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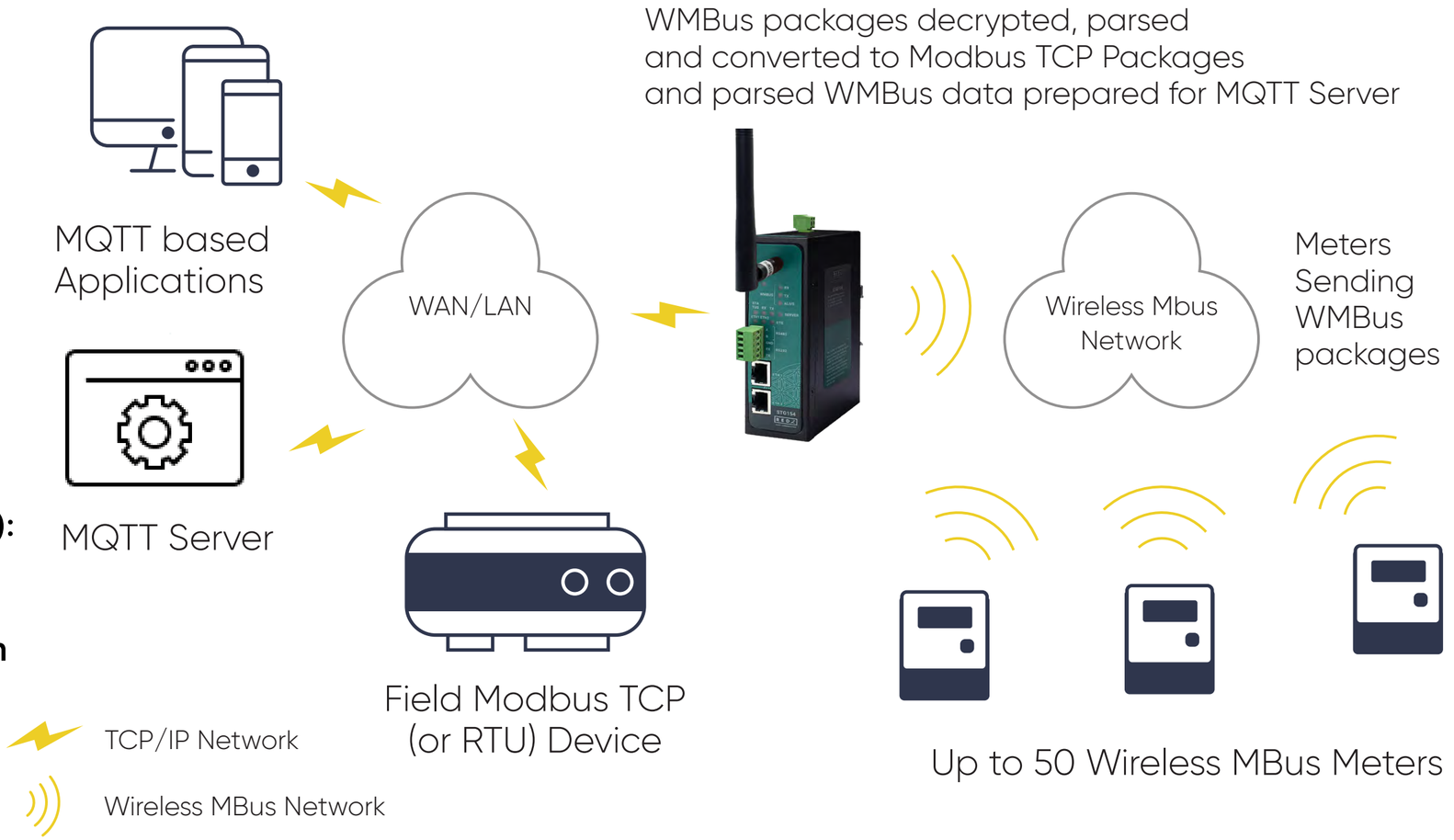
# STG Series WMBUS (Wireless MBus) Gateway

**WMbus to Modbus TCP/RTU Gateway**
**with MQTT Data Send Function**
**WMbus to Serial/TCP Transparent Conversion Function**
**WMbus Repeater Function**

**with 2 × 10/100Base-T(x) Ports,**
**1 × RS232 and 1 × RS485 Serial Ports**
**and option for BPL (Broadband Power Line Link)**

STG Series WMBus Gateways can get Wireless MBus frames over air, Decrypt Up to 50 device packets, parse and map those parsed data to Modbus registers as well as send data to MQTT Server.STG has auto configuration feature to automatically list the received WMBus packages on configuration web interface for easy configuration. STG has 6 Device Functions:

1. TCP/IP to WMBus Gateway: Receive WMBus frames and send to TCP Ip client device connected to STG. STG can also send WMbus frames from TCP side to WMbus side (generation of frames).
2. WMBus - Modbus TCP Gateway (and MQTT Publisher): STG can get WMBus frames, decrypt, parse, convert to Modbus TCP (and send to MQTT)
3. WMBus Decoder/Parser and MQTT Publisher: STG can get WMBus frames, decrypt, parse and send to MQTT (almost same like function 2 but no Modbus)
4. Serial to WMBus Gateway: Receive WMBus frames and send to Serial local device connected to STG over RS232 or RS485. STG can also send WMbus frames from serial side to WMbus side (generation of frames).
5. WMBus - Modbus RTU Gateway (and MQTT Publisher): STG can get WMBus frames, decrypt, parse, convert to Modbus RTU ( and send to MQTT)
6. WMBus Repeater: STG can receive WMBus frames and send them again as WMBus messages to air. This is a repeater function.




STG In all function modes 1-2-3-4-5-6: STG can decrypt up to 50 devices frames, for example in Function 6: Repeater function.

Typical applications: Automated Meter reading, Home – Building – Industrial Automation, Wireless Sensors, Telemetry...

STG models with Broadband Power Line (BPL) link can communicate with full transparent TCP/IP standard over Low Voltage power lines and allows easy connection between TCP/IP based terminals without use of extra cables.

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# Main Features

- Supports 2 x 10/100Base-T(X) ports
- Supports Full/Half-Duplex, auto MDI/MDI-X on each port
- DHCP Server Capability
- Supports 1 x RS232 and 1 x RS485 Serial Connection up to 460800 Baud
- Embedded web interface for ease of use
- **868MHz Wireless MBus (WMBus) Radio Frequency (RF) Communication**
- **1 Device with Many Functions:**
  **WMbus to Modbus TCP/RTU Gateway**
  **with MQTT Data Send Function**
  **WMbus to Serial/TCP Transparent Conversion Function**
  **WMbus Repeater Function**
- **Allows connection of multiple Modbus Master devices in Modbus TCP or RTU Conversion Modes**
- **MQTT Publisher with different data transfer options**
  **Raw WMBus Decrypted Frame**
  **Parsed WMBus Frame As Objects**
  **Parsed WMBus Frame As Modbus Frame**
- **WMBus link mode Configurable (S - Mode, T - Mode, C - Mode, C/T - Mode together)**
- **AES Decryption of Received Frames for up to 50 Devices (Mode 5, Mode 7, Mode 128 and custom modes)**
- **Supported CI Values: 53h, 5Bh, 60h, 6Ch, 6Dh, 6Eh, 6Fh, 72h, 74h, 75h, 78h, 7Ah, 7Ch, 7Dh, 80h, 8Ah, 8Bh, 8Ch, 8Dh, 8Eh, 8Fh, C3h, C4h, C5h**
- **Decrypted WMBus data can be parsed based on WMBus OMS or custom data model of manufacturer**
- **Auto Configuration based on received WMBus frames**
- **Unlimited Numbers of WMbus device data can be listened over air and WMBus frames can be sent to remote/local TCP or Serial devices**
- **WMBus Radio Power Level Configurable (-1 dBm to 13 dBm) when sending WMBus frames in WMbus to Serial/TCP Transparent Conversion Function and WMbus Repeater Functions**
- Easy to follow WMBus data packages on web interface
- Easy monitor of parsed WMbus OMS Parsed data on web interface
- Easy to follow Device Status on web interface
- Black List and White List based WMBus package filter
- Firmware Upgrade over Web
- 2 firmware storage capability on same device (1 active only)
- AC or DC wide range power options
- Wide operating temperature range from -25 to 70 °C AC and -40 to 85 °C DC power input versions
- Rugged Metal IP-40 housing design
- DIN-Rail mounting

**Extra Features for Models with BPL ( Broadband Powerline)**

- Supports 2 x 10/100Base-T(X) ports + 1 x BPL link
- Wide range 3 phase AC input
- Supports up to 30Mbps PHY rate on BPL with Up to 10 hops and 1000 nodes
- Up to 432 sub-carriers from 2 to 28MHz analog bandwidth
- Support LDPC-C FEC with 128-bit AES core
- Plug and play with Master/Slave selection via web interface

# Technical Specifications

## Connectors and Ports

| | |
|---|---|
| SMA Antenna Connector | 1 Standard SMA Female Interface for WMBus, 50 ohm |
| Console Port | Micro USB or USB Type-C connection for LOG in 115200 baud |
| 10/100T(X) RJ45 Ports | Ethernet Connection on 2 ports |
| Serial Ports | 5 pin wired Terminal Connection<br>Tx, Rx, GND for RS232<br>A and B for RS485 |
| Reset Buttons | Reset to Client and Reset to Server Operating modes buttons |

## WMBus Technology

| | |
|---|---|
| WMBus Module | 868MHz Wireless MBus (WMBus) Radio Frequency (RF) Communication |


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| | |
|---|---|
| Link Budget | Up to 130 dB |
| Communication Distance | Up to 3km (line of sight)<br>~100m, Typical Communication Distance Indoor/Urban |
| Link Modes | Configurable (S - Mode, T - Mode, C - Mode, C/T - Mode together) |
| Supported CI Values | 53h, 5Bh, 60h, 6Ch, 6Dh, 6Eh, 6Fh, 72h, 74h, 75h, 78h, 7Ah, 7Ch, 7Dh, 80h, 8Ah, 8Bh, 8Ch, 8Dh, 8Eh, 8Fh, C3h, C4h, C5h for standart models |
| Decryption | AES Decryption of Received Frames for up to 50 Devices (Mode 5, Mode 7, Mode 128 and custom modes) in standart models<br><br>There is also version with up to 16 device decryption and supports only Mode 5 |
| Parsing | Decrypted WMBus data can be parsed based on WMBus OMS or custom data model |
| Auto Configuration | Automatically lists the received WMBus frames with signal strength (RSSI) for easy configuration |
| WMBus to Serial/TCP Conversion Function | Receiving WMBus frames can be turned off if not used<br><br>Unlimited Numbers of WMbus device data can be listened over air and WMBus frames can be sent to Local/Remote TCP or serial devices. Up to 50 device’s frames still can be decrypted in this mode |
| Output Power Level | Configurable (-1 dBm to 13 dBm), used when sending frame in WMbus to Serial/TCP Transparent Conversion Function and WMbus Repeater Functions |

# Modbus Characteristics

| | |
|---|---|
| Modbus Protocol | Modbus TCP or RTU<br>Configurable |
| Modbus Devices | Allows connection of multiple Modbus Master devices in Modbus TCP or RTU Conversion Modes |
| Modbus Address | Modbus address freely can be assigned up to 50 WMBus Devices in standart models<br><br>There is also version with up to 20 WMBus devices data parsing and modbus mapping (and decrypt 16 devices) |
| Modbus Data | Data can be read via Function Code 3<br>Read Holding Registers (4x) |
| Data Structure | Modbus data is stored in three parts:<br>Status Block, several Data Blocks depends on number measurements stored in WMBus device and finally the Service Block.<br><br>Status Block, 6 Registers:<br>- WMbus Device ID: 2 Registers<br>- WMbus Man ID: 1 Register<br>- WMbus Version: 1 Register<br>- WMbus Type: 1 Register<br>- Total Data Count: 1 Register<br>(Represents how many data blocks exists) |
| | Data Block, each 5 Bytes total n bytes:<br>- Storage Number: 1 Register<br>- Function Field: 1 Register<br>- Data Type: 1 Register<br>- Data Value: 2 Registers<br><br>Service Block, 4 Registers:<br>- Access Number: 1 Register<br>- RSSI Value: 1 Register<br>- Status (from Frame): 1 Register<br>- Decrypt Status: 1 Register |

# MQTT Details

MQTT Publisher can be enabled and can be used in parallel with Modbus conversion (or stand alone)

| | |
|---|---|
| MQTT Connection | Broker IP and Port can be entered<br>Client ID , User name and Password can be set<br><br>Publish Topic and Subscribe Topic can be defined from web interface |
| Data Send Interval | User can send Data send interval in seconds<br>Default is 60 seconds and STG will send meter data to MQTT server in that interval |
| NTP Server | NTP server time will be added to each MQTT message |
| Data Format | There are 3 predefined formats<br>RAW WMBUS DECRYPTED DATA: STG will share WMBus frame as it is but decrypted<br>PARSED DATA AS OBJECTS: STG will share WMBus data as parsed objects<br>PARSED DATA AS MODBUS FRAME: STG will share WMBus data as Modbus like frame |

## Ethernet Switch Technology

| | |
|---|---|
| Ethernet Standards | IEEE 802.3 for 10Base-T<br>IEEE 802.3u for 100Base-T(X)<br>IEEE 802.3x Flow Control |
| Mac Table | 1K MAC address entry |
| Processing | Store-and-Forward |
| Memory | 448K bits packet buffer memory |

## BPL (Broadband Powerline) Technology for BPL Models

| | |
|---|---|
| **PHY Data Rate** | Up to 240 MHz |
| **MAC Layer Protocol** | CSMA/CA |
| **Modulation Technology** | OFDM-432 |
| **VLAN** | IEEE802.1q/ IEEE802.1p/ IEEE802.3d |

## Led Indicators

| | |
|---|---|
| Power indicator | Power LED |
| 10/100T(X) Indicators | Activity LEDs:<br>ETH1, ETH2 and STG (Activity of device itself) |
| WMBus Indicators | Alive (Blinks during normal operation), Tx and Rx of data LEDs |
| System Indicators | Status LED, Tx and Rx of data LEDs and Server LED (LED ON: Server Operating Mode, LED OFF: Client Operating Mode) |
| Console Indicators | Tx and Rx of data LEDs |

## Power - DC Models

| | |
|---|---|
| Input Range | 5-48V DC wide range Power Input<br>(Allows up to 60 V DC) |
| Reverse Polarity Protection | Available |
| Thermal Shutdown and Current Limit Protection | Available |

## Power – AC Models

| | |
|---|---|
| **Input Range** | 100 - 240V AC (120 – 370V DC),<br>50Hz to 60Hz AC input |
| **Isolation** | Fully Isolated >4200Vrms,<br>5mA 1 Min |
| **Insulation** | Class II |

## Physical & Environmental Characteristics DC Models

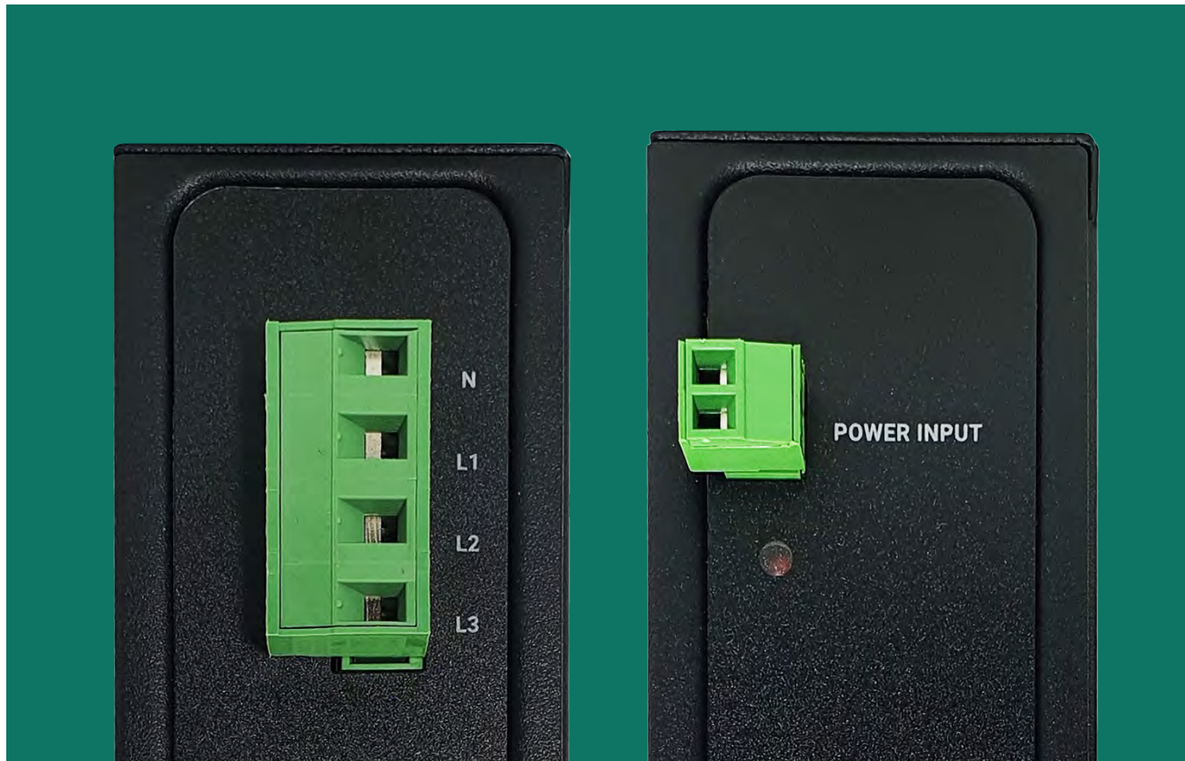
| | |
|---|---|
| Enclosure | Metal, IP 40 |
| Dimensions | 43 × 95 × 124 (w × d × h) mm |
| Weight | ~ 380 gr |
| Storage Temperature | – 65 to 150 °C |
| Operating Temperature | – 40 to 85 °C |
| Operating Humidity | 5% to 95% Non-condensing |

## Physical And Environmental Characteristics AC Models

| | |
|---|---|
| **Enclosure** | Metal, IP 40 |
| **Dimensions** | 43 x 95 x 124 (w x d x h) mm |
| **Weight** | ~400gr |
| **Storage Temperature** | -40 to 85 °C |
| **Operating Temperature** | -30 to 70 °C |
| **Operating Humidity** | 10% to 95% Non-condensing |

## Physical And Environmental Characteristics BPL Models

| | |
|---|---|
| **Enclosure** | Metal, IP 40 |
| **Dimensions** | 43 x 95 x 124 (w x d x h) mm |
| **Weight** | ~400gr |
| **Storage Temperature** | -65 to 150 °C |
| **Operating Temperature** | -40 to 85 °C |
| **Operating Humidity** | 5% to 95% Non-condensing |



# Ordering Information

**STG154:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V ( max. 60V) DC Power Input

**STG254:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

**STG655:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input, 110V–240V/50-60Hz

**STG154 - D16:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V ( max. 60V) DC Power Input

**STG254 - D16:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

**STG655 - D16:** 868MHz WMBus – Modbus TCP/RTU Gateway with MQTT Publisher, 2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input, 110V–240V/50-60Hz

## Product Comparison

| Model | MQTT Connectivity | Decrypt Up to 50 WMBus Device Data | Decrypt Up to 16 WMBus Device Data | Decryption Mode 5, Mode 7, Mode 128 and Custom | Decryption Mode 5 | 5-48V (max. 60V) DC Power Input | 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input | 3 Phase AC Power input, 110V240V/ 50-60Hz AC Power Input | BPL (Broadband Power Line) Link |
|---|---|---|---|---|---|---|---|---|---|
| STG154 | ● | ● | | ● | | ● | | | |
| STG254 | ● | ● | | ● | | | ● | | |
| STG655 | ● | ● | | ● | | | | ● | ● |
| STG154 - D16 | ● | | ● | | ● | ● | | | |
| STG254 - D16 | ● | | ● | | ● | | ● | | |
| STG655 - D16 | ● | | ● | | ● | | | ● | ● |