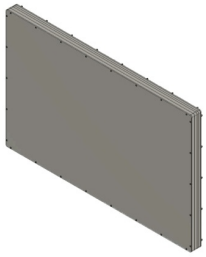
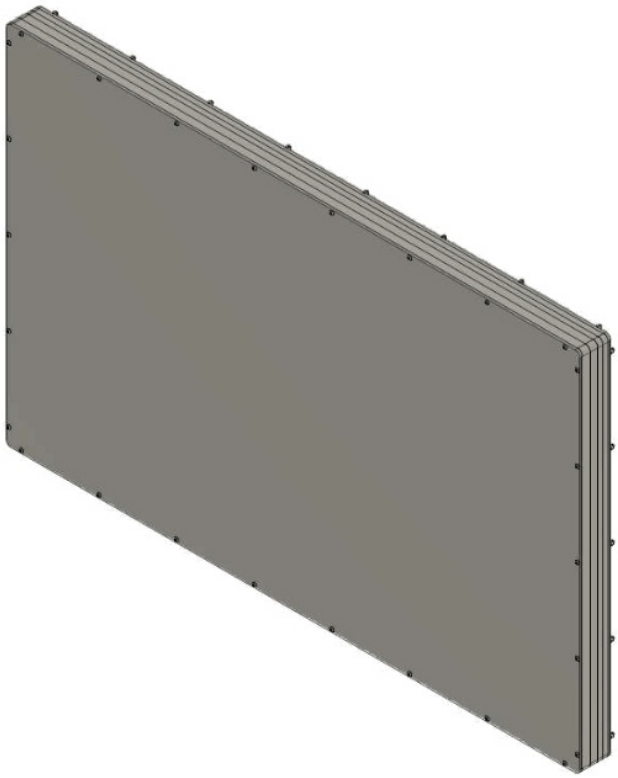


JR AUTOMATION TPM-CW-300 Continuous TPM Antenna User Manual

JR AUTOMATION
A Hitachi Group Company

Continuous TPM Antenna
Model Number: TPM-CW-300
Includes Variants: TPM-LA-300-000 & TPM-SA-300-000
User Manual



Contents

GENERAL IFORMATION & CONSIDERATIONS

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Additionally:

1. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
2. JR Automation TPM products & related equipment must be integrated into the end users manufacturing system by JR Automation, or by a JR Automation recommended automation Systems Integrator.
3. JR Automation TPM products are meant for industrial manufacturing settings only.
4. JR Automation does not manufacture or provide TPM valve stems, only the equipment that is used to communicate to those stems during tire, wheel, & vehicle manufacturing.

RF EXPOSURE STATEMENT

The device shall be used in such a manner that the potential for human contact normal operation is minimized. This equipment complies with RSS-102 radiation exposure limits. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

SAFETY

1. Only personnel who are properly trained and have adequate knowledge and skill related to this product should undertake any troubleshooting and repair.
2. It must be assumed at all times that POWER is "ON" so all conditions must be treated as live. This practice develops a caution that may prevent an accident. Follow posted lockout procedures.

3. REMOVE LOAD from circuit or equipment before and after maintenance/troubleshooting.
4. Equipment—NOTE: Test equipment must be checked at regular intervals.
5. Capacitors MUST be given time to discharge, otherwise it should be done manually with CARE.
6. When troubleshooting “LIVE” equipment, the necessary precautions must be taken as follows:
   a. Follow written safe operating practices.
   b. MAKE CERTAIN your tools and body are clear of Ground.
   c. Use extra PRECAUTION in DAMP areas.
   d. BE ALERT and work without any outside distraction.
7. BEFORE applying POWER to any equipment, it must be established without a DOUBT that all persons are CLEAR.
8. Any CONTROL PANEL DOORS shall be open ONLY when it is necessary to check out the electrical equipment or wiring. After CLOSING the door, make certain that the disconnecting means is operating properly with the DISCONNECT HANDLE MECHANISM.
9. ALL COVERS or junction boxes SHOULD be CLOSED before leaving any job.
10. BEFORE STARTING, read and understand all WARNING markings and notices.
11. READ all marking such as nameplates and identification plates.
12. DO NOT alter circuits unless authorized to do so by the manufacturer.
13. DO NOT alter or by-pass protective interlocks.
14. DO NOT place jumper wires across fuses.
15. DO NOT alter over-current protective devices.
16. GROUND connections allow fault currents to flow directly into the ground instead of following through the body then into the ground. ALL ELECTRICAL APPARATUS MUST BE PROPERLY GROUNDED.
17. Use CAUTION when connecting test equipment probes to test points. SHOCK HAZARDS could exist at the test points or in the test point area and/or TRANSIENTS induced by the problems could cause a MACHINE ACTION.
18. AVOID wearing a necklace, ring or chain that is made of a METALLIC substance.
19. All electrical wiring and items related to electrical controls are, and shall always be, in compliance with current National & Local Regulations.

RSONAL PROTECTIVE EQUIPMENT

When servicing, protect yourself by wearing protective equipment where required:

1. Safety Glasses—Must be properly fitted and worn when a hazard exists.
2. Gloves—Although it is recommended that gloves not be worn unless absolutely necessary, gloves can protect the hands from cuts or abrasions caused by slings or sharp edges. Do not use gloves when working on a tool with rotating equipment.

GROUNDING

The TPM antenna system must be properly grounded. Each of the following must be grounded ultimately to the installation sites grounding system:

1. Transmission antenna’s metal shielding (for products that include a metal shield)

2. The conduit between the transmission antenna and antenna enclosure
3. The antenna enclosure
4. Antenna stand or mounting structure

ELECTRICAL WARNING SIGNS

The antenna enclosure is marked with high voltage warning labels. The antenna system is capable of generating high voltages. The enclosure cover should be kept in place during operation. Only trained, qualified personnel should remove the enclosure cover.

TPM STEM OVERVIEW

The purpose of this section is to provide an overview of the TPM valve stems. The scope of this manual is to cover the operation of the JR Automation antenna systems that communicate to the stems, not detailed information on the TPM valve stems themselves. But a general overview of how TPM valve stems operate will help the users understand the operation of the antenna equipment. It should be noted that JR Automation does not manufacture or provide TPM valve stems

TPM valve stems are electronic valve stems that are designed to warn a vehicle driver when the tire inflation pressure is outside acceptable limits. The stems contain pressure sensors and RF communications devices to allow the stems to detect a bad inflation pressure, and then tell the vehicle computer system that an inflation problem exists. This allows the vehicle computer to annunciate the problem to the driver of the vehicle, usually with a dashboard indicator of some kind.

Tire Pressure Monitor sensors or TPM valve stems are manufactured by several different manufacturers. These stems vary greatly in shape, electrical design, function, communication method, and RF characteristics. It is this high degree of variation that poses the greatest challenge for a single antenna system to communicate to all these different stems.

TPM stems are designed to monitor and report on the conditions inside the tire (e.g. tire internal air temperature, pressure, and stem battery voltage). The stem will transmit this information via a UHF radio signal (usually 315MHz or 433 MHz). This is typically referred to as a “wake up”. These wake-up transmissions happen in response to different events, or in different modes. The one that we are most concerned with utilizes the LF wake up signal. All TPM stems are designed to respond with a UHF data transmission after receiving a 125kHz LF wakeup signal. Below is a table of some of the different UHF wakeup’s that are common to stems.

Event	Common Mode Name	Additional Info.
Inflation Pressure changes	Re-measure or Alert mode	Usually rapidly repeating wakeups
Motion in the wheel assembl y	Drive mode	Can cause wakeups in spinning process equip ment, such as balancers
Time interval	Stationary mode	Stem automatically wakes up at a programmed time interval, such as every hour
Stem Receives an LF Radio Signal	Learn mode, LF mode	This is meant for manufacturing purposes and f or use during tire servicing. This is the method t hat JR TPM Antennas utilize to communicate to the stems.

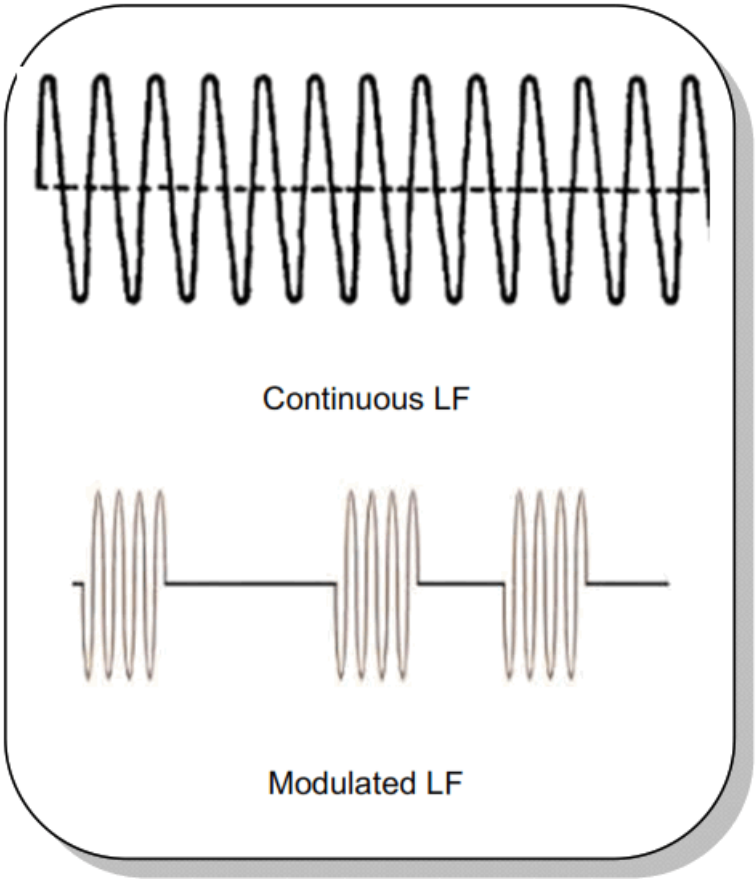
LF TRANSMISSION (125KHz)

THIS MODEL ONLY GENERATES A CONTINUOUS LF TRANSMISSION

The JR Automation TPM Antenna systems were developed to utilize the LF (Low Frequency) transmission to collect data from the TPM stem. The TPM stem responds with the 125 kHz wakeup signal can be of 2 different types – Continuous and Modulated LF. Each is described below.

Continuous LF: A stem requiring a continuous signal or a signal with no change. It is simply a continuous sine wave signal at a given frequency (125 kHz in our case). The stem will periodically “listen” for an LF broadcast. If it hears the broadcast for a specific amount of time (typically 1-3 seconds) the stem will respond with its UHF broadcast. This is also commonly referred to as “non-modulated LF”.

Modulated LF: In this case, the LF signal is turned off and on off quickly. This creates a pattern of pulses. Generally, a unique pattern is generated for each stem type. The stems are designed to wake up only if it hears a signal using its unique pattern. The antenna will generate this unique pattern over and over until it receives the UHF wake up response from the stem. The pulse pattern that is generated by the antenna forms a message packet. An individual packet is repeated over and over during the LF transmission. This repetition of the packet gives the stem’s receiving circuits multiple changes to receive the message, and to validate it. The pattern within the packet is arranged into a “structure”. Typically, a packet structure consists of several fields, with each having a specific purpose. This unique data structure is specified by the TPM Valve Stem manufacturer.



RECEIVING UHF SIGNALS

After the TPM stem receives the wake up signal it will transmit a UHF data package. The stems transmit data in one of two frequency bands 315 MHz and 433 MHz bands depending on the stems design. Typically, 315 MHz is used in the U.S. and 433 MHz is used in export vehicles. The frequency used is governed by the FCC in the United States. Vehicle's being sold in other countries will be governed by that country's RF communications governing body.

Like the Modulated LF message structure, the basic unit for a UHF transmission is a packet. This packet will be coded in a similar way that the LF data was coded. After a valid wake up signal is received by the stem, it will typically transmit the same data packet several times in "bursts". The number of packets in a burst varies from stem to stem. It can even vary for a single stem type, based on the mode the stem is in. With all the different stems that have been observed to date, the number of bursts can be in as few as 4 packets repeated to as many as 16 packets. Repetition of the packets helps ensure the highest probability that data will be received. Also, receiving the same packet multiple times helps ensure that the data was received correctly, not some falsely interpreted noise.

EXTERNAL CONNECTIONS & LED INDICATORS

The antenna box has 5 external connections. Please see the table & pictures below:

Connection	Description	Function
Power	Provide 24 VDC power to antenna system	
RS485	Provide RS485 Communication to the antenna from a syste m controller (provided by System Integrator)	
Antenna 1	Connection for a 315MHz or 433 MHz receiver antenna. Co nnected to receiver 1	
Antenna 2	Connection for a 315MHz or 433 MHz receiver antenna. Co nnected to receiver 2	
LF Antenna Bulkhead	Provides conduit connection for LF transmission antenna c oil wiring	

Power & RS485 Connection

LF Antenna Bulkhead

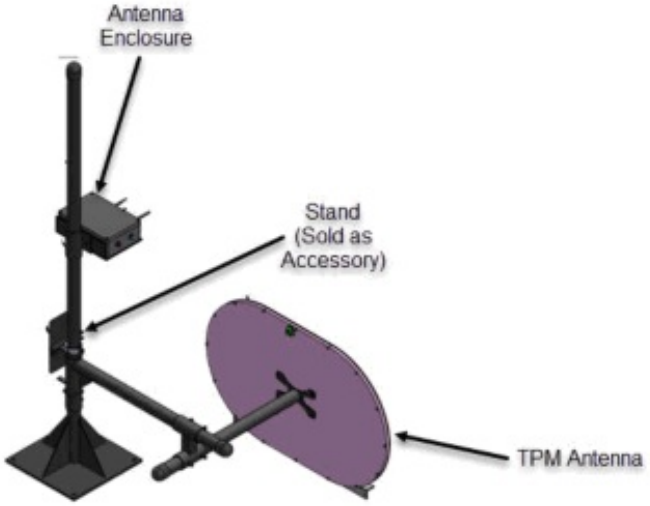
In addition to the external connections, the Antenna Enclosure has 4 indicator LED’s:

LED Description	Function
LF On	Illuminates when the antenna system is transmitting an 125KHz LF signal
Receiver 1	Momentarily flashes whenever a valid UHF packet is received from a TPM valve stem, on receiver 1 (antenna 1)
Receiver 2	Momentarily flashes whenever a valid UHF packet is received from a TPM valve stem, on receiver 2 (antenna 2)
Power on	Illuminates when the antenna is supplied with 24VDC

Receiver Antenna Connections & LED's

ANTENNA MOUNTING

The antenna is typically mounted on an adjustable stand that is sold as a separate accessary. The stand also holds the antenna enclosure, which is mounted on a backplate. Typically, this will be provided by the Automation System Integrator.



APPENDIX A: PRODUCT DATA SHEET

The table below summarizes the general product data and specifications:

Attribute:	Data:
Manufacturer Name (Legal Entity)	Esys Automation LLC
Model #	TPM-CW-300 (variants: TPM-LA-300-000 & TPM-SA-300-000)
Brand Name (Marketed by)	JR Automation
Country of Origin	USA
Country of Assembly	USA
Trade Name	Large Continuous Antenna
General HS Code Category (Trade Code)	8517.62
Mexico HS Code (Trade Code)	8517.62.99
Low Frequency Transmission (LF)	125 KHz
Ultra High Frequency Receivers (UHF)	315 MHz and 433 MHz
Input Voltage	24 VDC
External communication interface protocol	RS485 Serial
Product Packaging	No retail packaging included

1000 Brown Rd.
Auburn Hills, MI 48326
248.754.1900
jrautomation.com
Canada

Documents / Resources

	JR AUTOMATION TPM-CW-300 Continuous TPM Antenna [pdf] User Manual TPM-CW-300-000, TPMCW300000, 2A4GATPM-CW-300-000, 2A4GATPMCW300000, TPM-LA-300-000, TPM-SA-300-000, TPM-CW-300 Continuous TPM Antenna, TPM-CW-300, Continuous TPM Antenna, TPM Antenna, Antenna

References

- JR Automation - Global Robotics Automation Company