MR-200
MR-250

WESTERMO

MR-200
GPRS Router

MR-250
GPRS/Edge/3G/HSDPA Router

www.westermo.com

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http://www.westermo.com

Safety

⚠ **Before using this unit:**

Read this manual completely and gather all information on the unit. Make sure that you understand it fully. Check that your application does not exceed the safe operating specifications for this unit.

Hazardous voltages may occur within this unit when connected to a power supply.

Prevent access to hazardous voltages by disconnecting the unit from its power supply.

Prevent damage to internal electronics from electrostatic discharges (ESD) by discharging your body to a grounding point (e.g. use of wrist strap).

⚠ **Before installation:**

This unit should only be installed by qualified personnel.

This unit should be built-in to an apparatus cabinet, or similar, where access is restricted to service personnel only.

The power supply wiring must be sufficiently fused, and if necessary it must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

This unit uses convection cooling. To avoid obstructing the airflow around the unit, follow the spacing recommendations (see Installation section).

Care recommendations

Follow the care recommendations below to maintain full operation of unit and to fulfil the warranty obligations.

This unit must not be operated with covers or lids removed.
Do not attempt to disassemble the unit. There are no user serviceable parts inside.
Do not drop, knock or shake the unit, rough handling beyond the specification may cause damage to internal circuit boards.
Do not use harsh chemicals, cleaning solvents or strong detergents to clean the unit.
Do not paint the unit. Paint can clog the unit and prevent proper operation.
Do not expose the unit to any kind of liquids (rain, beverages, etc). The unit is not waterproof.-Keep the unit within the specified humidity levels.
Do not use or store the unit in dusty, dirty areas, connectors as well as other mechanical part may be damaged.
If the unit is not working properly, contact the place of purchase, nearest Westermo distributor office or Westermo Tech support.

GSM specific safety

Please read and follow the guidelines listed below. The precautions must be observed during all phases of the operation. Breaking these rules may be dangerous, illegal or affect performance of the unit and/or invalidate the unit's approval and/or warranty.

General

Remember to follow any special regulations and warnings in force in any area and never use the unit whenever it's forbidden to use it. Do not use the unit when it may cause interference or danger. A wireless device exposed to interference above specified limits could result in deteriorated performance.

Hospitals or other Medical environment

Do not use the unit in a medical environment such as health care facilities. Follow any regulations or rules that instruct you to not use the unit.

Pacemakers

The Health Industry Manufacturers Association recommends that a minimum separation of six (6") inches be maintained between cellular wireless equipment and a pacemaker to avoid potential interference with the pacemaker. These recommendations are consistent with the independent research by and recommendations of-Wireless Technology Research.

Persons with pacemakers:

- Should ALWAYS keep the the unit and its antenna more than six inches from their pacemaker when the unit is turned ON.
- If you have any reason to suspect that interference is taking place, turn your wireless equipment OFF immediately.

Hearing Aids

Some digital wireless equipment may interfere with some hearing aids. In the event of such interference, you may want to consult your service provider [or call the customer service line to discuss alternatives.]

Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if they are adequately shielded from external RF energy.-Your physician may be able to assist you in obtaining this information.

Turn the wireless equipment OFF in health care facilities when any regulations posted in these areas instruct you to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF energy.

Aircraft

Do not use the unit in an aircraft. The use of a wireless unit in an aircraft may be dangerous to the operation of the aircraft, disrupt the wireless network, and may be illegal.

Failure to observe these instructions may lead to suspension or denial of cellular services to the offender, legal action, or both.

Vehicle

If the unit is incorrectly installed in a vehicular environment, the operation of the unit could interfere with the vehicle electronics. Faulty installation and/or operation can constitute a safety hazard.

For Vehicles equipped with an airbag

An air bag inflates with great force. DO NOT place objects, including either installed or portable wireless equipment, in the area over the air bag or in the air bag deployment area. If in-vehicle wireless equipment is improperly installed and the air bag inflates, serious injury could result.

Blasting areas

Do not use the unit where blasting is in progress or in "blasting areas".
Observe restrictions and follow any regulation or rules.

Explosive atmospheres

Do not use the unit in any area with a potentially explosive atmosphere.
Potentially explosive areas are often, but not always, clearly marked.
They include fuelling areas such as petrol stations, below decks on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust, or metal powder.

RF energy

The MR-200 is a low power radio transmitter and receiver. When it is ON, it receives and also sends out radio frequency (RF) signals.
Most modern electronic equipment is shielded from RF signals. However, certain electronic equipment may not be shielded against the RF signals from the wireless unit. All radio-transmitting devices send signals, which may cause interference in different electronic devices. To avoid interference, place the units antenna a sufficiently long distance from other electronics.

Critical applications

Cellular units operate using radio signals and cellular networks cannot be guaranteed to connect in all conditions. Therefore you should never rely solely on a wireless device for essential communications, for example medical emergencies.

Backup copies

Remember to make backup copies of all important data, for example PIN/PUK codes, contents of SIM card etc.

Antenna care

Use only the supplied or an approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the unit and may violate current regulations.

Do not touch the antenna unnecessarily when the unit is in use. Contact with the antenna affects call quality and may cause the unit to operate at a higher power level than otherwise needed.

Maintenance

No maintenance is required, as long as the unit is used as intended within the specified conditions.

Agency approvals and standards compliance

Type	Approval / Compliance
Safety	EN 60950, IT equipment
R&TTE Article 3.1b Article 3.2	 EN 301 489-1 EN 301 511

Declaration of Conformity

Westermo Teleindustri AB

Declaration of conformity

The manufacturer   Westermo Teleindustri AB
                      SE-640 40 Stora Sundby, Sweden

Herewith declares that the product(s)

Type of product	Model	Art no	Installation manual
Table top	MR-250	3622-0110	6622-2202

is in conformity with the following EC directive(s).

No	Short name
89/336/EEG	Electromagnetic Compatibility (EMC)
73/23/EEG	Low Voltage Directive - LVD
1999/5/EC	RTTE Radio and Telecommunications Terminal Equipment

References of standards applied for this EC declaration of conformity.

No	Title	Issue
EN 301489-7	Electromagnetic compatibility and radio spectrum matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services.	1.2.1 (2002)
EN 301511	Global system for mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under Article 3(2) of the R&TTE Directive (1999/5/EC)	9.0.2 (03/2003)
EN 60950-1	Safety of information technology equipment	A11 (2004)

The last two digits of the year in which the CE marking was affixed: 08

Hans Levin

Hans Levin
Technical Manager
27th February 2008

Postadress/Postal address	Tel.	Telefax	Postgiro	Bankgiro	Org.nr/ Corp. identity number	Registered office
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Sweden	Int+46 16428000	Int+46 16428001				

Type tests and environmental conditions

Environmental		
Temperature	Operating	−20 to +50°C
Packaging		
Enclosure	Pressed steel	
Dimension W x H x D	160 x 120 x 32 mm	
Weight	0.53 kg	
Mounting	Horizontal on 35 mm DIN-rail or flat on level surface	

Description

The MR-200 router is an GPRS router designed to be compatible with the current and future requirements of remote telemetry and industrial control systems applications. The unit has an integral Ethernet port and a 25 pin RS-232 serial interface for local connectivity.

The Ethernet interface supports Multicasting (IGMP), VLAN, SNMP, SNTP, FTP, SNMP as well as all the standard TCP, UDP and DHCP protocols.

The inbuilt RS-232 port can be used to connect legacy serial based equipment such as PLCs, RTUs or IEDs. Alternatively the internal serial port can be used as a backup connection to the remote site when used in conjunction with a suitable Westermo Modem.

The MR-200 router has an integrated stateful inspection firewall and can support 5 IPSEC VPN (Virtual Private Network) terminations which can be secured using optional 3DES, AES, SSL, SSH encryption, and MD5, SHA1 key exchange protocols. These features ensure that the remote sites can use the latest security technology to resist denial of service attacks and hacking. The VPN's can be used as a way of increasing security and to create secure tunnels, running between sites. The VPNs can be used to interconnect the sites effectively replacing the requirement for dedicated leased lines. The VPN tunnels can be terminated on either another MR-200 ADSL router or on a Westermo DR-200 ADSL router. An optional license for 50 VPN terminations is also available.

The MR-200 can also be used for remote sites access, allowing the user to browse WEB pages, monitor / edit PLCs or access any device connected to the LAN. The MR-200 will allow devices connected on the LAN side to send emails or connect to FTP servers for transferring files.

The MR-200 supports VRRP (Virtual Redundant Router Protocol) allowing multiple physical routers to share a single gateway and provide multiple backup WAN connections. For complex network applications the MR-200 supports OSPF and RIP2. The MR-200 is supplied with a complete mounting kit for DIN rail, wall or shelf mounting. The wide temperature range and 24VDC supply ensure that the MR-200 can be used in industrial applications without the need for modification or consideration of the environmental conditions.

The MR-250 has got all the functionality of the MR-200 plus EDGE, 3G and HSDPA capapbility. The MR-250 will at all times use the communication method with the fastest transmission speed. If HSDPA is not available the unit will automatically switch down to 3G, EDGE or GPRS respectively.

Features:

- GPRS Router (MR-200)
- EDGE/3G/HSDPA (MR-250)
- Ethernet port switch
- Dual SIM card operation
- Integrated RS-232 terminal server port
- SNMP management protocol
- Firewall
- IPsec VPN support (5 tunnels)
- VRRP, OSPF, RIP2 redundant protocols
- DIN Rail, wall or shelf mounted
- −20°C to +55°C
- 24 VDC supply
- DES • 3DES • AES • SSL • SSH (optional)

Interface specifications

Power	
Rated voltage	12 VDC MR-200 11 – 28 VDC MR-250
Rated current	250 mA @ 12 VDC MR-200 450 mA @ 12 VDC MR-250
Rated frequency	DC

RS-232	
Electrical specification	RS-232 V.24
Data rate	300 bit/s – 115.2 kbit/s
Data format	7 or 8 data bits, Odd, even or no parity, 1 or 2 stop bits
Transmission range	2 m
Connection	25-pin D-sub female (DCE)

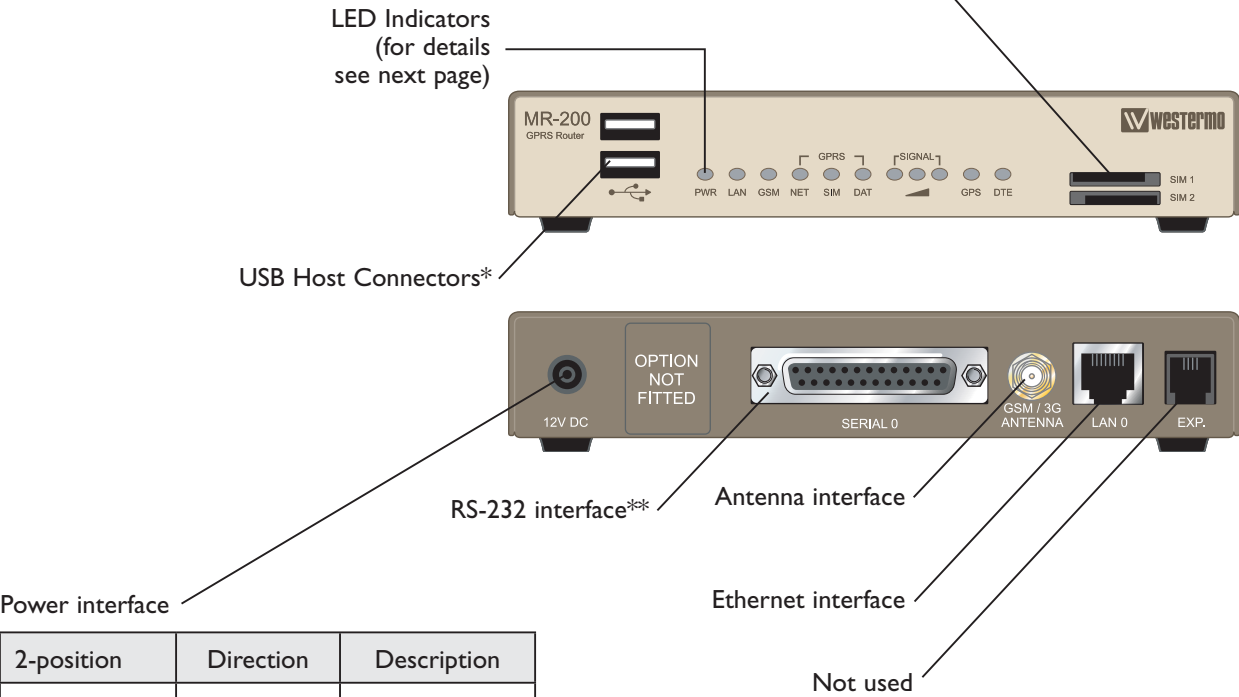| Antenna	
Frequency bands	GSM850: 824 – 849 and 869 – 894 MHz GSM1800 TX 1710 – 1785 and RX 1805 – 1880 MHz GSM1900 TX 1850 – 1910 and RX 1930 – 1990 MHz UMTS2100 TX 1920 – 1980 RX 2110 – 2170 (MR-250 only)
Data rate	GPRS: up to 85.6 kbit/s HSDPA: up to 7.2 Mbit/s
Connection	SMA female, impedance: 50 ohm

SIM	
Electrical specification	3 volts SIM supported

Ethernet	
Electrical specification	IEEE std 802.3. 2000 Edition
Data rate	10 Mbit/s or 100 Mbit/s, auto-negotiated
Protocol	UDP, TCP, ICMP, HTTP and ARP
Duplex	Full- or half duplex, auto-negotiated
Circuit type	TNV-1
Transmission range	100 m
Connection	RJ-45 shielded, auto MDI/MDI-X

Connections

SIM Card Sockets

The two sockets at the right side of the front panel are for the GSM SIM card(s) that you will receive from your service providers. Details of how to insert these correctly are given in section 2 below.

LED Indicators
(for details
see next page)

USB Host Connectors*

RS-232 interface**

Antenna interface

Power interface

Ethernet interface

Not used

2-position	Direction	Description
No. 1	In	− VDC
No. 2	In	+ VDC

* The USB host connectors may be used to connect compatible USB 2.0 client devices such as memory sticks, serial adapters, etc. Note that the total current available to power USB devices is collectively 0.5A (i.e. for both ports).

** RS-232 D-sub

25-position	Direction	Description
No. 2	In	Transmit Data (TD)
No. 3	Out	Receive Data (RD)
No. 4	In	Request To Send (RTS)
No. 5	Out	Clear To Send (CTS)
No. 6	Out	Data Set Ready (DSR)
No. 7	–	Signal ground (SG)
No. 8	Out	Data Carrier Detect (DCD))
No. 15	In	Transmitter Clock (TxC)
No. 17	Out	Receiver Clock (RxC)
No. 20	In	Data Terminal Ready (DTR)
No. 24	In	External Transmitter Clock (ETC)

LED Indicators

LED	Status	Description
PWR	ON	In service
	OFF	Out of service
LAN	ON	Network connection on LAN port
	OFF	No connection on LAN port
	Flash	Transmit or recive data on LAN port
GSM		This indicator is connected directly to the GSM module within the router and operates as described in the GSM Status Indicator Functions table below.
NET	ON	A wireless network has been detected
	OFF	No wireless network has been detected
SIM	ON	A valid SIM card is installed in the unit
	OFF	No valid SIM card is installed in the unit
DAT	Flash	Data is being transferred over the wireless network
	OFF	No data is being transferred over the wireless network
Signal	The three indicators labelled SIGNAL illuminate to indicate the GSM signal strength as follows:	
	None illuminated	< -113 dBm (effectively no signal)
	1 LED illuminated	>= -112 dBm and <= –87 dBm (weak)
	2 LED's illuminated	>= -86 dBm and <= –71 dBm (medium)
	3 LED's illuminated	>= -70 dBm and <= –51 dBm (strong)
GPS	ON	GPS option fitted and has been successfully configured by the unit
	OFF	GPS option not fitted or not successfully configured
DTE	ON	Terminal connected to the serial port and the DTR signal is on
	OFF	No connection on serial port Data is transmitted or received on the serial port
Flash		Data is transmitted or received on the serial port

GSM Status Indicator Functions	
OFF	GSM module is in SLEEP or Charge-only mode.
600 ms ON / 600 ms OFF	No SIM card inserted or no PIN entered, or network search in progress, or ongoing user authentication, or network login in progress.
75 ms ON / 3 s OFF	Logged on to network (monitoring control channels and user interactions), no call in progress.
75 ms ON / 75 ms OFF / 75 ms ON / 3 s OFF	One or more GPRS contexts activated.
Flashing	LED is On when data packets were exchanged in GPRS online mode during the last second.
ON	Connected to remote party or exchange of parameters while setting up or disconnecting call.

Reset switch

This is located on the underside of the unit near the front. Pressing the switch gently with the tip of a pen or other suitable implement will generate a hardware reset.

Refer to page 15 (restoring factory defaults).

It is important to allow the MR-2xx to complete the restore procedure. DO NOT press the reset button again or power cycle the unit for at least 2 minutes.

Installation

Mounting / Removal

The router should be positioned on a smooth, level surface making sure that there is adequate ventilation. Do not expose the router to extremes of heat or cold, strong magnetic fields or liquids.

It is important to remember that these products are wireless devices just like a mobile phone, so they will only operate reliably over the GSM network if there is a good signal. For many applications the stub aerial provided will be suitable but in some circumstances it may be necessary to use a window-mounted or magnetically mounted aerial with an extended cable to allow the aerial itself to be positioned to provide the best possible signal reception. Sarian Systems can supply a range of suitable aerials.

Step 1 – Installing the SIM card(s)

The router incorporates two separate SIM card holders so that if your application demands it, you may install SIM cards for two different networks. This means that one wireless service may be used as a back-up service in the event that the primary service fails in some way. By default, SIM 1 is the default SIM used for access to the primary network and SIM 2 is used for the back-up network.

Note: *SIM 1 and SIM 2 cannot be used to access two networks simultaneously.*

The SIM card(s) should be inserted into SIM cardholders on the right of the front panel as illustrated below.
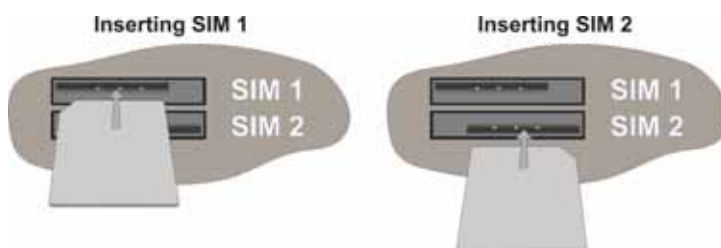
In both cases, the end of the SIM card with the chamfered corner should be inserted first. For SIM 1 the contacts should be face down. For SIM 2 the contacts should be face up.

The easiest way to get started is to use SIM-cards without PIN-code. If the PIN-code is activated it is possible to set this up in the settings for the router.

Step 2 – Fitting the wireless antenna

The router is supplied with a "stub" antenna suitable for with the model you have ordered. Alternatively you may have ordered a different type of antenna separately. In either case this should be screwed onto the SMA aerial connector on the rear of the unit.

Step 3 – Connecting the LAN cable

Plug one end of one of the supplied 2 metre CAT5 STP cable into the RJ45 socket labelled LAN 0. Plug the other end into the LAN socket on your PC or notebook.

Step 4 – Connecting the serial cable

For connection to a serial terminal device, connect the 25-way D plug on the serial cable provided to the SERIAL connector on the rear of the unit. Connect the other end of the cable (9-way D socket) to the terminal. If the serial connector on the terminal is not a 9-way D plug, you will need a suitable adapter.

Step 5 – Connecting the GPS antenna (if applicable)

If you have purchased the router with the GPS option fitted, this connector is used to connect the GPS antenna. A range of suitable antennas are available for purchase separately. To connect the antenna, screw the SMA termination firmly onto the rear panel connector.

Step 6 – Connecting the power supply

Plug the jack plug on the mains adapter into the socket labelled 12VDC. When power is first applied, the ON indicator will illuminate and the unit will initiate a series of diagnostic self-tests. During this process one or more of the other indicators, will flash to show that the unit is busy. When the flashing stops, the unit is ready to use.

The unit is now ready to be configured.

Getting started

IP Address

The default IP address of the MR-2xx when delivered is 192.168.0.99.

IP address configuration

The IP address is configurable by the Web tool and/or by using a terminal program. Below is an description of how to configure the IP address by using a terminal program.

1. If the address is known, connect to the unit from a Web browser with the address of the MR-2xx. If the address is unknown, connect the serial RS-232 interface to a terminal program with settings:
   Data rate: 115.2 bit/s
   Data bits: 8
   Stop bits: 1
   Parity: None
   Flow control: None

2. Use any terminal-program to setup the IP-address, gateway and subnetmask.
   Eth 0 ipaddr xxx.xxx.xxx.xxx (set up IP-address)
   Eth 0 gateway yyy.yyy.yyy.yyy (set up Gateway)
   Eth 0 mask zzz.zzz.zzz.zzz (set up subnetmask)
   Eth 0 status (check settings)
   Config 0 save (save configuration)

3. The unit is now ready for a complete configuration by the Web tool. Address MR-2xx in a browser with the configured IP address. Note that the used computer have to be on the same network as MR-2xx.

Username and Password for configuration

The MR-2xx is username and password protected. These are used when connecting with Web browser during configuration and with Telnet for diagnostics.

Default username: username
Default password: password

Restore Factory default settings

Note! This will clear your customized settings.

The factory default settings can be restored using the reset switch on the bottom of the unit. Pressing (~15 sec) the switch gently with the tip of a pen or other suitable implement will generate a hardware reset.

Note! If the default address of the unit is valid on the connected network it is possible to access the unit directly from a browser.

It is important to allow the MR-2xx to complete the restore procedure. DO NOT press the reset button again or power cycle the unit for at least 2 minutes.

Configuration by Web Tool

The MR-2xx includes an easy-to-use Web configuration tool. The Web tool is very intuitive and includes useful help information for the configurable parameters.

Connect and login to the MR-2xx on the default IP address and with default username and password combination (or your customized if configured) using a standard Web browser.

Basic GPRS/3G setup

The following setup must be done to get basic GPRS connectivity.

PPP Account
Username: If your GPRS provider supplied one
Password: If your GPRS provider supplied one

GPRS/3G Module
APN: Access Point Name from your provider goes here
Press Save then press OK
Press Reboot then press Reboot
The settings must be saved to one of the two profiles and then restarted.

When the router is restarted it will make a connection to the GPRS-network and it should be possible to browse the Internet from the connected computer.

Note: The Gateway and DNS address must be set on the computer to the IP address of the router.

Network status

Status of the GSM-interface can be found in the menu GPRS-module.

Status of the PPP-interface and IP-address in the GPRS-network can be found in the menu PPP.

Convenient configuration

Basic IP Address
   • *Static IP*
To change the default IP-address 192.168.0.99 and subnet mask to something else.

Basic IP Address
   • *DHCP*
Minimum assigned IP address: eg 192.168.0.2
IP address range: eg 20 (highest address will then be 192.168.0.22)
DNS server address: Address of router (192.168.0.99 default setting)
Gateway address: Address of router (192.168.0.99 default setting)
Mask: 255.255.255.0
All settings above must be saved to one of the two profiles and then restarted.
After that change the IP-address of the client computer to accept an IP-address from the DHCP server in the MR-2xx and verify that the computer receive a correct IP-address.

Time
To setup the internal clock of the router to get correct time in logs etc.

GPRS/3G Module
This menu is used to change the PIN code of SIM 1.

Westermo®

Subsidiaries

Westermo Teleindustri AB have distributors in several countries, contact us for further information.