-30 VAC		
PIN nr	Color	Power + 2 relays (NO/NC)
1	RED	Power ~ (AC), + (DC)
2	BLACK	Power ~(AC), - (DC GND)
3	GREEN/ SCREEN	Earth
4	WHITE	COM relay 1
5	YELLOW	NC relay 1
6	BLUE	NO relay 1
7	PURPLE	COM relay 2
8	ORANGE	NC relay 2
9	BROWN	NO relay 2

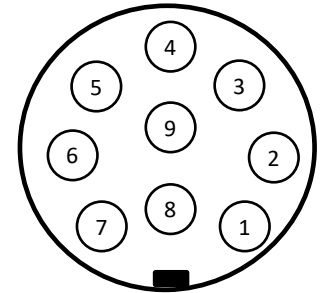


Figure 5: Bulgin connector PX0728/P

For version TMA-122-UK-W:

12-60 VDC – 10-30 VAC		
PIN nr	Color	Power + 2 relays (NO/NC)
1	RED	Power ~ (AC), + (DC)
2	BLUE	N/A
3	BLACK	Power ~(AC), - (DC GND)
4	BROWN	NO relay 2
5	WHITE or PURPLE	COM relay 1
6	GREY	NC relay 1
7	YELLOW	NO relay 1
8	GREEN	COM relay 2
9	PINK or ORANGE	NC relay 2



Figure 7: TMA-122-UK-W Backside

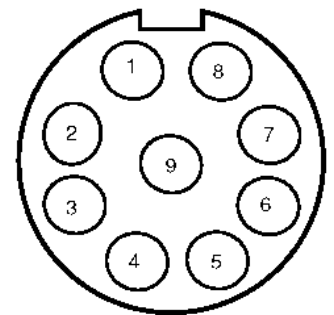


Figure 6: TMA-122-UK-W - Weipu connector SP1712/P9

USER'S OUTPUTS

Resistive load: 30 V AC 0.3A - 30 V DC 0.3A

Inductive load: 30 V AC 0.2A - 30 V DC 0.3A

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.

5 TECHNICAL FEATURES

	TMA
Protection level	IP 65
Power supply	12 – 60 V DC - 10 – 30 V AC
Power consumption	See tune up procedure
User output	Inverted relay contact(s): <ul style="list-style-type: none"> ▪ Resistive load: 30 V AC 0.3 A – 30 V DC 0.3 A ▪ Inductive load: 30 V AC 0.2 A – 30 V DC 0.3 A LEDs outputs Optional RS-232
Temperature range	-20° C to +60° C
Dimensions	L68 x H199 x D119 mm
Weight	350 gr
Wiring & connectors	Bulgin connector PX0728/P

6 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.

7 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.

8 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.

9 FURTHER INFORMATION

9.1 LEGAL NOTIFICATION

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

- UKCA
- Directive 2014/53/EC
- FCC Part 15B Class A
- IC ICES-003 issue 6
- TOPAS 2505A

9.2 VERSION

Issue n°	Date
V 1	04 March 2018
V 2	26 May 2020
V 2.1	04 June 2020
V 2.2	16 October 2020
V 2.3	27 October 2020
V 2.4	01 December 2020
V 2.5	08 December 2021
V 2.6	13 September 2022
V 2.7	October 19, 2022
V 2,8	February 15, 2024

Comment
First release – TMA-122 UK
Update on the detection range
Connector sketch
Version TMA-122-UK-W
Update on TMA-122-UK-W cabling
Info on fault types
Update on wiring
Update on wiring color TMA-122 UK W
Added “Decommissioning” section
Led color/RS-232

9.3 THE MANUFACTURER:



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TMA-122 configuration – Tune up



The TMA-122 is a microwave sensor for intersection management. The output consists of 2 relays which can be triggered on movement and/or when vehicles stop at the stop line. The product can count the vehicles which are passing the stop line.

1 PARAMETERS DESCRIPTION

See further in this document, Title 3, p. 9 for the parameters setting.

1.1 DISTANCE “MOVEMENT”

The TMA-122 detects the approaching movement at a distance of about 40 meters from the installation point. It is possible to limit this distance to 20 m with encoder 1 (see Title 3.1.1, p. 9). When an approaching movement is detected in this area, the radar toggles the relay 1. When there is no vehicle or only stopped vehicle(s) (no movement), the relay is not activated.

Vehicles moving away from the sensor are not detected.

1.2 DISTANCE “PRESENCE”

The TMA-122 detects the approaching moving and stopped vehicles at a distance of 10 or 15 m from the installation point. When an approaching movement is detected in this area, the radar toggles the relay 2 and tracks the vehicle. It holds the relay activated as long as the vehicle is in the detection area, be the vehicle moving or not.

Vehicles moving away from the sensor are not detected.

1.3 MAXIMUM RELAY HOLD TIME

This setting defines the maximum hold time for the relay. After this time, the radar will reset the relay, regardless of the presence of a vehicle.

1.4 SENSITIVITY SETTING

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).

1.5 SELF-MONITORING

The self-monitoring monitors the following parts of the hardware:

- Micro-wave device (VCO)
- Mixers
- Analogic format channel
- Analogic/digital converter
- Micro-processor oscillator
- Code running

When a failure is detected, the relays are permanently actuated and the LEDs flashing show an error code (see further, title 2.2, p. 9). The radar is reset after 1 hour.

1.6 RF CHANNEL

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

2 LED indicator

2.1 IN NORMAL OPERATION

- The green LED shows the state of the relay 2.
- The red LED shows the state of the relay 1.

2.2 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).

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.
3. Type 3 failure: Microwave oscillator and receiver chain. If a problem is detected, the LEDs show a code by blinking four times followed by a 1 second pause.

The reset takes less than 100 milliseconds.

3 SETTINGS

3.1 ENCODERS

See figures Figure 2 and 3, p. 4.

3.1.1 Encoder 1

Besides red LED, at the left facing the housing

Parameter	Value																Unit
Distance “movement” (relay 1)	40								20								m
Distance “presence” (relay 2)	10				15				10				15				m
Max. relay hold time	2	4	8	16	2	4	8	16	2	4	8	16	2	4	8	16	min
Encoder position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	

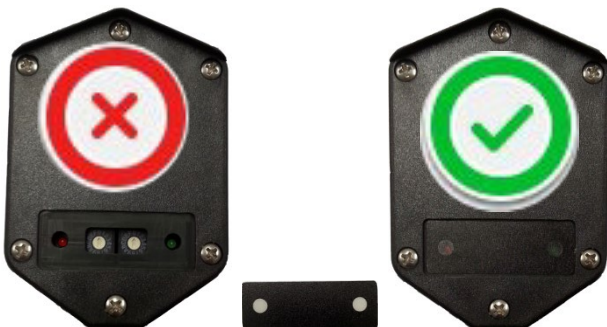
Factory setting = 0

3.1.2 Encoder 2

Besides green LED, at the right facing the housing

Parameter	Value															
Sensitivity	Normal								Low							
Self-monitoring	Active				Inactive				Active				Inactive			
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 = 0





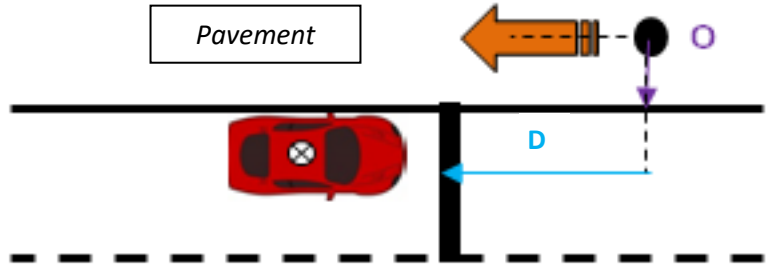
Once you have set the requested radar parameters, place the sticker on the front face to guarantee its water tightness.

ATTENTION: manufacturer’s warranty does not cover radars without sticker!

4 INSTALLATION GUIDE

4.1 GENERAL

- Installation' height: min. 3.5 m - max. 4.5 m
- **Offset** between pole and the roadside (O): max. 2 m
- **Distance** between pole and the stop-line (D): min. 2 m



4.2 ASSEMBLY AND MOUNTING

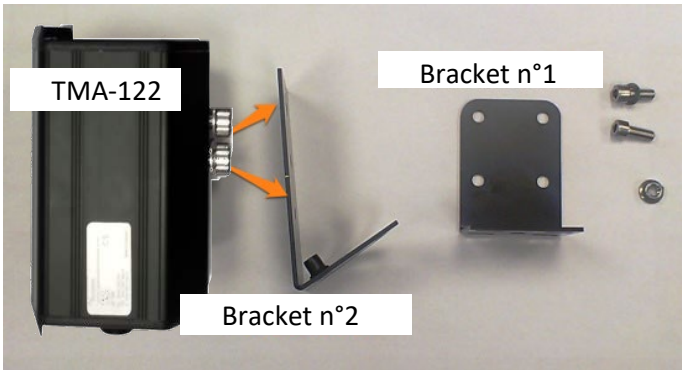


Figure 8: bracket elements

1. Set the appropriate parameter values with the encoders **and place the sticker!**

2. Place the upper right screw to assemble bracket n°2 with bracket n° 1, with the upper right screw, allowing bracket nr 2 to rotate.



Figure 9: bracket assembly

3. Fix the radar on bracket n°2 (see Figure 8).

4. Once you are behind the radar, place the second screw in the lower right hole. Don't tighten it completely. The radar bracket n°1 must be parallel to the approaching lane. See orange arrow example on Figure 10.

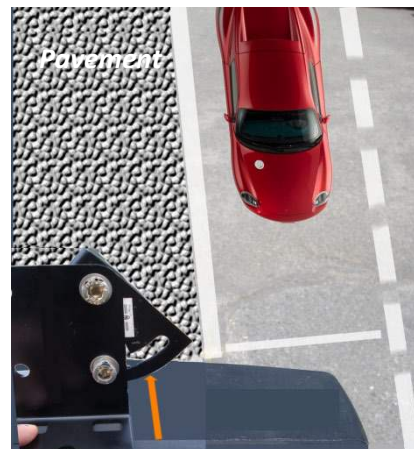


Figure 10: bracket position, parallel to the traffic

- 5. Incline the radar bracket n°2 in direction to the pavement until the notch appears (Figure 11).

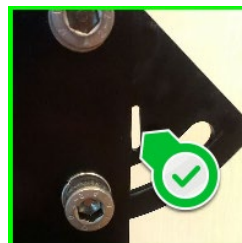


Figure 11: 45° tilt angle

- 6. Firmly tighten the screws.



Figure 12: view from the front of the signal head: radar is leaning

4.2.1 Key points

- The tilt angle must be in direction of the pavement, which means the side where the traffic light is. When you are in front of the radar: if the traffic light is on the right side of the vehicles, the housing of the radar has to be inclined to the right (Figure 10 & Figure 12). If the traffic light is on the left side of the vehicles, the housing of the radar has to be inclined to the left (Figure 13 & Figure 14).



Figure 13: Traffic light is on the left side from the cars



Figure 14: View from behind: installation set when the traffic light is on the left side from the cars.

- Pay attention that the signal head or other obstacle is not obstructing the radar front face (Figure 15).



Figure 15: pay attention to obstacles

- Vehicles that enter within the stop-line zone (0-10m) from the side (perpendicular approach) may not be detected (Figure 16). To validate a measure, the radar needs:
 - to track an approaching movement at a minimum distance of 8 meters;
 - to measure an approaching movement above 8 km/h during a minimum of 100ms (the minimum speed can vary within the detection zone).



Figure 16: side movements

4.2.2 Detection zone

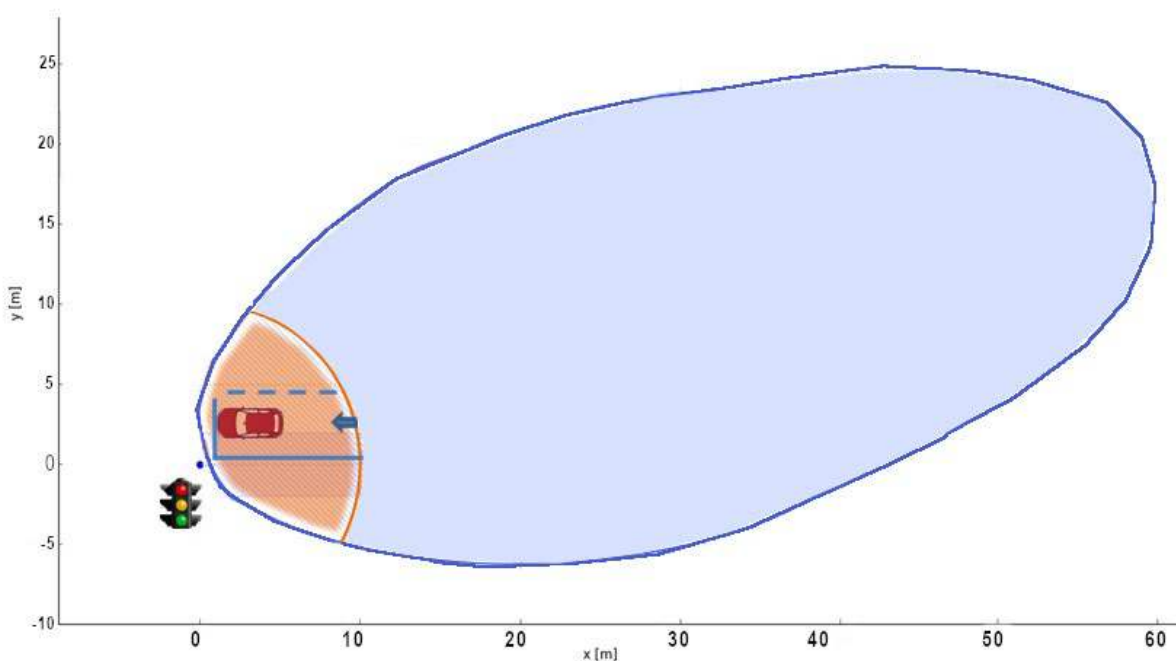
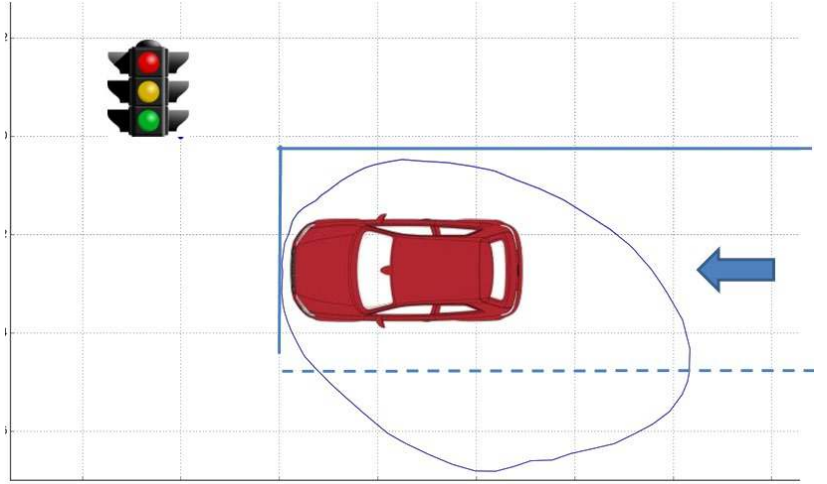


Figure 17: Stationary + movement zone (0-10 m) / movement zone (0-40 m), H = 4m, 45°tilt angle.

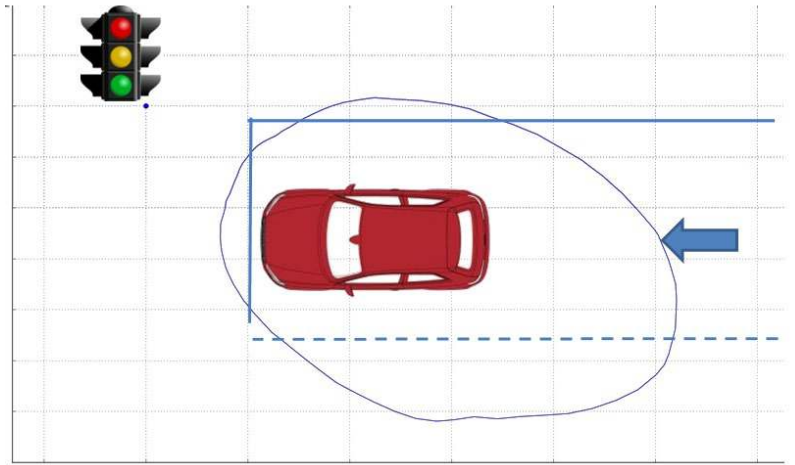
This drawing shows the theoretical radar lobe for vehicles approaching around 50 km/h. Different “stop-line” length zones can be set: 10 or 15 m; the approaching zone length is about 40 m for a car and can be limited to 40 m or 20 m depending on the rotary encoder setting.

4.3 IMPACT OF THE TILT ANGLE

Set the tilt angle to 10° away from the standard tilt angle in direction of the pavement.



Standard tilt angle of 45°



Set the tilt angle to 10° away from the standard tilt angle in direction of the traffic lane.

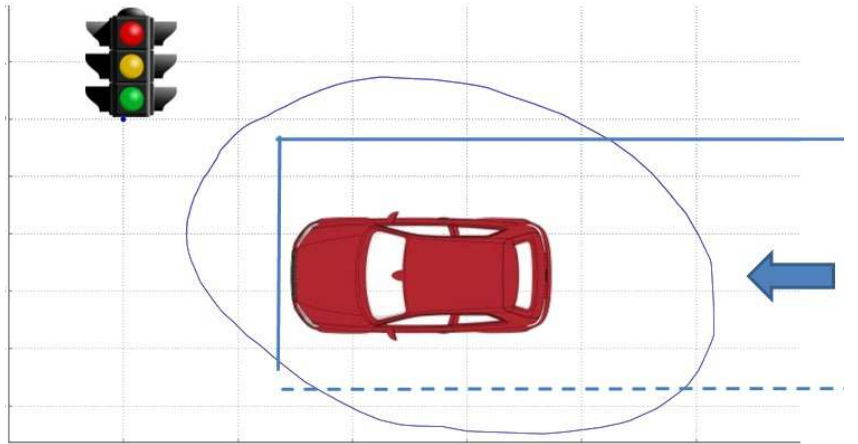


Figure 18: impact of the tilt angle

5 COUNTING FUNCTION

The relay 2 toggles from [detection] -> [no detection] each time a vehicle passes the stop line.

6 WHAT TO TRY IF...

- The 40 meters range of the “movement only” zone is not reached:
 - Check if the bracket n°1 is well parallel to the traffic lane;
 - If there is a curb in the street, turn slightly the bracket n°1 in direction of the curb to move the detection zone.
- If relay 2 stays closed even after the vehicle left the “stop-line” zone:
 - Check that the vehicles stop minimum 2 meters in front of to the radar pole.
 - If the distance (offset) between the pole and the traffic lane is too wide, you can incline slightly the radar in direction of the pavement/signal side.

To keep in mind:

- The TMA-122 only detects approaching traffic, receding traffic within the radar lobe has no effect.
- To get the best result in terms of accuracy, the radar bracket (n°1) must be parallel to the approaching traffic direction.
- The presence (stationary) detection is based on tracking algorithms: the radar needs to detect an approaching movement combined to a decreasing speed to validate the detection. Therefore, cars already parked during the installation won't be detected.
- The radar might be sensitive to pedestrian movement: if a pedestrian crosses the road between the vehicle and the stop-line, it might interfere. Furthermore, if the radar lobe is partly on the pedestrian path, a pedestrian moving or stopping within the detection area might also create a false detection status.

7 TECHNICAL FEATURES TMA-122-UK

	TMA
Protection level	IP 65
Power supply	12 – 60 VDC - 10 – 30 V AC
Power consumption	< 1,2 W @12 V DC
Frequency	K-Band 24.165-24.235 GHz
User output	Inverted relay contact(s): <ul style="list-style-type: none"> ▪ Resistive load: 30 V AC 0.3 A – 30 V DC 0.3 A ▪ Inductive load: 30 V AC 0.2 A – 30 V DC 0.3 A 2 LEDs on front face 2 LEDs on back face
Temperature range	-20° C to +60° C
Dimensions	L68 x H199 x D119 mm
Weight	350 gr
Wiring & connectors	Bulgin connector PX0728/P