

TR-400 Series

Industrial Router Datasheet

The TR-400 Series industrial routers are independently developed and manufactured by Tespro. They integrate Wi-Fi 6 (AX3000), 4G/5G cellular networks, IoT interfaces, and VPN encryption to deliver secure and reliable connectivity. Powered by TesproOS with a Web management platform, they support device monitoring, configuration, protocol management, and remote maintenance in complex network environments.

The TR-400 Series supports Gigabit Ethernet, 4G/5G access, serial communication, Modbus/BACnet gateways, and energy management. It provides stable and intelligent communication solutions for IoT deployments, industrial automation, and smart applications.



Global Network Adaptation

2G / 3G / 4G / 5G



1*WAN + 2/4*LAN

10/100/1000Mbps



Wi-Fi 4: 802.11b/g/n

Wi-Fi 6: 802.11a/b/g/n/ac/ax



1*RS232 + 2*RS485

4*GPIO

Typical application scenarios



Applied Topology



Core Advantages



2G/3G/4G/5G cellular networks

Supports 2G/3G/4G/5G cellular networks, with Cat.1, Cat.4 and Cat.6 for 4G access. 5G supports both NR and RedCap networks. Dual SIM and dual eSIM enable flexible network switching and link redundancy.



Gigabit Ethernet Interface + Wi-Fi

Gigabit Ethernet supports WAN/LAN auto-sensing, Dual-band Wi-Fi 4/6 (2.4/5GHz) reliable industrial equipment connectivity, data transmission and on-site networking.



Integrated serial and GPIO interfaces

An integrated design featuring serial ports (1×RS232 + 2×RS485) and four sets of GPIO interfaces facilitates the connection of industrial equipment and enables control of digital (on/off) inputs and outputs.



TesproOS System with an Extensive Protocol Library

TesproOS enables real-time device monitoring, remote configuration and fault log diagnosis. It also supports batch OTA firmware upgrades, reducing maintenance costs and minimizing on-site service visits and troubleshooting.



Remote O&M

TesproOS enables real-time monitoring, remote configuration and fault diagnosis. Batch OTA upgrades simplify maintenance, reduce service costs and improve efficiency, while minimizing on-site service visits.



Excellent weather resistance

Operates reliably from -40°C to +75°C with 5%–95% RH non-condensing humidity. Designed for harsh industrial environments, including high-altitude and extreme operating conditions.

Features

Performance & Hardware

- Dual-core Cortex-A53 processor, 1.3GHz clock speed, integrated hardware NAT acceleration.
- 512MB DDR3 RAM + 256 MB Flash; supports up to 512 MB RAM (optional)
- Standard MiniPCle and M.2 slots; compatible with global 4G/5G cellular networks
- MicroSD card slot supporting up to 128 GB storage expansion (optional)

Interfaces & Connectivity

- 3 or 5 Gigabit Ethernet ports (2/4 LAN + 1 WAN)
- Built-in lightning protection with 3 kV electromagnetic isolation
- Dual-band 2.4 GHz (up to 574Mbps) + 5 GHz (up to 2402 Mbps); supports AP/Client modes
- 3 serial ports: 1 × RS232 + 2 × RS485, with high-voltage isolation
- 4 × GPIOs, configurable as DI/DO
- Cellular/Wi-Fi/Ethernet link backup with ICMP detection

Protocols & Applications

- Modbus RTU/TCP gateway with MQTT/TCP/UDP/HTTP northbound communication
- BACnet gateway supporting BACnet/IP and BACnet MS/TP southbound data acquisition
- IPsec, OpenVPN, GRE, L2TP, PPTP, DMVPN and WireGuard
- Real-time energy consumption monitoring and multi-device alerts

Security & Networking

- Built-in TesproOS, enabling secure remote access, O&M, protocol management, and rapid mobile configuration
- Industrial-grade firewall with zone-based security policies
- Application-layer traffic identification (NetCtrl/DPI engine)
- Supports network functions such as DDNS, VRRP, DHCP Server, and IP Passthrough
- Event alert methods: SMS, Email, DO, SNMP Trap

Reliability & Protection

- Automatic network disconnection detection with auto-reboot upon dial-up failure or on a scheduled basis
- OTA — Multiple remote firmware upgrade methods
- 12–36 VDC / 3 A with automatic over-voltage cutoff protection
- Reverse polarity, surge and ESD protection

Management & Development

- proprietary TesproOS (Linux) and provides support for SDK and app development.
- Web management interface with support for switching between dark and light themes

TesproOS

TesproOS System

Remote Management and Cloud Integration

Make Device Connectivity Simpler, Safer, and More Efficient



Remote O&M

Remotely monitor device status, manage configurations, and receive real-time alarms and alerts.



Mobile Configuration

Quickly configure devices through a mobile phone or convenient smart device for easier management.



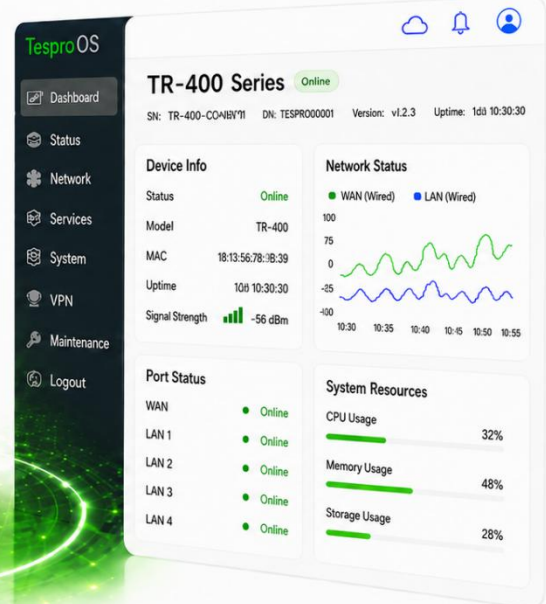
Software & Protocol Library Management

Protocol libraries for connection management and data sharing, efficiently supporting various application scenarios.



Online Firmware Upgrade

Upgrade firmware online to keep devices updated and improve security and stability.



Cloud Remote Management



Easy Configuration



Efficient Connectivity



Rich Features



Secure & Reliable



Device Group Batch Management

Protocol Support

Protocol Ecosystem Library

A rich industrial protocol ecosystem and rapid customization capabilities make device integration easier and enable plug-and-play

1



Northbound Integration Protocols

- MQTT
- TCP
- UDP
- HTTP
- OPC UA Client
- QPC UA Server

2



Industrial Bus Protocols

- Modbus RTU/TCP Master + Slave
- BACnet IP / MS/TP
- ProfiNet, EtherNet, EtherCat

3



VPN & Security Protocols

- OpenVPN
- WireGuard
- IPsec
- PPTP
- nftables Firewall

4



Rich Industry Protocols

Protocols for power, grid, energy storage and other industries

- PLC
- DLT645
- IEC1107
- IEC61850
- DLMS
- DLT698



Rich Service Stack



Flexible Integration



Reliable Communication



Remote Connectivity



Hardware Specifications

Category	TR-420	TR-424	TR-425	TR-440	TR-444	TR-445
Hardware System						
CPU	Dual-core Cortex-A53 processor, clocked at 1.3GHz					
RAM	512MB, DDR3					
FLASH	256 MB					
Network Interfaces						
Ethernet Ports	3 x 10/100/1000 Mbps Ethernet ports			5 x 10/100/1000 Mbps Ethernet ports		
Cellular Network	/	4G LTE: Cat1/Cat4/Cat6	5G NR: eMBB/RedCap	/	4G LTE: Cat1/Cat4/Cat6	5G NR: eMBB/RedCap
WAN	1 x WAN 10/100/1000 Mbps					
LAN	2 x LAN 10/100/1000 Mbps			4 x LAN 10/100/1000 Mbps		
SIM Card Slot	/	Dual SIM / Dual eSIM / 1 x SIM + 1 x eSIM		/	Dual SIM / Dual eSIM / 1 x SIM + 1 x eSIM	
Antenna	SMA female connector (external thread, center socket); 4 antenna ports					
Physical Interfaces						
Grounding Terminal	1 × Grounding Screw					
Status LEDs	6			8		
Reset Button	1					
Industrial Interfaces						
Serial Ports	2 x RS485 + 1 x RS232, 3 kV high-voltage isolation					
I/O Interfaces	Supports 4 x I/O, configurable as DI/DO					
Wi-Fi / WLAN						
Wi-Fi Frequency	2.4GHz, 5GHz					
Protocol Standards	Wi-Fi 4: 802.11b/g/n, Wi-Fi 6: 802.11a/b/g/n/ac/ax					
Maximum Transmission Rate	AX3000					
Data Rate	802.11b/g/n: up to 574 Mbps; 802.11a/b/g/n/ac/ax: up to 2402 Mbps					
Transmit Power	802.11b: 16 dBm +/- 2 dBm (11 Mbps); 802.11g: 16 dBm +/- 2 dBm (54 Mbps); 802.11n@2.4 GHz: 16 dBm +/- 2 dBm (HT20 MCS7); 802.11n@2.4 GHz: 16 dBm +/- 2 dBm (HT40 MCS7)					
Transmission Distance	Line-of-sight <= 100 m (actual transmission distance depends on the site environment)					
Power Supply						
Power Connector	1 x DC power connector (DC 2.1)					
Input Voltage Range	DC input: 12-36 V; reverse-polarity protection supported					
PoE (Optional)	Supports PoE power input; compatible with IEEE 802.3af / IEEE 802.3at (PoE+) standards					
Standby Power	120mA–200mA @12V					
Operating Power	150mA–320mA @12V					
Peak Power	320mA @12V					

Hardware Specifications

Category	TR-420	TR-424	TR-425	TR-440	TR-444	TR-445
Environmental Conditions						
Operating Temperature	-40°C ~ +75°C					
Operating Humidity	5% to 95% (non-condensing)					
Storage Temperature	-40°C ~ +80°C					
Mechanical Characteristics						
Dimensions	116 x 134 x 34 mm (including antenna connectors)					
Protection Rating	IP30					
Enclosure	Metal enclosure panel					
Installation	DIN-rail / Wall-mounted					
Cooling Method	Fanless cooling					
Product Weight	450 g					
Reliability						
Shock	IEC60068-2-27					
Vibration	IEC60068-2-6					
Drop	IEC60068-2-32					
Certifications & Standards						
Regulatory Certifications	CE, RCM, UKCA, RoHS, Kenya					
EMC Standards	EN 55032; EN 55035; EN IEC 61000-6-3:2021; EN IEC 610000-6-1:2019; EN 301489-1; EN 301489-17; EN 301 489-52					
RF Standards	EN300328; EN301893; EN301511; EN301908-1/-2/-13					
SAR+Safety	EN50665; EN IEC62368-1					
Cybersecurity	EN18031-1; EN18031-2					
Electrostatic Discharge (ESD)	EN 61000-4-2:2009					
Radiated Immunity	EN IEC 61000-4-3:2020					
Electrical Fast Transient/Burst (EFT)	EN 61000-4-4:2012					
Surge Immunity	EN 61000-4-5:2014 + A1:2017 (Ethernet ports)					
Conducted Immunity	EN 61000-4-6:2014					
Ring Wave Immunity	EN61000-4-12, level 3					
Power-Frequency Magnetic Field Immunity	EN61000-4-8, horizontal/vertical 400 A/m (> level 2)					

Software Specifications

Category	TR-420	TR-424	TR-425	TR-440	TR-444	TR-445
Industrial Protocols & Data Capabilities						
Industrial Protocols	Includes Modbus RTU, Modbus TCP, BACnet, M-Bus, OPC UA, and other protocols					
Modbus	Modbus RTU, Modbus TCP					
Industrial Device Protocols	PROFINET, EtherCAT, EtherNet (optional)					
BACnet	BACnet					
OPC UA	OPC UA					
Meter Protocols	DLT 645-2007, IEC 1107, IEC 61850, IEC 62056-21, DLMS					
DNP3	Supported modes: Station, Outstation; connection: TCP					
DLMS/COSEM	DLMS					
Custom Modbus Registers	Custom Modbus TCP register block requests; supports reading/writing files in the router, extending Modbus TCP client functionality					
Supported Data Formats	INT/UINT (8/16/32-bit), 32-bit Float, HEX, ASCII; supports MSB/LSB and byte-order conversion (ABCD/DCBA/CDAB/BADC)					
DTU Functions	Supports TCP/UDP transparent transmission; Modbus RTU-to-Modbus TCP conversion; DCTCP/DCUDP modes					
Data to Server	Supports HTTP(S)/MQTT/Azure MQTT; multi-source data aggregation and reporting; customizable acquisition interval (minimum 1 s); supports custom Lua script extensions					
Modbus / MQTT Gateway	Allows commands to be sent to a Modbus Server via an MQTT Broker and data to be received					
API / Web API	Supports Web API; API endpoints are used to retrieve or modify data					
Network Capabilities						
Network Access	2G / 3G / 4G / 5G cellular networks (or VPDN private network)					
Access Authentication	Supports CHAP / PAP authentication					
LAN Protocols	ARP, Ethernet					
WAN Protocols	PPP, PPPoE, DHCP					
Network Protocols	TCP, UDP, IPv4, IPv6, ICMP, NTP, DNS, HTTP, HTTPS, SFTP, FTP, SMTP, SSL/TLS, ARP, VRRP, PPP, PPPoE, UPNP, SSH, DHCP, Telnet, SMPP, SNMP, MQTT					
Routing	Static routing, OSPF dynamic routing					
NAT	DMZ, NAT, NAT-T, NAT64 (listed under Firewall)					
DHCP	Static and dynamic IP assignment, DHCP relay, DHCP server configuration/status, and static leases; supports wildcard MAC addresses					
Network Backup / Failover	Wi-Fi WAN, VRRP, and wired connection options can all be used for automatic failover					
QoS	Traffic priority queuing based on source/destination, service, protocol, or port; WMM, 802.11e					
IP Applications	Supports Ping, Trace, DHCP Server, DHCP Relay, DHCP Client, DNS relay, DDNS, Telnet					
DNS / DDNS	Supports DoH (DNS over HTTPS), multiple DDNS provider configurations, and manual customization					

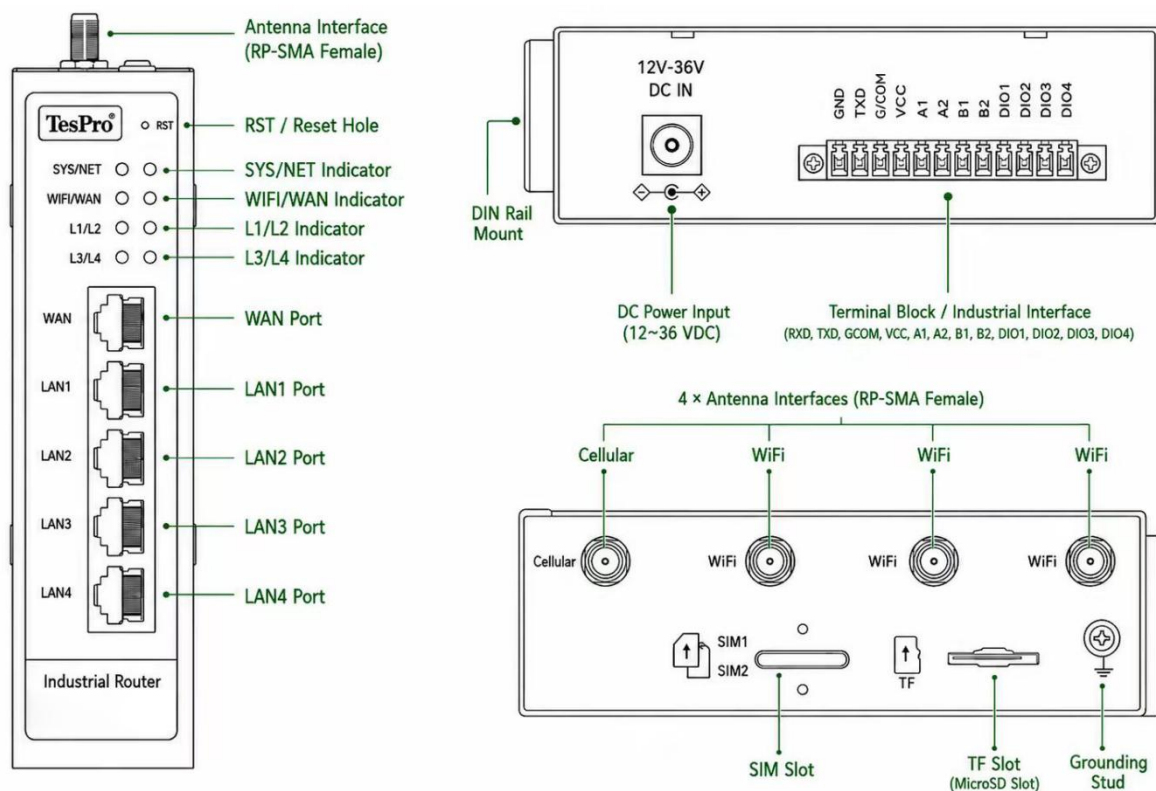
Software Specifications

Category	TR-420	TR-424	TR-425	TR-440	TR-444	TR-445
Wi-Fi						
Wireless Mode	Wi-Fi 4: 802.11b/g/n, Wi-Fi 6: 802.11a/b/g/n/ac/ax, Access Point(AP), Station(STA)					
Wi-Fi Security	WPA2-Enterprise/PSK, WPA-EAP/PSK, WPA3-SAE/EAP, OWE; AES-CCMP, TKIP, client separation, EAP-TLS, 802.11w PMF, etc.					
Wi-Fi Users	Wi-Fi 4: up to 30 simultaneous connections; Wi-Fi 6: up to 256 simultaneous connections					
Hotspot Relay	Forwards the Wi-Fi hotspot login page to downstream connected devices					
SSID / ESSID	SSID stealth mode; MAC-address-based access control					
Operating Modes	Supports AP, Client, and WDS modes					
Security Features	Open System, Shared Key, WPA/WPA2 authentication; WEP/TKIP/AES encryption					
Network Security & VPN						
Network Protection	Port forwarding / traffic rules / custom TTL; WebUI / CLI firewall configuration; DMZ, NAT / NAT-T / NAT64					
Data Protection	Supports PPTP, L2TP, GRE, IPsec VPN, DMVPN, OpenVPN, WireGuard, and other VPN functions; supports digital certificate CA					
Authentication	Pre-shared key / X.509 digital certificates, TACACS+, built-in / external RADIUS authentication, IP/time/login-attempt blocking, random password generator					
Attack Protection	DDoS protection (SYN flood, SSH, HTTP/HTTPS attack protection); port-scan protection (SYN-FIN, SYN-RST, X-mas, NULL flags, FIN scan attacks)					
VLAN	Port- and tag-based VLAN isolation					
Access Control	Flexible access control for SSH, Web interface, CLI, and Telnet					
Web Filter	Blacklist for unwanted websites; whitelist for allowed websites only					
Certificate Management	Certificate generation tool for creating CA, server, client, Let's Encrypt, and SCEP certificates					
OpenVPN	Supports multiple clients and one server running simultaneously; supports 27 encryption methods					
IPsec	XFRM, IKEv1, IKEv2; 14 encryption methods for IPsec: 3DES, DES, AES128, AES192, AES256, AES128/192/256GCM8/12/16					
WireGuard	Supports WireGuard VPN client and server					
GRE	Supports GRE tunnels and GRE over IPsec tunnels					
PPTP / L2TP	Client/Server instances can run simultaneously; supports L2TPv3 and L2TP over IPsec					
DMVPN	Scalable IPsec VPN supporting Phase 2, Phase 3, and Dual Hub					
SSTP	Supports SSTP client instances					
ZeroTier	Supports ZeroTier VPN client					
Stunnel	Proxy adds TLS encryption to existing clients and servers					
Tinc	Encryption, authentication, and compression within tunnels; supports client and server modes					
EoIP	Ethernet over IP tunnel based on GRE RFC 1701					

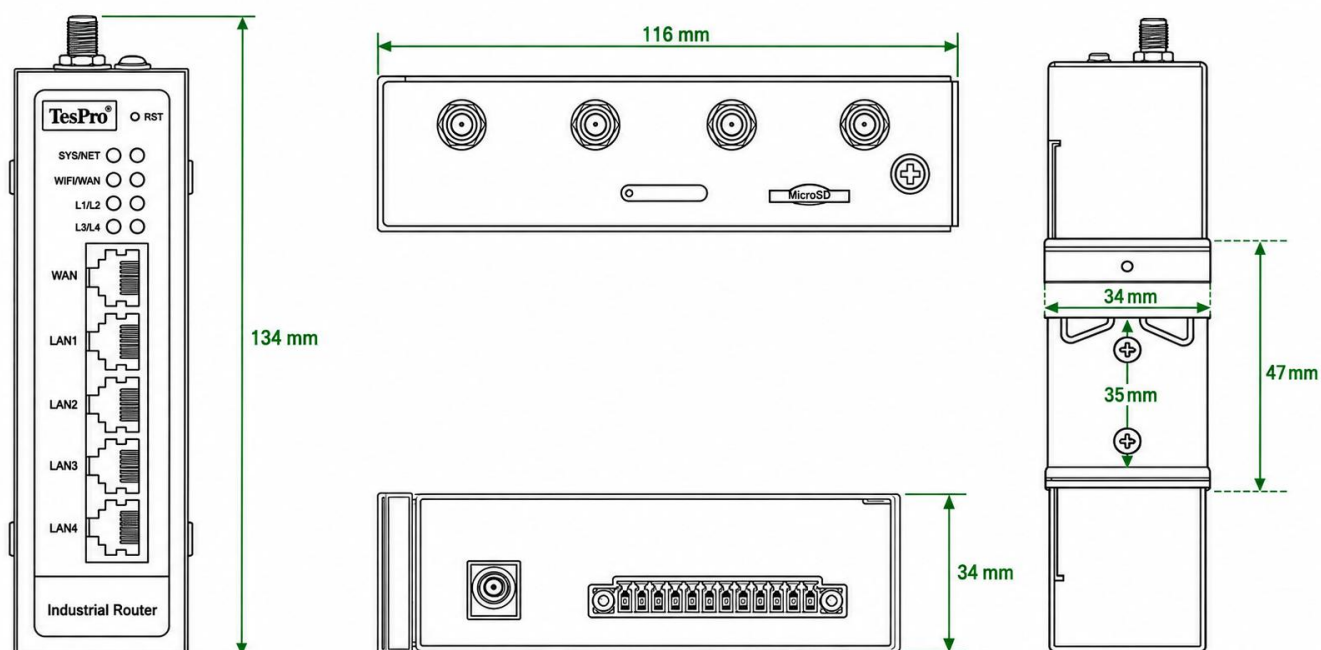
Software Specifications

Category	TR-420	TR-424	TR-425	TR-440	TR-444	TR-445
Management & Platform						
Configuration Methods	Web UI, CLI, SSH, JSON-RPC, TesproOS, etc.					
Cloud & IoT Platform Integration	Supports major global platforms: Google, Huawei, Amazon, Microsoft Cloud, iStarOS, Azure IoT Hub, other third-party cloud platforms, and custom clouds					
FOTA	Firmware updates from server with automatic notifications					
SNMP	SNMP (v1, v2, v3), SNMP Trap					
MQTT	MQTT Broker, MQTT Publisher					
JSON-RPC	HTTP/HTTPS-based management API					
SSH	SSH (v1, v2)					
Upgrade Methods	FOTA; Web UI					
Logging	Event logs, system logs, kernel logs					
Alarm Functions	Email message status alerts					
On-Demand Dialing / Activation	On-demand dialing, data activation, SMS activation					
Email	Receives email message status alerts from various services					
Software System						
Operating System	TesproOS (Linux)					
Supported Languages	BusyBox shell, Lua, C, C++, Python					
Development Tools	SDK package including build environment					
Custom Firmware / GPL Customization	Supports custom-branded firmware and Web page applications (colors, logo, etc.)					
Package Management	Supports installation of additional software packages					
Firmware & Configuration						
Web UI Upgrade	Update firmware from file; check firmware on server; configuration files; configuration backup					
FOTA Upgrade	Firmware update					
Cloud Batch Upgrade	Supports updating firmware/configuration on multiple devices at once through TesproOS					
Upgrade While Retaining Configuration	Updates firmware without losing the current configuration					
Factory Reset	Full factory reset, restoring all system settings including IP address, PIN code, and user data					
Environment & Reliability						
Hot Standby / VRRP	VRRP (listed under Network Backup)					
Link Connectivity Detection	Heartbeat detection; automatic reconnection after link disconnection					
Dual-SIM Link Switching	Supports dual-SIM or dual-eSIM link switching					
Embedded Watchdog	Device operation self-check with automatic fault recovery					

Interface Diagram



External dimensions



Accessories and Packaging



TR-400 Series Industrial Router
1 pc



Power Adapter
1 pc



Cellular Antenna
1 pc



Wi-Fi Antenna
3 pcs



Ethernet Cable (RJ45)
1 pc



Quick Start Guide
1 pc



Overall Dimensions

300 × 220 × 130 mm

Made of eco-friendly recyclable packaging materials, meeting green environmental requirements.

Product Selection

Product Model	Cellular Networks and Frequency Bands	Ethernet Interface	Wi-Fi	S: Serial port
TR-420	No cellular network	1*WAN + 2*LAN 10/100/1000Mbps	Wi-Fi 4: 802.11b/g/n Wi-Fi 6: 802.11a/b/g/n/ac/ax	1*RS232+2*RS485 4*GPIO
TR-440		1*WAN + 4*LAN 10/100/1000Mbps		
TR-424	4G LTE Cat.1 / Cat.4 / Cat.6 LTE FDD: B1/3/5/7/8/20/28/71/66	1*WAN + 2*LAN 10/100/1000Mbps		
TR-444	LTE TDD: B38/40/41 WCDMA: B1/3/5/8	1*WAN + 4*LAN 10/100/1000Mbps		
TR-425	5G NR / RedCap: n1/3/5/7/8/20/28/38/40/41/71/77/78/66 LTE FDD: B1/3/5/7/8/20/28/71/66	1*WAN + 2*LAN 10/100/1000Mbps		
TR-445	LTE TDD: B38/40/41	1*WAN + 4*LAN 10/100/1000Mbps		

About Tespro

Tespro is an industrial IoT manufacturer with 25 years of experience, specializing in AI computing, industrial IoT, power communication equipment, and software. Its products include industrial gateways, routers, DTUs, optical probes, testing instruments, and management platforms for energy, automation, smart buildings, and commercial applications. With branches in the U.S., U.K., Singapore, Hong Kong, and Zhuhai, Tespro serves 150+ countries and partners with Fortune Global 500 companies.

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