



# Merlin 4750 Series

VDSL 5G Cellular Router

# Table of Contents

|                                                        |    |
|--------------------------------------------------------|----|
| 1. General Information .....                           | 3  |
| 1.1. Legal Information .....                           | 3  |
| 1.2. About This Guide .....                            | 3  |
| 1.3. License and Copyright for Included FLOSS .....    | 3  |
| 2. Safety and Regulations .....                        | 4  |
| 2.1. Warning Levels .....                              | 4  |
| 2.2. Safety Information .....                          | 5  |
| 2.3. Care Recommendations .....                        | 7  |
| 2.4. Product Disposal .....                            | 7  |
| 2.5. Compliance Information .....                      | 8  |
| 2.5.1. Agency Approvals and Standards Compliance ..... | 8  |
| 2.5.2. Simplified Declaration of Conformity .....      | 8  |
| 3. Product Description .....                           | 9  |
| 3.1. Product Description .....                         | 9  |
| 3.2. Available Models .....                            | 9  |
| 3.3. Hardware Overview .....                           | 10 |
| 3.4. Connector Information Merlin .....                | 10 |
| 3.4.1. Power Input .....                               | 10 |
| 3.4.2. Digital I/O Interface .....                     | 11 |
| 3.4.3. Serial Ports .....                              | 11 |
| 3.4.4. DSL Port .....                                  | 13 |
| 3.4.5. Console Port .....                              | 13 |
| 3.4.6. Antennas .....                                  | 13 |
| 3.4.7. Reset Button .....                              | 13 |
| 3.5. LED Indicators .....                              | 14 |
| 3.6. Ethernet Port LED Behaviour .....                 | 15 |
| 3.7. Dimensions .....                                  | 16 |
| 4. Installation .....                                  | 17 |
| 4.1. Mounting the Router .....                         | 17 |
| 4.2. Cooling .....                                     | 17 |
| 4.3. Connecting Cables .....                           | 17 |
| 4.4. Connecting the Antenna .....                      | 17 |
| 4.5. Inserting SIM Cards .....                         | 18 |
| 4.5.1. Inserting SIM 1 Card .....                      | 18 |
| 4.5.2. Inserting SIM 2 Card .....                      | 18 |
| 4.6. Powering Up .....                                 | 18 |
| 5. Specifications .....                                | 19 |
| 5.1. Interface Specifications .....                    | 19 |
| 5.2. Type Tests and Environmental Conditions .....     | 21 |
| 6. Revision Notes .....                                | 23 |

# 1. General Information

## 1.1. Legal Information

The contents of this document are provided “as is”. Except as required by applicable law, no warranties of any kind are made in relation to the accuracy and reliability or contents of this document, either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Westermo reserves the right to revise this document or withdraw it at any time without prior notice.

Under no circumstances shall Westermo be responsible for any loss of data or income or any special, incidental, and consequential or indirect damages howsoever caused.

More information about Westermo can be found at [www.westermo.com](http://www.westermo.com) .

## 1.2. About This Guide

This guide is intended for installation engineers and users of the Westermo products.

It includes information on safety and regulations, a product description, installation instructions and technical specifications.

## 1.3. License and Copyright for Included FLOSS

This product includes software developed by third parties, including Free/Libre Open Source Software (FLOSS). The specific license terms and copyright associated with the software are included in each software package respectively. Please visit the product web page for more information.

Upon request, the applicable source code will be provided. A nominal fee may be charged to cover shipping and media. Please direct any source code request to your normal sales or support channel.

## 2. Safety and Regulations

### 2.1. Warning Levels

Warning signs are provided to prevent personal injuries and/or damages to the product. The following levels are used:

| Level of warning                                                                              | Description                                                                                 | Consequence personal injury    | Consequence material damage    |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|
| <br>WARNING  | Indicates a potentially hazardous situation                                                 | Possible death or major injury | Major damage to the product    |
| <br>CAUTION  | Indicates a potentially hazardous situation                                                 | Minor or moderate injury       | Moderate damage to the product |
| <br>NOTICE | Provides information in order to avoid misuse of the product, confusion or misunderstanding | No personal injury             | Minor damage to the product    |
| <br>NOTE   | Used for highlighting general, but important information                                    | No personal injury             | Minor damage to the product    |

Table 1. Warning levels

## 2.2. Safety Information

### Before installation:

Read this manual completely and gather all information available on the product. Make sure it is fully understood. Check that your application does not exceed the safe operating specifications for the product.



### SAFETY DURING INSTALLATION

The product must be installed and operated by qualified service personnel and installed into an apparatus cabinet or similar, where access is restricted to service personnel only.

Before energising and connecting communication cables to the product, ensure a protective earthing conductor is first connected to the protective earthing terminal (only valid for metallic housings). Westermo recommends a cross-sectional area of at least 4 mm<sup>2</sup>.

Upon removal of the product, disconnect the product from the power supply and all other communication ports before disconnecting the protective earthing conductor.



### SAFETY USE

This equipment is not suitable for use in locations where children are likely to be present.



### HAZARDOUS VOLTAGE

Do not open an energised product. Hazardous voltage may occur when connected to a power supply.



### PROTECTIVE FUSE

The power supply wiring must be sufficiently fused.

This product has no internal fuse and should be connected via an external fuse for protection.

The Merlin 4750 has a maximum current of 1018mA drawn at 12 VDC. Hence a 2A fuse is recommended

It must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.



### EARTH CONNECTION

For correct function, the earth connection needs to be properly connected to a designated protective earthing rail (only valid for metallic housings). Torque: 3.1 Nm.



### INDOOR USE ONLY

The device is to be connected only to networks without routing to the outside plant. All communication ports are for indoor use only.



### **POWER SUPPLY CONNECTION**

There are safety regulations governing the power source that can be used in conjunction with the product. Refer to the user guide for detailed information.



### **REDUCE THE RISK OF FIRE**

To reduce the risk of fire, use only telecommunication line cords with a cable diameter of AWG 26 or larger. Regarding power cable dimensions, see chapter Interface Specifications.



### **RADIO PRODUCTS**

Observe the usage limitations of radio products at filling stations, in chemical plants, in systems with explosives or potentially explosive locations.

The product may not be used in airplanes. Exercise particular caution near personal medical aids, such as pacemakers and hearing aids. Never perform work on the antenna system during a thunderstorm.

To fulfill human safety, a minimum separation distance of 20 cm or more should be maintained between the antenna of the product and personnel during operation.



### **ELECTROSTATIC DISCHARGE (ESD)**

Prevent electrostatic discharge damage to internal electronic parts by discharging your body to a grounding point (e.g. use a wrist strap).



### **HOT SURFACE**

Be aware that the surface of this product may become hot. When it is operated at high temperatures, the external surface may exceed Touch Temperature Limit according to the product's relevant electrical safety standard.



### **CABLE TEMPERATURE RATING FOR FIELD TERMINAL WIRES**

There may be a requirement on the minimum temperature rating of the cable to be connected to the field wiring terminals, refer to the user guide for detailed information.

## 2.3. Care Recommendations

Follow the care recommendations below to maintain full operation of the product and to fulfill the warranty obligations:

- Do not drop, knock or shake the product. Rough handling above the specification may cause damage to internal circuit boards.
- Use a dry or slightly water-damp cloth to clean the product. Do not use harsh chemicals, cleaning solvents or strong detergents.
- Do not paint the product. Paint can clog the product and prevent proper operation.

If the product is used in a manner not according to specification, the protection provided by the equipment may be impaired.

If the product is not working properly, contact the place of purchase, the nearest Westermo distributor office or Westermo technical support.

## 2.4. Product Disposal

This symbol means that the product shall not be treated as unsorted municipal waste when disposing of it. It needs to be handed over to an applicable collection point for recycling electrical and electronic equipment.

Proper disposal of the product helps minimize hazardous substances and prevents potential negative impacts on both the environment and human health.



Figure 1. WEEE symbol for treatment of product disposal

## 2.5. Compliance Information

### 2.5.1. Agency Approvals and Standards Compliance

| Type   | Approval/Compliance                                                                                                                                               |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMC    | <ul style="list-style-type: none"><li>• EN/IEC 61000-6-2, Immunity industrial environments</li><li>• EN/IEC 61000-6-4, Emission industrial environments</li></ul> |
| Safety | <ul style="list-style-type: none"><li>• EN 62368-1, Safety Communication Technology</li></ul>                                                                     |
| VDSL   | BT Openreach MCT (pending)                                                                                                                                        |

Table 2. Agency approvals and standards compliance

### 2.5.2. Simplified Declaration of Conformity

Hereby, Westermo declares that this product is in compliance with applicable EU directives and UK legislations. The full declaration of conformity and other detailed information is available at [www.westermo.com/support/product-support](http://www.westermo.com/support/product-support).



Figure 2. The European Conformity and the UK Conformity Assessment markings

## 3. Product Description

### 3.1. Product Description

The Merlin series of versatile cellular routers provide high speed data network connectivity for demanding industrial and smart grid applications. Coupled with the Zero Touch deployment software Activator, it provides cost-effective, reliable, and consistent onboarding of routers in large-scale projects.

This compact, rugged unit is suited to tight spaces. Its high MTBF and wide temperature range support maximum service life.

To achieve best-in-class cybersecurity, the Merlin series is equipped with a TPM (Trusted Platform Module) chip that keeps cryptographic keys secure. Secure Boot ensures that the unit boots using only software that is signed and trusted by manufacturer. A set of cybersecurity tools is available as standard including VPN and stateful Firewall support for data security and user authentication.

The built-in industrial protocol gateway enables several devices using different protocols to be accessed via a common protocol interface. The unit supports up to 6 digital inputs and 2 outputs for local control or monitoring. Support for more digital inputs and outputs is possible using external modules.

### 3.2. Available Models

See datasheet for full list of models available.

### 3.3. Hardware Overview

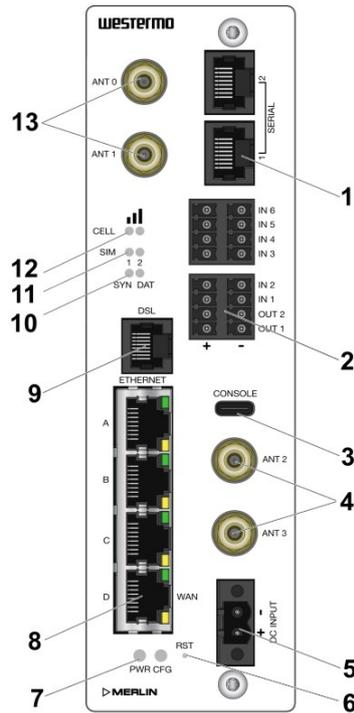


Figure 3. Location of interface ports and LEDs, illustrated by a Merlin-4758-V-T4G-S2-DI6-DO2-LV model

| No. | Description                  | No. | Description         |
|-----|------------------------------|-----|---------------------|
| 1   | Serial ports                 | 2   | Digital I/Os        |
| 3   | USB-C Console port           | 4   | Antennas            |
| 5   | Power connection             | 6   | Reset button        |
| 7   | Power and configuration LEDs | 8   | Ethernet RJ45 ports |
| 9   | VDSL port                    | 10  | DSL status LEDs     |
| 11  | SIM LEDs                     | 12  | LTE signal strength |
| 13  | Antennas                     |     |                     |

### 3.4. Connector Information Merlin

#### 3.4.1. Power Input

| Illustration    | Position | Product marking | Direction | Description    |
|-----------------|----------|-----------------|-----------|----------------|
| <p>DC INPUT</p> | 1        | DC+             | Input     | Supply voltage |
|                 | 2        | DC-             | Input     | Supply voltage |

Table 3. Power input

The positive input is marked with a plus sign, "+". The negative input is marked with a minus sign, "-". Connect the voltage to the + pin and the return to the - pin on the power input.



### NOTICE - POWER SUPPLY

Where an AC/DC-adaptor has not been supplied, a power supply of no greater than 100 W should be used, with a current limit of 1 Amp.

The product can be supplied with power from a source that complies with PS2/LPS according to UL/IEC 62368-1 or with LPS according to UL/IEC 60950-1, the latest edition or equivalent. Such a power supply shall not exceed 100W after 5 seconds.

### 3.4.2. Digital I/O Interface

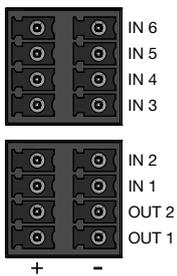


Figure 4. Pinout of the digital I/O sockets

On the first digital I/O socket, there is a 4 x 2 pin connector comprising two inputs and two outputs. The second digital I/O socket has four inputs.

The relay contact output is rated up to 60 VDC.

The output is connected to a pair of relay contacts that are normally open, that is open when no power is applied.

### 3.4.3. Serial Ports

A pair of asynchronous serial ports may be present on the router. The serial ports are named as follows, also their identifiers for use within the terminal server configuration:

| Label    | tserverd.port.serialPortName |
|----------|------------------------------|
| SERIAL 1 | serial1                      |
| SERIAL 2 | serial2                      |

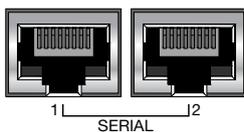


Figure 5. Serial ports

Each serial port is software configurable to operate in either RS-232 or RS-485 mode.

The pin numbering of the serial port connector is shown below.

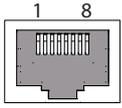


Figure 6. Pin numbering of serial port

## RS-232 ports

When you configure a serial port to operate as an RS-232 interface, it supports the following signals:

- Transmit Data
- Receive Data
- CTS
- RTS
- DSR
- DTR

The pin numbering of the RJ45 socket, when viewed from the front of the unit, is as shown below. The RS-232 interface is wired as a DCE.

| Illustration | Pin no. | Signal | Direction | Description                       |
|--------------|---------|--------|-----------|-----------------------------------|
|              | 1       | DSR    | Out       | Data Set Ready                    |
|              | 2       | DCD    | Out       | Data Carrier Detect               |
|              | 3       | DTR    | In        | Data Terminal Ready               |
|              | 4       | SG     | -         | Signal Ground, not chassis ground |
|              | 5       | RD     | Out       | Receive Data                      |
|              | 6       | TD     | In        | Transmit Data                     |
|              | 7       | CTS    | Out       | Clear To Send                     |
|              | 8       | RTS    | In        | Request To Send                   |

Table 4. RS-232 connection

## RS-485 ports

When you configure a serial port to operate as an RS-485 interface, it supports both two-wire (half-duplex) and four-wire (full-duplex) modes. Configuration between two-wire and four-wire RS-485 modes is under software control. The pin-numbering of the RJ45 connector in RS-485 mode, when viewed from the front of the unit, is shown below.

| Illustration | Pin no. | Signal         |               | Direction | Description                                       |
|--------------|---------|----------------|---------------|-----------|---------------------------------------------------|
|              |         | Four-wire mode | Two-wire mode |           |                                                   |
|              | 1       |                |               |           |                                                   |
|              | 2       | R-             | -             | In        | Four wire: Receive                                |
|              | 3       | T-             | T-/R-         | Out/In    | Four-wire: Transmit<br>Two-wire: Transmit/Receive |
|              | 4       |                |               |           |                                                   |
|              | 5       | R+             |               | In        | Four-wire: Receive                                |
|              | 6       | T+             | T+/R+         | Out/In    | Four-wire: Transmit<br>Two-wire: Transmit/Receive |
|              | 7       |                |               |           |                                                   |
|              | 8       |                |               |           |                                                   |

Table 5. RS-485 port pinout

### 3.4.4. DSL Port

The router has a single ADSL2+/VDSL2 port with a RJ11 connector.

### 3.4.5. Console Port

The router has a USB console port with a type C connector. The router acts as a device.

### 3.4.6. Antennas

For routers with four SMA connectors for mobile radio LTE antennas, marked Ant 0 through Ant 3, they are used for 5G communication. It is recommended to use all four antenna connectors.

### 3.4.7. Reset Button

Use the reset button to request a system reset. When pressing the reset button, all LEDs turn on simultaneously. The length of time holding the reset button will determine its behaviour.

| Press duration | PWR/CONFIG LED behaviour | Router behaviour on depress                                                                                                                                                                                           |
|----------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0-3 seconds    | Solid on                 | Normal reset to running config. No special LED activity.                                                                                                                                                              |
| 3-15 seconds   | Flashing fast            | Releasing 3-15 seconds switches the router back to factory configuration. Note: this will wipe the configurations, both config1 and config2.                                                                          |
| 15-20 seconds  | Solid on                 | Releasing 15-20 seconds performs a normal reset to running config.                                                                                                                                                    |
| 20-30 seconds  | Flashing slowly          | Releasing 20-30 seconds reboots the router to recovery mode. Only to be done in case of emergency and under the guidance of Westermo support staff. Note: this may wipe the configurations, both config1 and config2. |
| > 30 seconds   | Solid on                 | Releasing after 30 seconds performs a normal reset.                                                                                                                                                                   |

Table 6. Merlin series router reset behaviour

### 3.5. LED Indicators

The LED indicators described in this section are all single colour LEDs. When the router is powered on, the power LED is green.

The possible LED states are:

- Off
- Flashing slowly
- Flashing quickly
- On

| LED                          | Status                                              | Description                                                                                                                                                                                                                                 |
|------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Booting up                   |                                                     | The router takes less than a minute to boot up. During this time, the power LED flashes.<br><br>Other LEDs display different diagnostic patterns during boot up. Booting is complete when the power LED stops flashing and stays on steady. |
| Power                        | On                                                  | Power is present                                                                                                                                                                                                                            |
|                              | Off                                                 | No power: Boot loader does not exist.                                                                                                                                                                                                       |
|                              | Flashing                                            | Booting                                                                                                                                                                                                                                     |
| CFG                          | On                                                  | The router is running a valid configuration file.                                                                                                                                                                                           |
|                              | Flashing slowly                                     | The router is running in recovery mode (2.5 flashes/second)                                                                                                                                                                                 |
|                              | Flashing quickly                                    | The router is running in factory configuration (5 flashes/second)                                                                                                                                                                           |
| SIM                          | On                                                  | SIM selected and registered on the 3G/4G network                                                                                                                                                                                            |
|                              | Off                                                 | Not selected or SIM not inserted                                                                                                                                                                                                            |
|                              | Flashing                                            | SIM selected and not registered on the network                                                                                                                                                                                              |
| DSL                          | SYN                                                 | Blinking: DSL link is synchronising; Solid On: DSL link is synchronised                                                                                                                                                                     |
|                              | DAT                                                 | Blinking: data is passing on the DSL link                                                                                                                                                                                                   |
| Cellular signal strength LED | Both LEDs off                                       | Data link not connected or signal strength $\leq -113$ dBm                                                                                                                                                                                  |
|                              | Left LED on                                         | Data link connected and signal strength $\leq -89$ dBm                                                                                                                                                                                      |
|                              | Right LED off                                       |                                                                                                                                                                                                                                             |
|                              | Left LED off                                        | Data link connected and signal strength is between $-89$ to $-69$ dBm                                                                                                                                                                       |
|                              | Right LED on                                        |                                                                                                                                                                                                                                             |
| Both LEDs on                 | Data link connected and signal strength $> -69$ dBm |                                                                                                                                                                                                                                             |

Table 7. LED indicators

### 3.6. Ethernet Port LED Behaviour

There are four Ethernet ports and each has a pair of LEDs: a LINK LED (green) and a SPEED LED (amber). When looking at the port, the LED on the bottom is the LINK LED, and the SPEED LED is on the top.

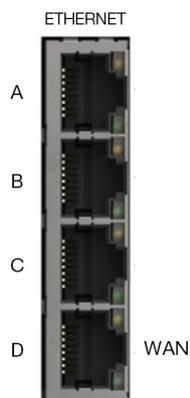


Figure 7. Ethernet ports on Merlin 4700 and Merlin 4750

|                      |          |                                                     |
|----------------------|----------|-----------------------------------------------------|
| LINK LED<br>(green)  | On       | Physical Ethernet link detected                     |
|                      | Off      | No physical Ethernet link detected                  |
|                      | Flashing | Data is being transmitted or received over the link |
| SPEED LED<br>(amber) | On       | Link operating at 1000 Mbps                         |
|                      | Off      | Link operating at 10 Mbps or 100 Mbps               |

Table 8. Ethernet LED behaviour and descriptions

### 3.7. Dimensions

Dimensions are stated in millimetres and are regardless of model.

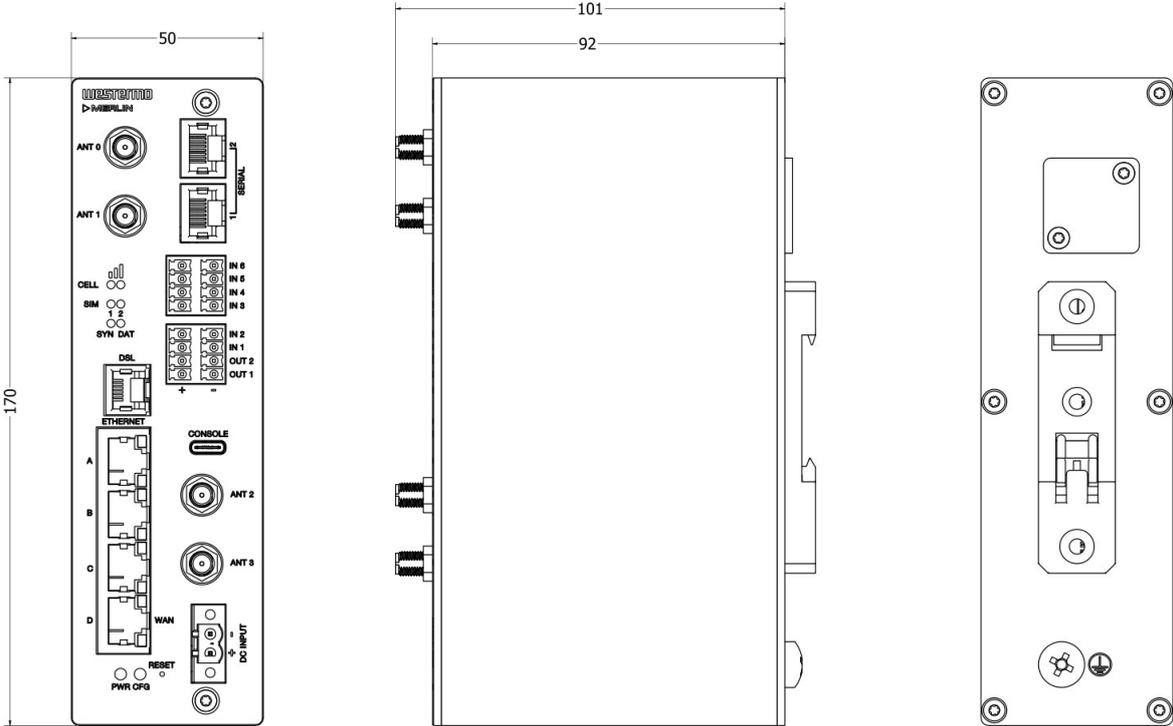


Figure 8. Dimensional drawing

## 4. Installation

### 4.1. Mounting the Router

The router is fitted with a DIN-rail clip by default. To attach the router to a DIN-rail:

1. Position the router so that the spring of the DIN-clip rests on the DIN-rail.
2. Push the router in an upward direction so that the spring of the DIN-clip compresses and the top hook of the DIN-clip slides and clamps to the DIN-rail.

To remove the router from the DIN-rail, simply reverse the procedure.



#### **MOUNTING HEIGHT**

To reduce the risk of personal injury and damage to the device, the unit must not be mounted at a height greater than two metres above the ground beneath it.

### 4.2. Cooling

This product uses convection cooling. Spacing is recommended for the use of the product in full operating temperature range and service life. To avoid obstructing the airflow around the product, use the following spacing rules.

A minimum spacing of 25 mm (1 inch) above and below, and 10 mm (0.4 inches) left and right of the product is recommended.



#### **REDUCE THE RISK OF FIRE**

To reduce the risk of fire, use only telecommunication line cords with a cable diameter of AWG 26 or larger. Regarding power cable dimensions, see chapter Interface Specifications.

### 4.3. Connecting Cables

Connect one end of the Ethernet cable into port A and the other end to your PC or switch.

### 4.4. Connecting the Antenna

If only connecting one LTE antenna, screw the antenna into the SMA connector marked 'Ant 0'.

Be careful to select an antenna that ensures the equipment complies with local regulatory requirements.

In North America, Westermo has indicated to PTCRB the following set of antennas for use with this equipment:

| Article Number | Model                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------|
| 160-00148      | 2J 2J7724Ma - Cellular/LTE MIMO Magnetic Mount with two 3m LL100 leads, SMA Male                 |
| 160-00184      | 2J 2J2183K-B07H-300LL195-C91GST - Cellular/LTE wall mount antenna with a 3m LL195 lead, SMA Male |

Table 9. List of antennas for use with this equipment in North America, as indicated to PTCRB

To comply with the requirements of PTCRB in North America:

1. It is recommended to select an antenna from the list above.
2. Should a user select their own antenna, Westermo strongly recommends that it be mounted with at least 20cm of cable.
3. Where a user selects a directly mounted antenna, it must comply with the OTA requirements of the PTCRB.

## 4.5. Inserting SIM Cards

On the rear side of the router there are two SIM slots. To access the SIM cards, first remove the SIM cover using a suitable screwdriver (not supplied). Only the proper driver can drive a specific head size without risk of damaging the driver or screw.

The product datasheet indicates the correct size of SIM card to use. A Mini-SIM card (2FF) is of size 25mm x 15mm x 0.76mm. Do not use a card larger than or smaller than that specified in the product datasheet or you may cause damage to the unit. Using the correct SIM card size helps avoid issues such as incompatibility or improper insertion that can lead to device malfunction.

### 4.5.1. Inserting SIM 1 Card

Ensure the router is powered off.

- Remove the SIM cover using a suitable screwdriver.
- Hold the SIM 1 card with the chip side facing down and the cut corner facing away from you, to the left.
- Gently push the SIM card into the upper SIM slot 1 until it clicks in.
- Screw the SIM cover back on with the screwdriver.

### 4.5.2. Inserting SIM 2 Card

- If you are using a second SIM, hold the SIM 2 card with the chip side facing up and the cut corner front right facing away from you.
- Gently push the SIM card into the lower SIM slot 2 until it clicks in.
- Screw the SIM cover back on with the screwdriver.

## 4.6. Powering Up

Plug the power cable first into the device and then to a suitable power source. The router takes less than a minute to boot up. During this time, the power LED flashes.

Other LEDs display different diagnostic patterns during boot up. Booting is complete when the power LED stops flashing and stays on steady.

## 5. Specifications

### 5.1. Interface Specifications

| DC, Power port                  |                                      |
|---------------------------------|--------------------------------------|
| Operating voltage               | 9.6 to 60 VDC                        |
| Rated current                   | 890 mA at 12 VDC<br>230 mA at 48 VDC |
| Rated frequency                 | DC                                   |
| Polarity                        | Reverse polarity protected           |
| Redundant power input           | No                                   |
| Isolation                       | All other ports                      |
| Connector                       | Push-in spring connectors            |
| Conductor cross section         | 0.2-2.5 mm <sup>2</sup> (AWG 24-12)  |
| Stripping length cable          | 7 mm                                 |
| Tightening torque, screw flange | 0.3 Nm                               |
| Shielded cable                  | Not required                         |

| Ethernet TX              |                                                    |
|--------------------------|----------------------------------------------------|
| Electrical specification | IEEE std 802.3                                     |
| Data rate                | 10 Mbit/s, 100 Mbit/s, 1000 Mbits/s manual or auto |
| Duplex                   | Full or half, manual or auto                       |
| Transmission range       | Up to 150 m with CAT5e cable or better             |
| Isolation                | All other ports                                    |
| Connection               | RJ-45, auto MDI/MDI-X                              |
| Cabling                  | Shielded CAT5e or better is recommended            |
| Number of ports          | 4                                                  |

| RS-232/485               |                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------|
| Electrical specification | Configurable for EIA RS-232 or EIA RS-422/485                                                         |
| Data rate                | RS-232: 50 bit/s - 1 Mbit/s<br>RS-485: 50 bit/s - 20 Mbit/s                                           |
| Data format              | 7 or 8 data bits, odd, even or none parity, 1 or 2 stop bits (2 stop bits only when no parity is set) |
| Transmission range       | RS-232: 15 m/49 ft<br>RS-485: Up to 1200 m/0.74 mi, depending on data rate and cable type             |
| Isolation                | To all other ports                                                                                    |
| Connection               | RS-232: RJ-45 according to EIA-561<br>RS-485: RJ-45                                                   |
| Shielded cable           | Recommended                                                                                           |
| Number of ports          | 2                                                                                                     |

| <b>I/O connection, Relay output</b> |                                          |
|-------------------------------------|------------------------------------------|
| Maximum voltage                     | Up to 60 VDC                             |
| Connect resistance                  | <100mΩ                                   |
| Isolation                           | To all other ports                       |
| Connector                           | Detachable latch terminal                |
| Conductor cross section             | 0.14 - 1.5 mm <sup>2</sup> (AWG 28 - 16) |
| Stripping length cable              | 7 mm                                     |
| Number of ports                     | 2                                        |

| <b>I/O connection, Digital input</b> |                                             |
|--------------------------------------|---------------------------------------------|
| Maximum voltage/current              | 24 VDC                                      |
| Voltage levels                       | Logic one: >9.9 VDC<br>Logic zero: <7.4 VDC |
| Isolation                            | To all other ports                          |
| Connector                            | Detachable latch terminal                   |
| Conductor cross section              | 0.14 - 1.5 mm <sup>2</sup> (AWG 28 - 16)    |
| Stripping length cable               | 7 mm                                        |
| Number of inputs                     | 6                                           |

| <b>Console port</b>      |                                                     |
|--------------------------|-----------------------------------------------------|
| Electrical specification | USB 2.0 host interface                              |
| Data rate                | 115.2 kbit/s                                        |
| Circuit type             | SELV                                                |
| Data format              | 8 data bits, no parity, 1 stop bit, no flow control |
| Connection               | USB receptacle connector type C                     |

## 5.2. Type Tests and Environmental Conditions

| Environmental phenomena        | Basic standard                           | Description                        | Test levels                                                                                                                                                                                                                                                                                              |
|--------------------------------|------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESD                            | EN 61000-4-2                             | Enclosure                          | Contact: $\pm 4$ kV<br>Air: $\pm 8$ kV                                                                                                                                                                                                                                                                   |
| Radiated RF immunity           | EN 61000-4-3                             | Enclosure                          | 3 V/m at (80 - 6000) MHz<br>1 kHz sine, 80% AM                                                                                                                                                                                                                                                           |
| Fast transients                | EN 61000-4-4                             | Power port                         | $\pm 0.5$ kV, direct coupling                                                                                                                                                                                                                                                                            |
|                                |                                          | Ethernet ports                     | $\pm 0.5$ kV, capacitive coupling clamp                                                                                                                                                                                                                                                                  |
|                                |                                          | I/O port                           |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | Serial ports                       |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | DSL port                           |                                                                                                                                                                                                                                                                                                          |
| Surge                          | EN 61000-4-5                             | Power port                         | L-E: $\pm 1$ kV, $12 \Omega$ , $9 \mu\text{F}$ , $1.2/50 \mu\text{s}$<br>L-E: $\pm 1$ kV, $42 \Omega$ , $0.5 \mu\text{F}$ , $1.2/50 \mu\text{s}$<br>L-L: $\pm 0.5$ kV, $2 \Omega$ , $18 \mu\text{F}$ , $1.2/50 \mu\text{s}$<br>L-L: $\pm 0.5$ kV, $42 \Omega$ , $0.5 \mu\text{F}$ , $1.2/50 \mu\text{s}$ |
|                                |                                          | Ethernet ports                     | L-E: $\pm 1$ kV, $2 \Omega$ , direct on shield, $1.2/50 \mu\text{s}$                                                                                                                                                                                                                                     |
|                                |                                          | I/O port                           | L-E: $\pm 1$ kV, $12 \Omega$ , $9 \mu\text{F}$ , $1.2/50 \mu\text{s}$                                                                                                                                                                                                                                    |
|                                |                                          | RS-232                             | L-E: $\pm 1$ kV, $2 \Omega$ , $0.5 \mu\text{F}$                                                                                                                                                                                                                                                          |
|                                |                                          | RS-422/485                         | L-E: $\pm 1$ kV, $42 \Omega$ , $0.5 \mu\text{F}$                                                                                                                                                                                                                                                         |
|                                |                                          | DSL port                           | L-E: $\pm 1$ kV, $42 \Omega$ , $0.5 \mu\text{F}$                                                                                                                                                                                                                                                         |
| Conducted RF immunity          | EN 61000-6-1, EN 61000-4-6, EN 301 489-1 | Power port                         | 3 Vrms, 80% AM, 1 kHz; (0.15-80) MHz                                                                                                                                                                                                                                                                     |
|                                |                                          | Ethernet                           |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | I/O port                           |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | Serial ports                       |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | DSL port                           |                                                                                                                                                                                                                                                                                                          |
| Power frequency magnetic field | EN 61000-4-8                             | Enclosure                          | 3 A/m; 50 Hz                                                                                                                                                                                                                                                                                             |
| Radiated RF emission           | EN 61000-6-3, EN 301 489-1               | Enclosure                          | Class B (Light industrial), 30 MHz to 12.75 GHz                                                                                                                                                                                                                                                          |
| Conducted RF emission          | EN 61000-6-3, EN 301 489-1               | Power port                         | Class A                                                                                                                                                                                                                                                                                                  |
|                                |                                          | Ethernet                           | Class A                                                                                                                                                                                                                                                                                                  |
|                                |                                          | I/O port                           | Class A                                                                                                                                                                                                                                                                                                  |
|                                |                                          | Serial ports                       | Class A                                                                                                                                                                                                                                                                                                  |
|                                |                                          | DSL port                           | Class A                                                                                                                                                                                                                                                                                                  |
| Dielectric strength            | UL 62368-1                               | Power port to all other ports      | 4 kV, 50 Hz minimum                                                                                                                                                                                                                                                                                      |
|                                | UL 62368-1                               | I/O port to all other ports        | 1.5 kVrms, 50 Hz, 1 min                                                                                                                                                                                                                                                                                  |
|                                |                                          | RS-232 port to all other ports     |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | RS-422/485 port to all other ports |                                                                                                                                                                                                                                                                                                          |
|                                |                                          | DSL port to all other ports        |                                                                                                                                                                                                                                                                                                          |
| UL 62368-1 IEEE 802.3          | Ethernet TX to all other ports           | 2.25kV DC, 0.5mA, 1 min            |                                                                                                                                                                                                                                                                                                          |

Table 10. EMC and electrical conditions

| Environmental phenomena | Basic standard               | Description         | Test levels                 |
|-------------------------|------------------------------|---------------------|-----------------------------|
| Temperatures            | EN 60068-2-1<br>EN 60068-2-2 | Operational         | -20 to +65°C <sup>a</sup> . |
| Humidity                | EN 60068-2-30                | Operational         | 5-95% relative humidity     |
| MTBF                    | Telcordia                    | Ground benign, 25°C | 1,500,000 hours             |
| Enclosure               | EN 62368-1                   | Aluminium           | Fire enclosure              |
| Weight                  |                              |                     | 760 g                       |
| Cooling                 |                              |                     | Convection                  |

<sup>a</sup>Refer to "Safety Information" chapter regarding touch temperature

*Table 11. Environmental and mechanical conditions*

## 6. Revision Notes

| <b>Revision</b> | <b>Date</b> | <b>Change description</b>                |
|-----------------|-------------|------------------------------------------|
| Rev. A          | 2024-05-28  | First version                            |
| Rev. B          | 2025-01-15  | Upper limit of digital outputs redefined |
| Rev. C          | 2025-03-13  | A note on protective fuse                |
| Rev. D          | 2025-03-26  | Power consumption details                |

