CONTENTS

CONTENTS 1
TABLE OF FIGURES 2
THEORY OF OPERATION 3
PRODUCT DESCRIPTION 4
1 DELIVERY 4
2 LABELS LOCATION 4
2.1 IDENTIFICATION LABEL 4
2.2 SERIAL NUMBER 4
3 SETTINGS 4
SAFETY PRECAUTIONS 5
WIRING 6
1 STANDARD RELAYS 6
2 OPTION 250 V RELAYS- HV VERSION 6
3 RS-232 7
PARAMETERS DESCRIPTION 8
1 SENSITIVITY 8
2 SELF-MONITORING 8
3 RF CHANNEL 8
4 SPEED THRESHOLD 8
5 RELAY TRIGGER 8
6 PARAMETERS TO BE SET USING RS-232 SERIAL COMMUNICATION 8
6.1 DETECTION DISTANCE 8
6.2 DETECTION DIRECTION 8
6.3 MAXIMUM RELAY HOLD TIME 8
6.4 OTHERS 8
CONFIGURATION & TUNE-UP TMA-296 9
1 SETTINGS WITH ROTARY ENCODERS 9
1.1 ROTARY ENCODER 1 10
1.2 ROTARY ENCODER 2 10
2 SETTINGS THROUGH RS-232 11
2.1 PROTOCOL DESCRIPTION 11
2.2 PARAMETER DESCRIPTIONS 12
2.2.1 Hardware parameters 12
2.2.1.1 Configuration mode ([pnum] 4) 12
2.2.1.2 RF channel ([pnum] 16) 13
2.2.2 Detection parameters: Speed unit ([pnum] 13) 13
2.2.3 Communication parameters 13
2.2.3.1 Baud rate ([pnum] 30) 13
2.2.3.2 Echo in operator mode ([pnum] 32) 13
2.2.4 Message parameters 14
2.2.4.1 Message type ([pnum] 50) 14
2.2.4.2 Message minimum speed ([pnum] 51) 15
2.2.4.3 Message maximum speed ([pnum] 52) 15
2.2.4.4 Message direction ([pnum] 53) 15
2.2.4.5 Message minimum range ([pnum] 54) 15
2.2.4.6 Message maximum range ([pnum] 55) 15

2.2.4.7 Track selection ([pnum] 56) 15
2.2.5 Relay output parameters (K1|K2) 15
2.2.5.1 Contact (K1|K2) minimum speed ([pnum] 61|81) 15
2.2.5.2 Contact (K1|K2) maximum speed ([pnum] 62|82) 15
2.2.5.3 Contact (K1|K2) direction ([pnum] 63|83) 16
2.2.5.4 Contact (K1|K2) minimum range (K1|K2) ([pnum] 64|84) 16
2.2.5.5 Contact (K1|K2) maximum range (K1|K2) ([pnum] 65|85) 16
2.2.5.6 Contact (K1|K2) sequence active duration ([pnum] 67|87) 16
2.2.5.7 Contact (K1|K2) idle state ([pnum] 69|89) 16
LED INDICATOR 17
1 AT START-UP 17
2 IN NORMAL OPERATION 17
3 WHEN THE SELF-MONITORING DETECTS AN ERROR 17
INSTALLATION GUIDE 17
1 GENERAL 17
2 ASSEMBLY AND MOUNTING 18
3 DETECTION ZONE 18
USE CASES - REMARKS 19
1 DETECTING BICYCLES 19
2 DETECT VEHICLES AT 150 M 19
TECHNICAL FEATURES 19
WARRANTY 19
DECOMMISSIONING 20
FURTHER INFORMATION 20
1 LEGAL NOTIFICATION 20
2 VERSION 20
3 THE MANUFACTURER: 20

TABLE OF FIGURES

FIGURE 1: DELIVERY 4
FIGURE 2: TMA-296 LV, MV AND HV* RADAR CONNECTOR WEIPU SP1712/P9 6
FIGURE 3: TMA-296 HV RADAR CONNECTOR WEIPU SP2112/P7 6
FIGURE 4: FRONT FACE 9
FIGURE 5: ENCODERS & LEDS 9
FIGURE 6: FRONT FACE WITH/WITHOUT STICKER 9
TABLE 1: PROTOCOL DESCRIPTION 11
TABLE 2: PARAMETER DESCRIPTION 12
FIGURE 7: TILT OR INSTALLATION ANGLE 17
FIGURE 8: DETECTION ZONE SIMULATION FOR A DOWNWARD TILT ANGLE OF 10° 18
FIGURE 9: DETECTION ZONE SIMULATION FOR A DOWNWARD TILT ANGLE OF 0° 18

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-296 is a microwave sensor for managing warnings and intersections. The output consists of 2 relays which can be triggered on two different speed and range thresholds. The output can also be read using a RS-232 serial communication.

1. Unpack the unit and check the following items are in the box (see Figure 1, p. 4):
    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"). For the TMA-296, it is also possible to make the setup through RS-232. The encoders are then inoperable.
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 title Wiring, 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

Depending on the TMA configuration chosen, the settings are either done using 2 encoders with 16 positions each or using RS-232 serial communication. 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

1 STANDARD RELAYS

LV (12-60 V DC – 10-30 V AC), MV (21-75 V DC – 15-54 V AC) & HV (100-240 V AC) *		
PIN nr	**Color**	**Function**
1	RED	Power ~ (AC), + (DC) (LV & MV only) Do not connect on HV versions
2	BLUE	Relay 2 – COM
3	BLACK	Power ~(AC), - (DC GND) (LV & MV only) Do not connect on HV versions
4	BROWN	RS232 – GND
5	WHITE or PURPLE	Relay 1 – COM
6	GREY	Relay 1 – NO by default (see 2.2.5.7)
7	YELLOW	Relay 2 – NO by default (see 2.2.5.7)
8	GREEN	RS232 – Rx radar (Tx PC)
9	PINK or ORANGE	RS232 – Tx radar (Rx PC)

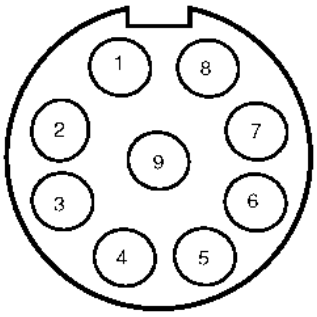


Figure 2: TMA-296 LV, MV and HV radar connector Weipu SP1712/P9*

HV (100-240 V AC)		
PIN nr	**Color**	**Function**
1	BLUE	~ Power
2	BROWN	~ Power
3	YELLOW/ GREEN	EARTH
4	WHITE	Do not connect
5	GREY	Do not connect
6	YELLOW	Do not connect
7	PURPLE	Do not connect

* On TMA-296 HV, both connectors are mounted on the unit rear face.

Resistive load:
30 V AC 0.3A - 60 V DC 0.3A

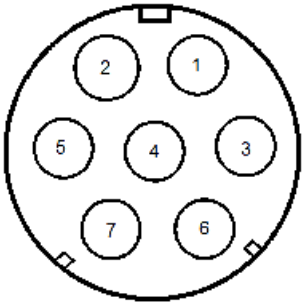


Figure 3: TMA-296 HV radar connector Weipu SP2112/P7

2 OPTION 250 V RELAYS- HV VERSION

RS-232 – See Figure 2		
PIN nr	**Color**	**Function**
1	RED	Do not connect
2	BLUE	Do not connect
3	BLACK	Do not connect
4	BROWN	RS232 – GND
5	WHITE or PURPLE	Do not connect
6	GREY	Do not connect
7	YELLOW	Do not connect
8	GREEN	RS232 – Rx radar (Tx PC)
9	PINK or ORANGE	RS232 – Tx radar (Rx PC)

HV (100-240 VAC) – See Figure 3		
PIN nr	**Color**	**Function**
1	BLUE	~ Power
2	BROWN	~ Power
3	YELLOW/ GREEN	EARTH
4	WHITE	COM relay 1
5	GREY	NO relay 2
6	YELLOW	COM relay 2
7	PURPLE	NO relay 1

For TMA-296 **HV with relay 250 V option**, the connector in Figure 2 is used only for the RS-232 connection. Put the cap on the connector if no cable is connected to this connector when the radar is in operation.

Resistive load: 250 V AC – 30 V DC – 0.3 A

3 RS-232

Wiring DB9 female		
CONTACT nr	**Color**	**Function**
5	**BROWN**	**RS232 - GND**
3	**GREEN**	**RS232 – Rx radar (Tx PC)**
2	**PINK or ORANGE**	**RS232 – Tx radar (Rx PC)**

After configuring the radar, if the RS-232 port is not used during operation, it is strongly recommended that the brown and green wires be connected together to ground the radar RX. This will prevent any parasitic effects in the cable from unintentionally changing the radar configuration.

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-296 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 RELAY TRIGGER

This parameter defines the logic for the relay triggering. It can be triggered for speeds above or under the chosen threshold. This threshold is thus a minimum or maximum value for the relay activation.

6 PARAMETERS TO BE SET USING RS-232 SERIAL COMMUNICATION

6.1 DETECTION DISTANCE

This parameter defines the maximum detection range.

6.2 DETECTION DIRECTION

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

6.3 MAXIMUM RELAY HOLD TIME

This parameter defines the maximum hold time for the relay in the absence of detection. When this time is elapsed, the radar will release the relay, regardless of the presence of a vehicle.

6.4 OTHERS

See also p. 11 and following for a complete list of parameters that can be set via RS-232.

CONFIGURATION & TUNE-UP TMA-296

The TMA-296 is equipped with two encoding wheels for manual setting. It is also equipped with an RS-232 link giving access to a wide range of parameters.

By default, the settings are made via the encoder wheels

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
  - If the green LED flashes, the configuration comes from the encoder wheels
  - If the red LED flashes, the configuration comes from the parameters sent via RS-232

If the radar has been configured via RS-232 and the position of an encoder is subsequently changed while the radar is powered, the radar switches to encoder configuration.

To switch to the RS-232 configuration, it is necessary to switch the parameter to "RS-232" (see 2.2.1.1, p. 12).

1 SETTINGS WITH ROTARY ENCODERS

You can set different parameters through 2 encoders allowing 16 positions each.

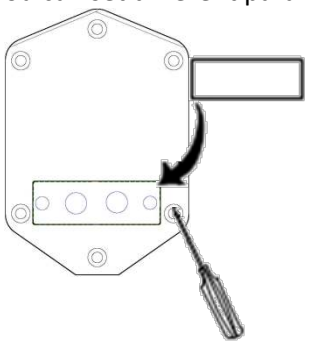


Figure 4: front face

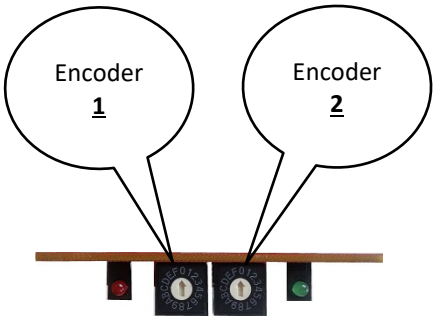


Figure 5: encoders & LEDs

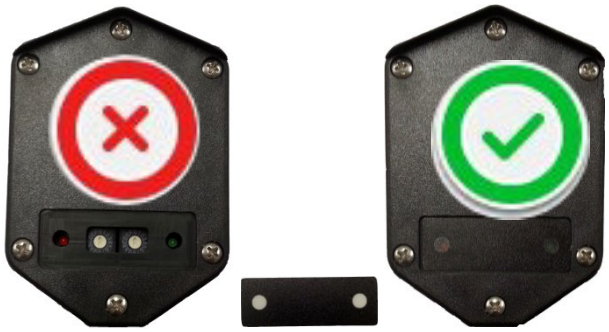


Figure 6: front face with/without sticker

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!

1.1 ROTARY ENCODER 1

Besides red LED, at the left facing the housing:

Parameter	***Value***															
Position	***0***	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Threshold relay 1	4 km/h								8 km/h							
Trigger relay 2	Below the threshold (see encoder 2)				Above the threshold (see encoder 2)				Below the threshold (see encoder 2)				Above the threshold (see encoder 2)			
RF channel	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Sensitivity	Normal		Low		Normal		Low		Normal		Low		Normal		Low	

Factory setting = 0

1.2 ROTARY ENCODER 2

Besides green LED, at the right facing the housing:

Parameter	***Value (km/h)***															
Encoder position	***0***	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Threshold relay 2	**10**	**20**	**25**	**30**	**40**	**45**	**50**	**55**	**60**	**70**	**80**	**85**	**90**	**100**	**110**	**120**

Factory setting = 0

If the parameters are not changed via the RS-232 link, the TMA-296 operates as follows:

- Approaching traffic only
- Maximum range (up to 150 m for most vehicles)

2 SETTINGS THROUGH RS-232

To switch to the RS-232 configuration, it is necessary to switch the parameter to "RS-232" (see 2.2.1.1, p. 12).

The parameters are set using the protocol over RS-232 serial communication. The RS-232 settings to be used for communication with the device are:

- Baud rate: 115200 by default, can be changed, see parameter settings, title 2.2.3.1.
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

2.1 PROTOCOL DESCRIPTION

Table 1: protocol description

Command	Description
• **param [*pnum*] [*value*]**<CR>	• If *value* is not specified: get the current value of the parameter *pnum*. • If *value* is specified: set the value of the parameter *pnum*. • The values are sent and received in decimal. • *Note: Modifications to parameters are immediately active (except for the baud rate and some advanced parameters) but require a "save" command to save the value in the non-volatile memory.* • *Note:* see Table 2: parameter description for the *parameter numbers (*pnum*).*
• **save**<CR>	• Save parameters to non-volatile memory.
• **status**<CR>	• List the current value of user parameters according to the chosen configuration mode.
• **reset**<CR>	• Reset the detector. (Note: start up time = +/- 5 s)
• **dump**<CR>	• Print all parameters and their value
• **defaults**<CR>	• Reset all parameters to factory settings. Use **save**<CR> to save the factory settings in the non-volatile memory

2.2 PARAMETER DESCRIPTIONS

Table 2: parameter description

S/N***:

Parameter	Range	Default	Unit	Parameter number	See §	Chosen value
Hardware						
Configuration mode	[0, 1]	0		4	2.2.1.1	
RF-channel	[0,3]	1		16	2.2.1.2	
Detection						
Speed unit	[0,1]	0	[km/h, mph]*	13	2.2.2	
Communication						
Baud rate	[0,4]	4	-	30	2.2.3.1	
Operator/Menu Echo	[0,1]	1	-	32	2.2.3.2	
Message						
Message type	[0,9]	9	-	50	2.2.4.1	
Message min speed	[1, 200]	8	Selected speed unit**	51	2.2.4.2	
Message max speed	[1, 200]	200	Selected speed unit**	52	2.2.4.3	
Message direction	[0, 1, 2]	2	OUT: 0 | IN: 1 | BIDIR: 2	53	2.2.4.4	
Message min range	[5, 180]	15	m*	54	2.2.4.5	
Message max range	[5, 180]	180	m*	55	2.2.4.6	
Track selection	[0,3]	0		56	2.2.4.7	
Contacts K1 and K2						
Contact min speed	[1, 200]	4, 50	Selected speed unit**	61, 81 (K1, K2)	2.2.5.1	
Contact max speed	[1, 200]	200, 200	Selected speed unit**	62, 82 (K1, K2)	2.2.5.2	
Contact direction	[0, 1, 2]	1, 1	OUT: 0 | IN: 1 | BIDIR: 2	63, 83 (K1, K2)	2.2.5.3	
Contact min range	[5, 180]	5, 15	m*	64, 84 (K1, K2)	2.2.5.4	
Contact max range	[5, 180]	180, 180	m*	65, 85 (K1, K2)	2.2.5.5	
Contact active duration	[56, 65535	1000, 1000	ms	67, 87 (K1, K2)	2.2.5.6	
Contact idle state	[0, 1]	1, 1	-	69, 89 (K1, K2)	2.2.5.7	

* The distance is always given in meters (m).
** The minimum radial speed for target validation is 3.5 km/h.
*** The S/N field and the “Chosen value” column allow you to note the configuration chosen for a given serial number.

2.2.1 Hardware parameters

2.2.1.1 Configuration mode ([pnum] 4)

Description	Radar configuration mode
Notes	• 0 : through rotary encoders • 1 : through RS-232 Changing this setting immediately causes the current settings to be saved and the radar to be reset. If the position of one of the rotary encoders is changed, the configuration mode returns to "rotary encoders" **with default parameters values**.

2.2.1.2 RF channel ([pnum] 16)

Description	Radar centre frequency
Notes	• 0: 24.185 GHz • 1: 24.195 GHz • 2: 24.205 GHz • 3: 24.215 GHz

2.2.2 Detection parameters: Speed unit ([pnum] 13)

Description	Speed unit in which the different thresholds are specified, and the ASCII measurement messages are sent.
Notes	• 0: km/h • 1: mph

2.2.3 Communication parameters

2.2.3.1 Baud rate ([pnum] 30)

Description	Baud rate of the serial communication
Notes	• 0: 9,600 baud/s • 1: 19,200 baud/s • 2: 38,400 baud/s • 3: 57,600 baud/s • 4: 115,200 baud/s

2.2.3.2 Echo in operator mode ([pnum] 32)

Description	Echo for the operator mode
Notes	• 0: no echo • 1: echo in operator mode A <LF> character is added by the device when it receives a <CR>

2.2.4 Message parameters

2.2.4.1 Message type ([pnum] 50)

Description	Type of the measurement message sent
Notes	0: **No message** 1: **<+|->***SSS***<SP>(km/h|mph)<CR><LF>** **<+|- >** is the character '+' (approaching traffic) or '-' (receding traffic) in ASCII, *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<SP>** is the space character in ASCII **(km/h|mph)** (4 chars) is the current speed unit **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. 2: *SSS***<K|M><I|O><CR><LF>** *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<K|M>** is the current speed unit: 'K' for km/h or 'M' for mph. **<I|O>** is the character 'I' (approaching traffic) or 'O' (receding traffic) in ASCII, **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. 3: **<+|->***SSS***<CR><LF>** **<+|- >** is the character '+' (approaching traffic) or '-' (receding traffic) in ASCII, *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. 4: ***S***SSS***<CR><LF>** ***S** (two fixed chars), *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. Note: No distinction is done between approaching and receding traffic. 5: **s***SSS***<CR><LF>** **s** (one fixed char), *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. 6: **<+|->***SSS***<SP>(km/h|mph)<SP>***DDD***<SP>m<CR><LF>** **<+|->** is the character '+' (approaching traffic) or '-' (receding traffic) in ASCII, *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<SP>** is the space character in ASCII **(km/h|mph)** (4 chars) is the current speed unit *DDD* (3 decimal digits in ASCII) is the measured range in the current range unit. **<SP>m** is the space character in ASCII followed by the current range unit (meter) **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII. 9 : *TTTTTTTTTT***<SP>**ms**<SP><+|->***SSS***<SP>(km/h|mph)<SP>***DDD***<SP>m<CR><LF>** *TTTTTTTTTT (10 decimal digits in ASCII) Time elapsed in milliseconds since radar start.*

	<+|- > is the character '+' (approaching traffic or '-' (receding traffic) in ASCII, *SSS* (3 decimal digits in ASCII) is the measured speed in the current speed unit. **<SP>** is the space character in ASCII **(km/h|mph)** (4 chars) is the current speed unit *DDD* (3 decimal digits in ASCII) is the measured range in the current range unit. **<SP>m** is the space character in ASCII followed by the current range unit (meter) **<CR>** is the carriage return character in ASCII and **<LF>** is the line feed character in ASCII.

2.2.4.2 Message minimum speed ([pnum] 51)

Description	Minimum speed above which a measurement message will be sent.
Notes	The minimum radial speed for target validation is 3.5 km/h.

2.2.4.3 Message maximum speed ([pnum] 52)

Description	Maximum speed below which a measurement message will be sent.
Notes	The minimum radial speed for target validation is 3.5 km/h.

2.2.4.4 Message direction ([pnum] 53)

Description	Direction(s) for which a measurement message will be sent.
Notes	• 0: receding vehicles • 1: approaching vehicles • 2: bidirectional

2.2.4.5 Message minimum range ([pnum] 54)

Description	Minimum range above what a measurement message will be sent.
Notes	

2.2.4.6 Message maximum range ([pnum] 55)

Description	Maximum range below what a measurement message will be sent.
Notes	

2.2.4.7 Track selection ([pnum] 56)

Description	As the detector can detect a few vehicles simultaneously, this parameter specifies the one that will be sent on the serial port as measurement.
Notes	• 0: Closest vehicle • 1: Fastest vehicle • 2: Slowest vehicle • 3: Best Signal-to-Noise Ratio (SNR), i.e. the vehicle reflecting the most

2.2.5 Relay output parameters (K1|K2)

2.2.5.1 Contact (K1|K2) minimum speed ([pnum] 61|81)

Description	Minimum speed above what the contact sequence will be triggered.
Notes	The minimum radial speed for target validation is 3.5 km/h.

2.2.5.2 Contact (K1|K2) maximum speed ([pnum] 62|82)

Description	Maximum speed under what the contact sequence will be triggered.
Notes	The minimum radial speed for target validation is 3.5 km/h.

2.2.5.3 Contact (K1|K2) direction ([pnum] 63|83)

Description	The direction(s) for which the contact sequence will be triggered.
Notes	• 0: receding vehicles • 1: approaching vehicles • 2: bidirectional

2.2.5.4 Contact (K1|K2) minimum range (K1|K2) ([pnum] 64|84)

Description	Minimum range above what the contact sequence will be triggered.
Notes	

2.2.5.5 Contact (K1|K2) maximum range (K1|K2) ([pnum] 65|85)

Description	Maximum range above what the contact sequence will be triggered.
Notes	

2.2.5.6 Contact (K1|K2) sequence active duration ([pnum] 67|87)

Description	Minimum activation time of a contact in milliseconds
Notes	The meaning of active is determined by the *contact idle State* parameter.

2.2.5.7 Contact (K1|K2) idle state ([pnum] 69|89)

Description	State of the contact when there is no detection
Notes	• 0: Relay not energized • 1: Relay energized

Advice - Good practices:

- Don't forget to save the settings with **save**<CR>.
- If, when the radar is powered and in "RS-232 configuration" mode ([pnum] 4, [value] 1), the position of one of the encoder wheels is modified, the parameters programmed via RS-232 are erased and return to factory values.
- Do not forget to put the sticker on the front face of the radar (see Figure 6).
- To keep track of the radar configuration:
  - Use the "chosen value" column of Table 2: description of the parameters.
  - Save your settings as a .txt file, using your terminal emulator.

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
  - If the green LED flashes, the configuration comes from the encoder wheels
  - If the red LED flashes, the configuration comes from the parameters sent via RS-232

2 IN NORMAL OPERATION

- The green LED shows the state of the relay K1.
- The red LED shows the state of the relay K2.

3 WHEN THE SELF-MONITORING DETECTS AN ERROR

The two LEDs blink quickly:

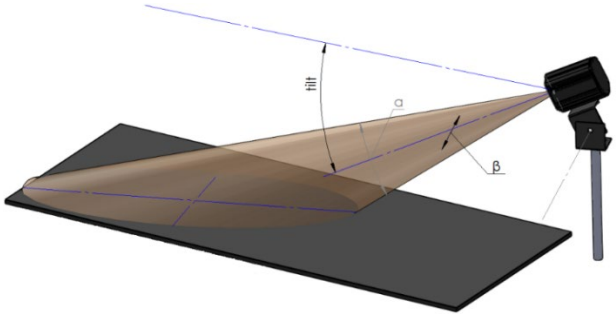
1. Type 1 failure (2 quick flashes followed by a 1 s break): code execution and internal micro-controller state consistency. If a problem is detected, the system is reset. The reset takes 1 500 milliseconds.
2. Type 2 failure (4 quick flashes followed by a 1 s break): micro-controller oscillator monitoring. 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 duration takes 1 500 milliseconds.

INSTALLATION GUIDE

1 GENERAL

- Installation height: typically, 3 m. The greater the height, the longer the 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. 19, 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

2 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

3 DETECTION ZONE

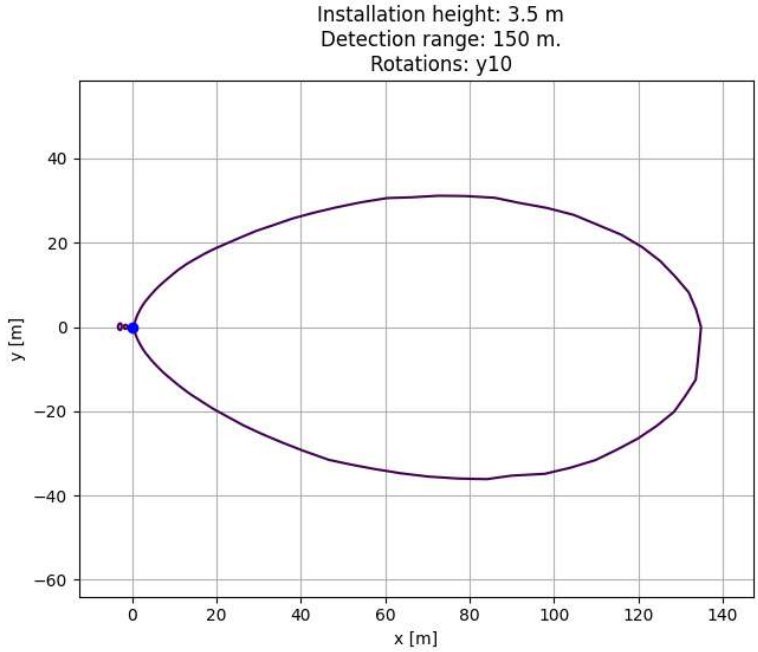


Figure 8: detection zone simulation for a downward tilt angle of 10°

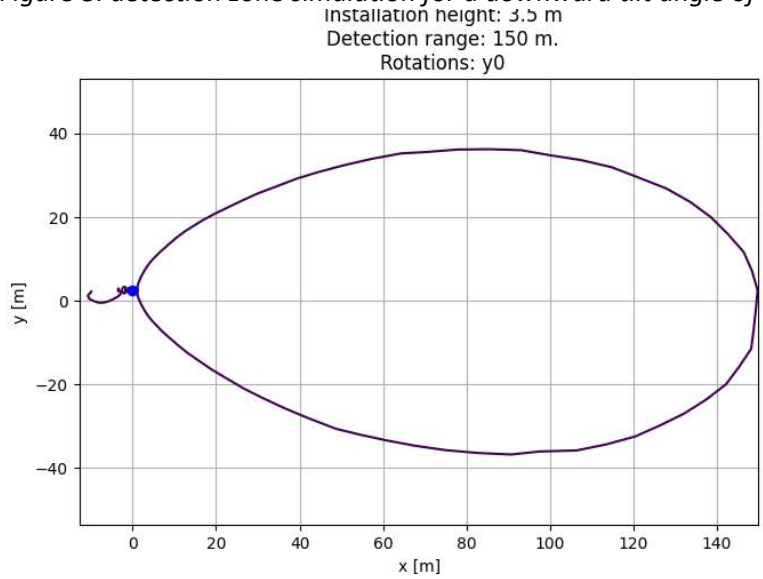


Figure 9: detection zone simulation for a downward tilt angle of 0°

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)
- 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-296-LV	TMA-296-MV	TMA-296-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 • RS-232		
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	L 68 x H 99 mm x D 212 mm
Weight (excl. cable and mounting support)	320 gr	510 gr	563 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, 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 – 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 1	December 28, 2020	First release TMA-296 LM-V
V 1.2	February 18, 2021	Minor updates
V 1.3	March 02, 2021	Layout updates – Typos
V 1.3.1	April 08, 2021	RS-232 default settings
V 1.4	June 18, 2021	HV version
V 1.5	August 6, 2021	TMA generic user guide – Layout
V 1.6	April 5, 2022	Wire colour changes for the molded cable
V 2	May 23, 2022	Rotary encoders – 250 V relay option
V 2.1	June 23, 2022	Self monitoring, layout, timeout
V 2.2	October 19, 2022	Added “Decommissioning” section
V 2.3	December 7, 2022	Cabling 250 V relay/HV – Added distance param for relay setting – Clarification encoder/RS

3 THE MANUFACTURER:

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