

Truck TPMS RS232&R2485 output communication protocol

Communication Parameters:

Baud rate: 115200
Data bits: 8
Stop bits: 1

Process:

After a successful handshake, first send a system query command to obtain the version number.
Then proceed to query the vehicle model and tire data.

Wheel Position Distribution:

The tire coordinate is defined as follows:

- The higher 4 bits represent the axle number, increasing sequentially from the front to the rear of the vehicle.
- The lower 4 bits represent the wheel position on that axle, increasing from left to right.

Example:

Tire Coordinates: 00 Tire serial number: 01		Tire Coordinates: 01 Tire serial number: 02	
Tire Coordinates: 10 Tire serial number: 03	Tire Coordinates: 11 Tire serial number: 04	Tire Coordinates: 12 Tire serial number: 05	Tire Coordinates: 13 Tire serial number: 06

1. Data frame protocol

1.1 Tire pressure data frame

Sync Header 2Byte	Byte Length 1Byte	Type 1Byte	Tire Position 1Byte	Pressure Value 1Byte	Temperature value 1Byte	Status Bit 1Byte	Voltage Value 1Byte	Checksum 1Byte
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Tire pressure data frame content:

Byte Count	Information name	Byte Description										
Byte1	Sync header 0	0X55										
Byte2	Ssync header 1	0XAA										
Byte3	Byte count	0X0A (Total byte length from sync header 0 to check value)										
Byte4	Data Type	0x00: The current sensor data pertains to the tire data of the vehicle body										
		0x01: The current sensor data pertains to the tire data of the trailer										
Byte5	Tire Position	Tire serial number										
Byte6	Pressure Value	P7:P0										
Byte7	Temperature Value	Original data: -50										
Byte8	Status Bit	Bit0	Abnormal sensor signal alarm					Normal: 0			Alarm: 1	
		Bit1	Tire leakage alarm					Normal: 0			Alarm: 1	
		Bit2	High pressure alarm					Normal: 0			Alarm: 1	
		Bit3	Low pressure alarm					Normal: 0			Alarm: 1	
		Bit4	High temperature alarm					Normal: 0			Alarm: 1	
		Bit5	Low battery alert					Normal: 0			Alarm: 1	
		Bit6	Repeater abnormal alarm					Normal: 0			Alarm: 1	
		Bit7	Retain					Send 0				
Byte9	Sensor voltage value	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0			
		V = 0.1*V0+1.9					Retain (Send 0)		P9	P8		
Byte10	Checksum	Standard Xor verification of Byte1 to Byte9										

Note:

1. Pressure calculation method: $P = 2.5 \cdot \text{original data P}$ (in kPa); the original data P consists of 10 digits, denoted as p9-p0,
The upper two bits, bit0 and bit1, are in the voltage position, and the lower 8 bits are for Pressure;
2. Temperature data = Original data - 50
3. Sensor voltage calculation method: $V = 0.1 \cdot V_0 + 1.9$ (BYTE9 BIT4~BIT7), where V represents the actual battery level and V0 represents the uploaded raw data

Example:

Taking a vehicle body with 2 axles and 6 wheels (2:4) as an example:

0x55 0xAA 0x0A 0x00 0x01 P T S V CSUM

0x55 0xAA 0x0A 0x00 0x02 P T S V CSUM

0x55 0xAA 0x0A 0x00 0x03 P T S V CSUM

0x55 0xAA 0x0A 0x00 0x04 P T S V CSUM

0x55 0xAA 0x0A 0x00 0x05 P T S V CSUM

0x55 0xAA 0x0A 0x00 0x06 P T S V CSUM

1. Sensor three-axis acceleration data format

Sync header 2Byte	Byte Length 1Byte	Type 1Byte	Tire position 1Byte	Z-axis acceleration 2Byte	X-axis acceleration 2Byte	Y-axis acceleration 2Byte	Signal strength 1Byte	Checksum 1Byte
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Byte Count	Information name	Byte description
Byte1	Sync header0	0X55
Byte2	Sync header1	0XAA
Byte3	Byte count	0X0D (total byte length from sync header 0 to check value)
Byte4	Data type	0x02 The current sensor data is three-axis acceleration data
Byte5	Tire Position	Tire serial number
Byte6-Byte7	X-axis acceleration	The raw data from the sensor has Byte6 as the high-order bit
Byte8-Byte9	Y-axis acceleration	The raw data from the sensor has Byte8 as the high-order bit
Byte10-Byte11	Z-axis acceleration	The raw data from the sensor has Byte10 as the high-order bit
Byte12	Signal strength	
Byte13	Checksum	Standard XOR check for Byte1 to Byte12

Acceleration accuracy: 0.1G, data type: int16_t

Example: X-axis acceleration algorithm: $(\text{int16_t})(\text{Byte6} \ll 8 | \text{Byte7}) / 10$

3.Command frame protocol

1. Send:

Frame Header (2Byte)	Byte Length (1Byte)	Order (1Byte)	Data (LEN Byte)	Verification code (1Byte)
0x5A,0xA5	The total number of bytes from the frame header to the check sum	CMD	DAT	Exclusive-OR check (from frame header to data)

Responds:

Frame Header (2Byte)	Byte Length (1Byte)	Order (1Byte)	Data (LEN Byte)	Verification code (1Byte)
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0x5A,0xA5	The total number of bytes from the frame header to the check sum	CMD	DAT	Exclusive-OR check (from frame header to data)
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(The response command byte bit7 indicates that the operation has been completed, while bit6 indicates that the operation is currently in progress)

(The following examples are all in hexadecimal)

Among the following instructions, the "Set vehicle model" and "Set device parameters" instructions are mutual instructions between the APP and the tire pressure device. The rest of the instructions are sent by the APP as the sender, and the tire pressure device responds as the receiver 0x00

0x00 System Instruction

After pairing with the slave device, the APP first sends a system command Handshake:

~~Send: 5A A5 06 00 00 F9~~

~~Command: 0x00~~

~~Byte Length: 0x06~~

~~Data: 00~~

~~**Response:** 5A A5 06 80 00 79~~

~~Command: 0x00~~

~~Byte Length: 0x06~~

~~Data: 00~~

Send: 5A A5 0A 00 02 seed0 seed1 seed2 seed3 XOR

Command: 0x00

Byte Length: 0A

Data: Four random numbers

Responds: 5A A5 0A 90 02 key0 key1 key2 key3 XOR

Command: 0x00

Byte Length: 0A

Data: The key corresponding to four random numbers

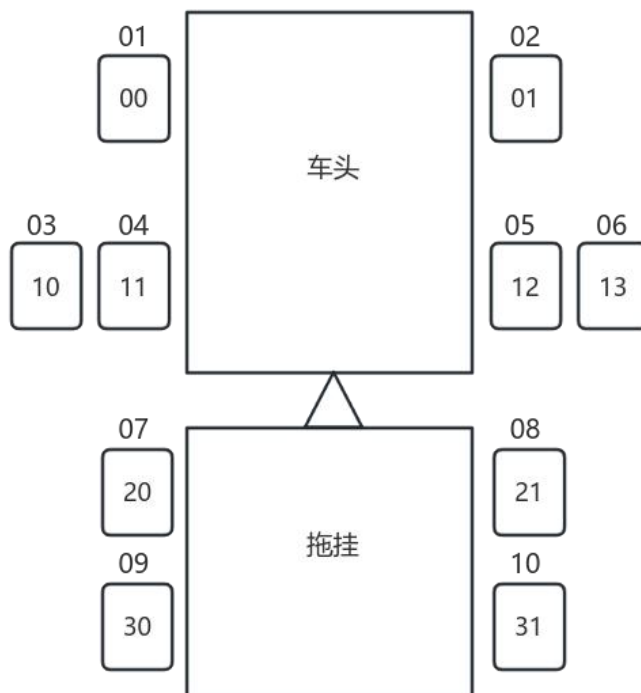
0x01 Set vehicle model instructions

Data: 50 wheels can be set

BYTE1	BYTE2	BYTEN	BYTE50
1: The first wheel activated 0: The first wheel is not activated	1: The second wheel activated 0: The second wheel is not activated	1: The N wheel activated 0: The N wheel is not activated	1: The 50 th wheel activated 0: The 50 th wheel is not activated

Data: None

Example:



Set the front of the car with 2 axles and 6 wheels, do not activate the trailer, and

send:

[illegible]

0x02 Query vehicle model command

Send: 5A A5 05 02 XOR

Command: 0x02

Byte Length: 0x05

Data: Model code

Responds: 5A A5 37 82 XX XX XOR

Command: 0x02

Byte Length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
1: The first wheel activated 0: The first wheel is not activated	1: The Second wheel activated 0: The second wheel is not enabled	1: The N wheel activated 0: The N wheel is not activated	1: The 50 th wheel activated 0: The 50 th wheel is not activated

Example

Send: 5A A5 05 02 F8

[illegible]

0x03 Tire Sensor Matched

Send: 5A A5 06 03 XX XOR

Command: 0x03

Byte Length: 0x06

Data: Wheel position number

Upon receiving the sensor pairing instruction, the slave immediately responds

Responds: 5A A5 06 43 XX XOR

Command: 0x03

Byte Length: 0x06

Data: Wheel position number

Response to successful pairing of slave sensors:

Responds: 5A A5 0A 83 XX ID0 ID1 ID2 ID3 XOR

Command: 0x03

Byte Length: 0x0A

Data: Wheel position number Tire ID number

Response to pairing failure of slave sensor:

Responds: 5A A5 0A 83 XX FF FF FF FF XOR

Command: 0x03

Byte Length: 0x0A

Data: Wheel position number

Example: Study the tire sensor with serial number 1

Host sends: 5A A5 06 03 01 FB

Immediate response from the Slave device: 5A A5 06 43 01 BB

Learning Success Return: 5A A5 0A 83 01 00 00 00 01 76

Learning failure return: 5A A5 0A 83 01 FF FF FF FF 77

0x04 Exit pairing command

Send: 5A A5 05 04 XOR

Command: 0x04

Byte Length: 0x05

Data: None

Responds: 5A A5 05 84 XOR

Command: 0x04

Byte Length: 0x05

Data: None

Example:

Send: 5A A5 05 04 FE

Responds: 5A A5 05 84 7E

0x05 Write sensor ID command

Send: 5A A5 0A 05 XX XX XOR

Command: 0x05

Byte Length: 0x0A

Data:

BYTE1	BYTE2	BYTE3	BYTE4	BYTE5
wheel position number	ID0	ID1	ID2	ID3

Responds: 5A A5 06 85 XX XOR

Command: 0x05

Byte Length: 0x06

Example: Write sensor to tire with serial number 01 ID 00112233

Send: 5A A5 0A 05 01 00 11 22 33 F1

Responds: 5A A5 06 85 01 7D

0x06 Read sensor ID command

Send: 5A A5 06 06 XX XOR

Command: 0x06

Byte Length: 0x06

Data: Wheel position coordinates

Responds: 5A A5 0A 86 XX XX XOR

Command: 0x06

Byte Length: 0x0A

Data:

BYTE1	BYTE2	BYTE3	BYTE4	BYTE5
wheel position number	ID0	ID1	ID2	ID3

Example:

Send: 5A A5 06 06 01 FE

Responds: 5A A5 0A 86 01 00 11 22 33 72

0x07 Set high pressure threshold command

Send: 5A A5 37 07 XX XX XOR

Command: 0x07

Byte Length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
High pressure value of the first wheel P = KPA/10	High pressure value of the second wheel P = KPA/10	High pressure value of the N wheel P = KPA/10	High pressure value of the 50 wheel P = KPA/10

Responds: 5A A5 05 87 XOR

Command: 0x07

Byte Length: 0x05

Data: None

Example:

Write the alarm threshold of 900KPA in the first 2 rounds, 850KPA in the 3rd to 10th rounds, and 800KPA in the 11th to 14th rounds

[illegible]

Responds: 5A A5 05 87 7D

0x08 Query high pressure threshold command

Send: 5A A5 05 08 XOR

Command: 0x08

Byte length: 0x05

Data: None

Responds: 5A A5 37 88 XX XX XOR

Command: 0x08

Byte length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
High pressure value of the first wheel P = KPA/10	High pressure value of the second wheel P = KPA/10	High pressure value of the N wheel P = KPA/10	High pressure value of the 50 th wheel P = KPA/10

Example:

Send: 5A A5 05 08 F2

[illegible]

0x09 Set low pressure threshold command

Send: 5A A5 37 09 XX XX XOR

Command: 0x09

Byte Length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
High pressure value of the first wheel P = KPA/10	High pressure value of the second wheel P = KPA/10	High pressure value of the N wheel P = KPA/10	High pressure value of the 50 th wheel P = KPA/10

Responds: 5A A5 05 89 XOR

Command: 0x07

Byte length: 0x05

Data: None

Example:

Write the alarm threshold of 700KPA in the first 2 rounds, 650KPA in the 3rd to 10th rounds, and 600KPA in the 11th to 14th rounds

[illegible]

Responds: 5A A5 05 89 73

0x0A Query low pressure threshold command

Send: 5A A5 05 0A XOR

Command: 0x0A
 Byte Length: 0x05
 Data: None

Responds: 5A A5 37 0A XX XX XOR
 Command: 0x0A
 Byte Length: 0x37
 Data:

BYTE1	BYTE2	BYTEN	BYTE50
High pressure value of the first wheel P = KPA/10	High pressure value of the second wheel P = KPA/10	High pressure value of the N wheel P = KPA/10	High pressure value of the 50 th wheel P = KPA/10

Example:

Send: 5A A5 05 0A F0

Responds: 5A A5 37 8A 46 46 41 41 41 41 41 41 41 41 3C 3C 3C 3C 00 00 00 00 00 00
 00
 00 00 42

0x0B Set high temperature threshold command

Send: 5A A5 37 0B XX XX XOR
 Command: 0x0B
 Byte Length: 0x37
 Data:

BYTE1	BYTE2	BYTEN	BYTE50
High temperature value of the first wheel T = °C+50	High temperature value of the second wheel T = °C+50	High temperature value of the N wheel T = °C+50	High temperature value of the 50 th wheel T = °C+50

Responds: 5A A5 05 8B XOR
 Command: 0x0B
 Byte Length: 0x05
 Data: None

Example: Set the high temperature alarm threshold for the first 14 rounds to 85 degrees Celsius

Send: 5A A5 37 0B 87 87 87 87 87 87 87 87 87 87 87 87 87 87 87 87 87 87 00 00 00 00 00 00 00 00
 00
 C3

Responds: 5A A5 05 8B 71

0x0C Query high temperature threshold command

Send: 5A A5 05 0C XOR

Command: 0x0C

Byte Length: 0x05

Data: None

Responds: 5A A5 37 0C XX XX XOR

Command: 0x0C

Byte Length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
High temperature value of the first wheel T = °C+50	High temperature value of the second wheel T = °C+50	High temperature value of the N wheel T = °C+50	High temperature value of the 50 th wheel T = °C+50

例：

Send: 5A A5 05 0C F6

[illegible]

0x0D Request tire upload data command

Send: 5A A5 06 0D XX XOR

Command: 0x0D

Byte Length: 0x06

Data: Wheel position number

Responds: Upload data for this wheel position

0x55 0xAA 0x0A XX XX P T S V CSUM

Example:

Send: 5A A5 06 0D 01 F5

Responds: 55 AA 0A 00 01 78 00 0A B0 36

0x0E Request all tires to upload data command

Send: 5A A5 05 0E XOR

Command: 0x0E

Byte Length: 0x05

Data: None

Responds: Upload data for all wheel positions in sequence

Example:

Send: 5A A5 05 0E F4

Responds: 55 AA 0A 00 01 78 00 0A B0 36 55 AA 0A 00 02 8C 00 08 B0 C3 55 AA 0A 00 03 00 00 28 00 DE 55 AA 0A 00 04 00 00 28 00 D9 55 AA 0A 00 05 00 00 28 00 D8 55 AA 0A 00 06 00 00 28 00 DB 55 AA 0A 00 07 00 00 28 00 DA 55 AA 0A 00 08 00 00 28 00 D5 55 AA 0A 00 09 00 00 28 00 D4 55 AA 0A 00 0A 00 00 28 00 D7 55 AA 0A 00 0B 00 00 28 00 D6 55 AA 0A 00 0C 00 00 28 00 D1 55 AA 0A 00 0D 00 00 28 00 D0 55 AA 0A 00 0E 00 00 28 00 D3

0x0F Set device parameter instructions

1.Adjust brightness

Send: 5A A5 07 0F 01 XX XOR

Command: 0x0F

Byte Length: 0x07

Data:

BYTE1
Brightness: Range: 1-100

Responds: 5A A5 06 8F 01 XOR

Command: 0x0F

Byte Length: 0x06

Data: None

2.Set sound

Send: 5A A5 07 0F 02 XX XOR

Command: 0x0F

Byte Length: 0x07

Data:

BYTE1
Sound switch: 1: On 0: off

Responds: 5A A5 06 8F 02 XOR

Command: 0x0F

Byte Length: 0x06

Data: None

2. Set CAN baud rate

Send: 5A A5 07 0F 03 XX XOR

Command: 0x0F

Byte Length: 0x07

Data:

BYTE1

CAN Baud Rate 1:250K ,2:500K,3:10 00
--

Responds: 5A A5 06 8F 03 XOR

Command: 0x0F

Byte Length: 0x06

Data: None

4.Set date and time

Send: 5A A5 0D 0F 04 XX XX XOR

Command: 0x0F

Byte Length: 0x0D

Data:

BYTE1	BYTE2	BYTE3	BYTE4	BYTE5	BYTE6	BYTE7
Year	Month	Day	Week	Hour	Minute	Second

Responds: 5A A5 06 8F 04 XOR

Command: 0x0F

Byte Length: 0x06

Data: None

Example: 27th of Nov ,2025, Thursday 14/15/30

Send: 5A A5 0D 0F 04 19 0B 1B 04 0E 0F 1E EB

Responds: 5A A5 06 8F 04 72

0x10 Query device parameter instructions

Send: 5A A5 05 10 XOR

Command: 0x10

Byte Length: 0x05

Data: None

Responds: 5A A5 07 90 XX XX XOR

Command: 0x10

Byte Length: 0x07

Data:

BYTE1	BYTE2	BYTE3
Brightness: Range: 1-100	Sound Switch: 1: On 0: Off	CAN Baud Rate 1:250K ,2:500K,3:1000 K

0x11 Request hardware version number

Send: 5A A5 05 11 XOR

Command: 0x11

Byte Length: 0x05

Data: 01

Responds: 5A A5 XX 91 XX XX XOR

Command: 0x11

Byte Length:

Data: Hardware version number (ASCII)

Example:

Send: 5A A5 05 11 EB

Responds: 5A A5 15 91 44 35 30 30 5F 56 37 20 20 20 20 20 20 20 20 14

0x12 Request software version number

Send: 5A A5 05 12 XOR

Command: 0x12

Byte Length: 0x05

Data:

Responds: 5A A5 XX 92 XX XX XOR

Command: 0x12

Byte Length:

Data: Software version number (ASCII)

Example:

Send: 5A A5 05 12 E8

Responds: 5A A5 15 92 44 41 30 31 5F 56 31 2E 31 2E 37 20 20 20 20 62

0x13 Tire exchange instruction

Send: 5A A5 07 13 XX XX XOR

Command: 0x13

Byte Length: 0x07

Data:

BYTE1	BYTE2
The tire number of the first wheel	The tire number of the second wheel

Responds: 5A A5 05 93 XOR

Command: 0x13
Byte Length: 0x05
Data: None

Example: Swap the tire with tire number 1 and the tire with tire number 2
Send: 5A A5 07 13 01 02 E8
Responds: 5A A5 05 93 69

0x14 Query all sensor IDs

Send: 5A A5 05 14 XOR
Command: 0x13
Byte Length: 0x07
Data: None

Responds: 5A A5 len 94 XX XX XOR
Command: 0x13
Byte Length:
Data:

BYTE1	BYTE2	BYTE3	BYTE4	BYTE5
The tire number of the first wheel	The first wheel's ID0	The first wheel's ID1	The first wheel's ID2	The first wheel's ID3
BYTE6	BYTE7	BYTE8	BYTE9	BYTE10
The tire number of the second wheel	The second wheel's ID0	The second wheel's ID1	The second wheel's ID2	The second wheel's ID3
...				

Example:
Send: 5A A5 05 14 EE
Responds: 5A A5 19 94 01 00 00 00 02 02 00 00 00 01 03 00 00 00 03 06 00 00 00 06 72

0x15 Restore Default

1.Restore alarm threshold

Send: 5A A5 06 15 01 XOR
Command: 0x15

Byte Length: 0x06

Data: None

Responds: 5A A5 06 95 01 XOR

Command: 0x15

Byte Length: 0x06

Data: None

Example:

Send: 5A A5 06 15 01 ED

Responds: 5A A5 06 95 01 6D

0x16 Set Unit Instructions

Send: 5A A5 07 16 XX XX XOR

Command: 0x16

Byte Length: 0x07

Data:

BYTE1	BYTE2
Pressure Unit 1:BAR, 2:KPA, PSI	Temperature Unit 1:°C, 2:°F

Responds: 5A A5 05 96 XOR

Command: 0x16

Byte Length: 0x05

Data: None

Example:

Send: 5A A5 07 16 01 01 EE

Responds: 5A A5 05 96 6C

0x17 Query unit instructions

Send: 5A A5 05 17 XOR

Command: 0x17

Byte Length: 0x05

Data: None

Responds: 5A A5 07 17 XX XX XOR

Responds: 5A A5 05 98 62

0x19 Query alarm shielding instructions

Send: 5A A5 05 19 XOR

Command: 0x19

Byte Length: 0x05

Data: None

Responds: 5A A5 37 19 XX XX XOR

Command: 0x19

Byte Length: 0x37

Data:

BYTE1	BYTE2	BYTEN	BYTE50
Alarm status of the first wheel	Alarm status of the second wheel	Alarm status of the N wheel	Alarm status of the 50 th wheel

Alarm status	Bit0	Abnormal sensor signal alarm	Normal: 0	Block: 1
	Bit1	Tire leakage alarm	Normal: 0	Block: 1
	Bit2	High pressure alarm	Normal: 0	Block: 1
	Bit3	Low pressure alarm	Normal: 0	Block: 1
	Bit4	High temperature alarm	Normal: 0	Block: 1
	Bit5	Sensor low battery alarm	Normal: 0	Block: 1
	Bit6	Repeater abnormal alarm	Normal: 0	Block: 1
	Bit7	Retain	Send 0	

Example:

Send: 5A A5 05 19 E3

[illegible]

0x1F Upgrade instruction

Send: 5A A5 0A 1F 00 seed0 seed1 seed2 seed3 XOR

Command: 0x1F

Byte Length: 0A

Data: Four digit random number

Responds: 5A A5 0A 9F 00 key0 key1 key2 key3 XOR

Command: 0x1F

Byte Length: 0A

Data: Four digit random number

Send: 5A A5 07 1F 01 XX XOR

Command: 0x1F

Byte Length: 0x07

Data: Is encryption successful (Approved: 1 Failure: 0)

Send: 5A A5 07 1F 01 XX XOR

Command: 0x1F

Byte Length: 0x07

Data: Does the slave machine meet the upgrade conditions (Support: 1 not Support: 0)

Example:

Send: 5A A5 0A 1F 00 12 34 56 78 E2

Responds: 5A A5 0A 9F 00 77 53 1D D0 83

Send: 5A A5 07 1F 01 01 E7

Responds: 5A A5 07 9F 01 01 67

The host sends an upgrade instruction with a four byte random number to the slave, and the slave returns four bytes of encrypted data upon receiving it. After encryption passes and the slave meets the upgrade conditions, the upgrade is performed according to the YMODEM protocol.