SR2MOD02 and SR2MOD03

Wireless 2G/3G Modem User Guide

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www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This manual describes how to install, configure, and use the SR2MOD02 and SR2MOD03 2G/3G modems, based on descriptive information and how-to procedures. The modems are quad-Bands (850/900/1800/1900 MHz) in 2G GSM Class 12/EDGE.

The modems with manufacturing dates greater than or equal to 1630 are six Bands (Band I (2100 MHz), Band II (1900 MHz), Band IV (1700 MHz), Band V (850 MHz), Band VI (800 MHz) and Band VIII (900 MHz)) in 3G UMTS/HSDPA/HSUPA.

This manual describes 2 modem references based upon the controllers supported:

- **Smart relays**
  - Zelio Logic of Schneider Electric
  - Modem reference: SR2MOD02
- **Programmable controllers**
  - M221, M241, M251 Logic Controllers of Schneider Electric
  - Modem reference: SR2MOD03

NOTE: Read and understand this document before installing, operating, or maintaining the SR2MOD02 and SR2MOD03 modems.

Validity Note

This document has been updated with the release of SR2MOD02/03 with manufacturing dates greater than or equal to 1630.

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.

Step	Action
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related Documents

For more information refer to the Online Help of Zelio Soft 2 Programming Software and to the Online Help of SoMachine Basic and SoMachine Programming Software.

Title of Documentation	Reference Number
SoMachine Basic OnLine Help	–
SoMachine OnLine Help	–
SR2MOD02 / SR2MOD03 Instruction Sheet	*HRB70154*
SR2COM01 Instruction Sheet	*W916063660111*
SR2COM01 Quick Start Guide	*W916022340111*

You can download these technical publications and other technical information from our website at https://www.schneider-electric.com/en/download

Product Related Information

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
EN 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2008	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 1088:2008 ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2006	Safety of machinery - Emergency stop - Principles for design
EN/IEC 62061:2005	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2008	Digital data communication for measurement and control: Functional safety field buses.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Chapter 1
Introduction

Overview

This chapter describes the various features and the specific regulations of the SR2MOD02/03 modem.

What Is in This Chapter?

This chapter contains the following topics:

Product Information

General

This equipment contains Licensed Transmitter FCC ID XPYLISAU200, IC: 8595A-LISAU200N.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

It is necessary to follow the specific regulations for the use of radio operator equipment. In particular the possible risks of radio frequency interference (RFI).

Restrictions of use for radio operator equipment in:

- Fuel depots.
- Chemical factories.
- Locations where demolition is under way.
- Other places where signs indicate that the use of cellular telephones is prohibited or dangerous.

⚠ DANGER

POTENTIAL FOR EXPLOSION

- Install and use this equipment in non-hazardous locations only.
- Do not connect or disconnect equipment unless power has been removed or the location is known to be non-hazardous.

Failure to follow these instructions will result in death or serious injury.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, interference may occur in a given or particular installation nonetheless. If this equipment does cause harmful interference to radio, television or other communication device transmission/reception, which can be determined by turning the equipment off and on, you are hereby encouraged to try to correct the interference.

⚠ WARNING

ELECTROMAGNETIC INTERFERENCE

- Reorient or relocate the modem antenna if you experience communication interference with other devices.
- Increase the separation distance between equipment subject to electromagnetic interference and the modem / antenna.
- Connect equipment subject to electromagnetic interference into a power outlet on a circuit different from that to which the modem is connected.
- Consult your local Schneider Electric representative if you are unable to resolve electromagnetic interference issues that may arise in conjunction with the use of the modem.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This equipment complies with FCC's radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20.3 cm (8 in) is maintained between the radiator (antenna) and the body of the user or nearby person at all times.
2. This transmitter must not be collocated or operating in conjunction with any other antenna or transmitter.

⚠ WARNING

ELECTROMAGNETIC RADIATION EXPOSURE

- Do not operate the modem, or have the antenna placed, within 20.3 cm (8 in) of anyone.
- Do not use any other antenna than that supplied with the modem.
- Do not share the use of the modem antenna with any other device.
- Do not locate the modem antenna in proximity to another antenna or radio transmitting device.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

There can be a hazard associated with the use of your modem close to insufficiently protected medical devices such as acoustic apparatuses and pacemakers. Consult the manufacturers of medical equipment to determine if they are adequately protected. If the equipment is insufficiently protected, then the use of your modem in close proximity to other electronic equipment can also cause interference. Observe all recommendations for the equipment from the manufacturer.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use this product in safety critical machine functions.
- Use approved appropriate hard-wired safety interlocks where personnel and/or equipment hazards exist.
- Do not disassemble, repair, or modify the products.
- Use this equipment only in a properly rated enclosure.
- Do not connect this equipment directly to line voltage.
- Use a minimum of a PELV rated power supply to supply power to this equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

INOPERABLE EQUIPMENT

- Do not open the modem housing.
- Return the modem to the seller in case any damage is detected.

Failure to follow these instructions can result in injury or equipment damage.

Power Supply

The modems require a power supply rated between 7.2 and 32 Vdc.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not connect the equipment directly to line voltage.
- Use a minimum of a PELV rated power supply to supply power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Care and Maintenance

NOTICE
UNINTENDED MAINTENANCE EQUIPMENT ● Do not expose the modem to environments outside of those specified for this equipment such as a high temperature or a high humidity content. ● Do not use or store the modem in dusty or dirty environments. ● Do not open or disassemble the modem. ● Do not expose the modem to liquids. ● Avoid dropping, striking, or shaking the equipment. ● Do not place the modem near computer disks, credit or voyage cards, or other type of sensitive media. **Failure to follow these instructions can result in equipment damage.**

Features

Modem Features

The table shows the various features of the SR2MOD02/03 modem:

Functions UMTS / HSPA (3G) - GSM / EDGE (2G)		
UMTS/HSPA	800/850/900/1700/1900/2100 MHz 3GPP Release 7 (HSPA+)	Bands I, II, IV, V, VI, VIII
GSM	4 band 850/900/1800/1900 MHz 3GPP Release 7 PBCCH support	Support GSM / E-GSM / DCS / PCS
EDGE	Class 12, MCS1–9, up to 236.8 kb/s	
CS	GSM up to 9.6 kb/s WCDMA up to 64 kb/s	
SMS	MT/MO/CB PDU/Text mode SMS over PSD or CSD	
WCDMA/HSDPA/HSUPA GSM EDGE	Power Class 3 Power Class 4 Power Class 1 Power Class E2 Power Class E2	(24 dBm / Band VIII) (33 dBm) for GSM/E-GSM bands (30 dBm) for DCS/PCS bands (27 dBm) for GSM/E-GSM bands (26 dBm) for DCS/PCS bands
Packet Switched Data Rate	HSUPA category 6, up to 5.76 Mb/s HSDPA category 8, up to 7.2 Mb/s WCDMA data up to 384 kb/s DL/UL	
Packet Switched Data Rate	EDGE multi-slot class 12, MCS1-MCS9 up to 236.8 kb/s DL, MCS1-MCS4 up to 70.4 kb/s UL **NOTE:** EDGE multi-slot class determines the number of timeslots available for upload and download. Thus the speed at which data can be transmitted and received, with higher classes typically allowing faster data transfer rates. EDGE multi-slot class 12 implies a maximum of 4 slots in DL (reception) and 4 slots in UL (transmission) with 5 slots in total.	
Interfaces	Antenna: Connector SMA-Female	
	Power supply: +7.2...+32 Vdc (4-pin micro-FIT connector)	
	1 serial port RS 232 (300...115200 bds) 15-pin SUB-D female	
	AT commands: 3GPP TS 27.007 / 27.005 / 27.010	
	SIM reader (SIM 3 V – 1.8 V)	
	External device power supply through RI pin	

Functions UMTS / HSPA (3G) - GSM / EDGE (2G)	
Accessories	Fixing brackets (x 2)
	2-wire Micro FIT supply cable
	SUB-D 15 to SUB-D 9-pin adapter cable

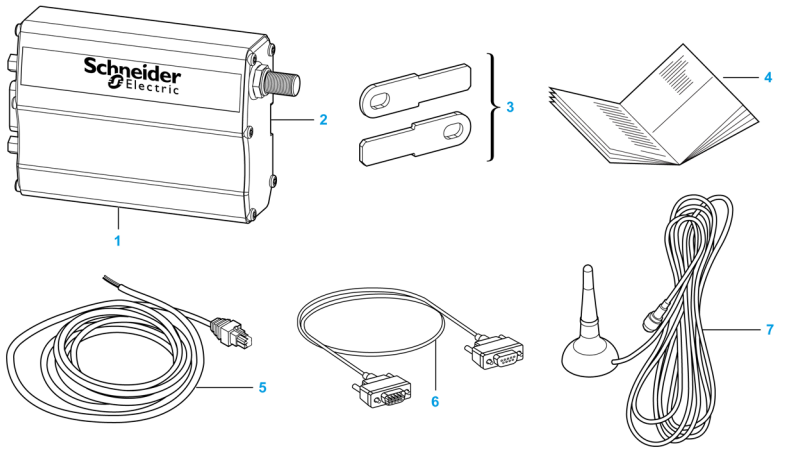
NOTE: Some functions require the support of other devices in the system. For more details, refer the devices documentation.

Chapter 2
Package Contents and Labels

Package Contents and Labels

Overview

This figure illustrates the contents included in the modem package:



1 The SR2MOD02/03 modem.
2 DIN 35 mm (1.38 in.) rail mounting clip.
3 2 mounting brackets.
4 Instruction Sheet.
5 2-wire power cable (Red/Black).
6 SUB-D 15 to SUB-D 9-pin adapter cable.
7 Magnetic antenna with connection cable (2500±100 mm) and SMA male connector.

Chapter 3
General Presentation

Overview

This chapter describes the modem description, functional description, and technical characteristics of the SR2MOD02/03 modem.

What Is in This Chapter?

This chapter contains the following sections:

Section 3.1
Modem Description

Overview

This section provides information about the physical description, external connections, and accessories of the SR2MOD02/03 modem.

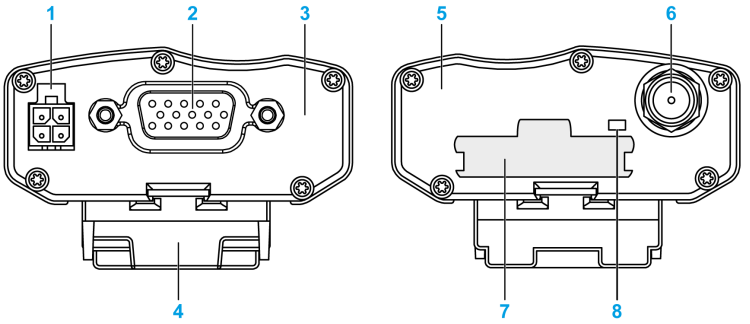
What Is in This Section?

This section contains the following topics:

Physical Description

Description of the Modem

This figure provides the description of the modem:



1 Micro FIT 3.0™ female 4-pin connector for the electrical supply
2 Female SUB-D 15-pin connector for RS 232
3 Front side
4 Optional DIN rail mounting clip
5 Rear side
6 SMA female antenna connector: The antenna connector is a 50 Ω impedance female SMA type
7 SIM card cover
8 Modem activity LED

External Connections

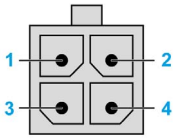
Antenna Connector

The antenna connector is a 50 Ω impedance female SMA type.

4-Pin Micro FIT Female Connector

The connector allows the connection of an external DC supply.

This table describes the connector pin assignment:

Pin Assignment	Pin Number	Signal
	1	7.2...32 Vdc
	2	0 Vdc
	3	N.C.
	4	N.C.

⚠ WARNING

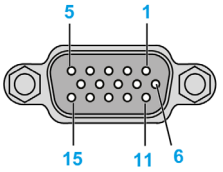
UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

15-Pin SUB-D Female Connector

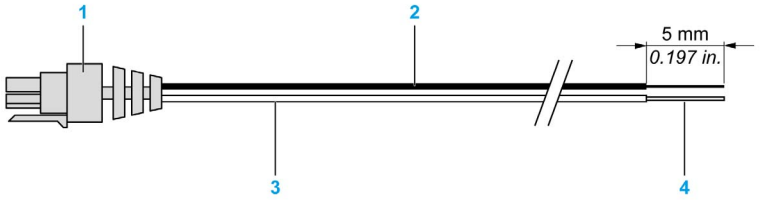
The table describes the connector pin assignment:

Pin Assignment	Pin Number	Pin Name	Circuit (V24 - RS 232C)	I/O
	1	Signal detection	DCD	O
	2	Data transmission	TXD	I
	3	N.C.	N.C.	–
	4	N.C.	N.C.	–
	5	N.C.	N.C.	–
	6	Data reception	RXD	O
	7	Data set ready	DSR	O
	8	Data terminal ready	DTR	I
	9	Ground	GND	–
	10	N.C.	N.C.	–
	11	Clear to send	CTS	O
	12	Request to send	RTS	I
	13	Ring indicator	RI	O
	14	N.C.	N.C.	–
	15	N.C.	N.C.	–

Accessories

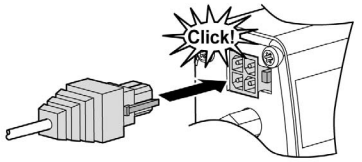
2-Wire Micro FIT Supply Cable

This figure illustrates the cable supplied with the modem:

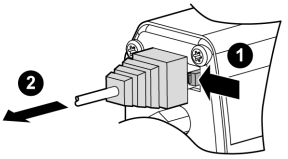


1 Molex connector micro FIT 3.0
2 Black wire (0 Vdc)
3 Red wire (+Vdc)
4 Tinned copper wire

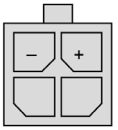
This figure describes how to connect the cable to the modem:



This figure describes how to disconnect the cable from the modem:



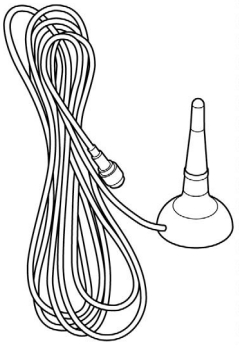
This table illustrates the connector from cable side and describes its components and characteristics:

View	Component	Characteristics
	4-pin micro FIT connector	Type: Molex
	Cable	1500 mm (59.1 in.)
	Wire section/Gauge	Tinned copper 24 x 0.2 mm (0.94 x 0.01 in.) Surface area: 0.75 mm^2 (18 AWG)

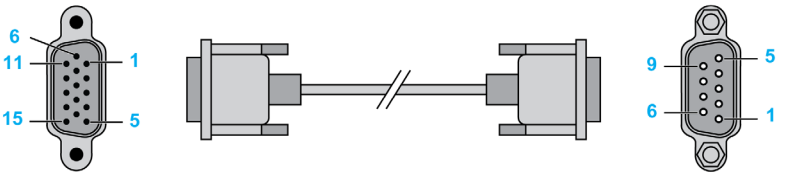
Magnetic Antenna (SMA-M)

The magnetic antenna is designed for vertical installation on a metallic support. Its SMA male connection allows it to be directly connected to the modem.

This table illustrates the magnetic antenna and describes its components and characteristics:

View	Component	Characteristics
	SMA-M antenna	GSM quad-Bands (2G) 850/900/1800/1900 MHz UMTS/HSPA six Bands (3G) 800/850/900/1700/1900/2100 MHz
	Cable	2500±100 mm (59.1±3.94 in.)
	Coaxial	RG174 - Ø 2.54 mm (Ø 0.10 in.)
	Dimensions	Base: Ø 30 mm (Ø 1.18 in.) Total height: Ø 70 mm (Ø 2.76 in.)

SUB-D 15 to SUB-D 9-Pin Adapter Cable



The table describes the pin assignments on the adapter cable:

SUB-D 15 male	Signal	SUB-D 9 female
1	Signal detection (DCD)	1
2	Data transmission (TXD)	3
3	N.C.	–
4	N.C.	–
5	N.C.	–
6	Data reception (RXD)	2
7	Data set ready (DSR)	6
8	Data terminal ready (DTR)	4
9	Ground (GND)	5

SUB-D 15 male	Signal	SUB-D 9 female
10	N.C.	–
11	Clear to send (CTS)	8
12	Request to send (RTS)	7
13	Ring indicator (RI)	9
14	N.C.	–
15	N.C.	–

Section 3.2
Functional Description

Overview

This section provides information about the power supply and RS 232 serial link of the SR2MOD02/03 modem.

What Is in This Section?

This section contains the following topics:

Power Supply

Description

Use a minimum of a PELV rated external, regulated DC power source between 7.2...32 Vdc to power the modem. The modem will not function correctly if the input voltage (+Vdc) falls below 7.2 Vdc.

RS 232 Serial Link

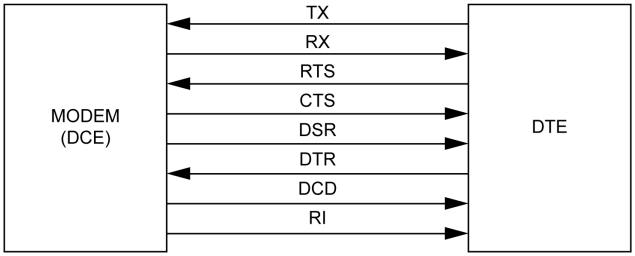
General

The RS 232 interface provides a level translation between the GSM/UMTS/HSPA module (DCE) and the controller port (DTE). The RS 232 interface is protected internally (ESD shielding) against external electrostatic spikes.

Filter specifications:
- Input/output EMI/RFI reduction
- Signal smoothing

The following signals are available in this link:
- TX data (`TX`)
- RX data (`RX`)
- Request to send (`RTS`)
- Clear to send (`CTS`)
- Data terminal ready (`DTR`)
- Data set ready (`DSR`)
- Data carrier detect (`DCD`)
- Ring indicator (`RI`)

This figure illustrates the signals exchanged by the modem:



NOTE: The RS 232 interface allows a certain amount of flexibility in the use of its signals. For example, the modem operates in the 3-wire mode using only the TX, RX and GND signals.

Mode Autobaud

The auto-baud mode allows the modem to detect the transmission speed used by the DTE. Only the following speeds are detected: 2400, 4800, 9600, 19,200, 38,400 bps, and 57,600 bps. Auto-baud detection is not reliable for speeds below or above the given values. The auto-baud mode is controlled by the AT commands.

To see this function explained in detail, refer to the description of the AT baud rate command *(see page 73)* in Appendix A.

Section 3.3
Technical Characteristics

Overview

This section provides information about the mechanical, electrical, and environmental characteristics and the standards/conformities of the SR2MOD02/03 modem.

What Is in This Section?

This section contains the following topics:

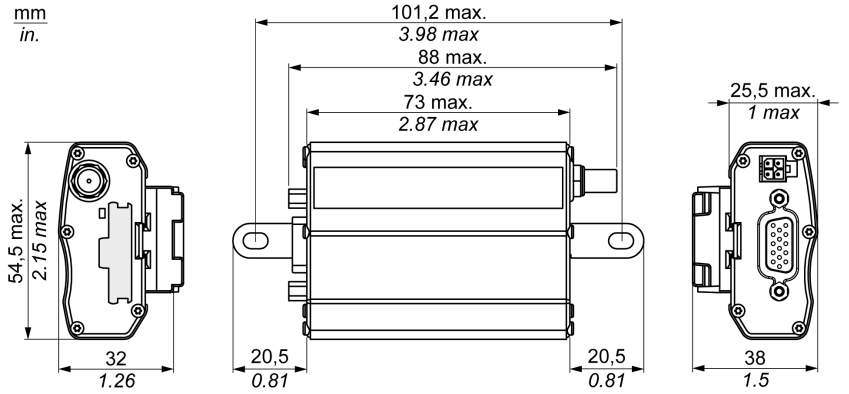
Mechanical Characteristics

General

This table describes the mechanical characteristics of the modem:

Mechanical Characteristics	
Dimensions	73 x 54.5 x 25.5 mm (2.87 x 2.14 x 1 in.) (without connectors)
Overall dimensions	88 x 54.5 x 25.5 mm (3.46 x 2.14 x 1 in.)
Weight	87 g (3.06 oz) (modem only) < 190 g (6.7 oz) (modem and accessories)
Volume	101.5 cm^3 (39.96 $in.^3$)
Case	Extruded aluminum
Ingress protection	IP31

This figure describes the dimensions of the modem and the clearances necessary for installation:



Electrical Characteristics

Power Supply

The operating voltage range is between 7.2...32 Vdc.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not connect the equipment directly to line voltage.
- Use a minimum of a PELV rated power supply to supply power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: The modem remains under power as long as it is connected to a power supply that is itself under power.

If the Voltage:	Then
< 7.2 Vdc	GSM/UMTS/HSPA communication cannot operate properly.
> 32 Vdc (transient peaks)	The modem has built-in protection.

Power Supply Consumption

The following table describes the power consumption:

	12 V	24 V
Attached mode, average	2.5 mA	1.5 mA
Data transfer (GSM/UMTS/HSPA), maximum	140 mA	70 mA
Data transfer (GSM/UMTS/HSPA), peak	950 mA	500 mA
Data transfer (WCDMA), maximum	310 mA	150 mA

Electrical Characteristics of the SIM Interface

The electrical characteristic of the SIM card is 1.8 Vdc or 3 Vdc.

GSM/DCS Frequency Bands

This table describes the frequency ranges:

UMTS/HSPA	800/850/900/1700/1900/2100 MHz 3GPP Release 7 (HSPA+)	Bands I, II, IV, V, VI, VIII
GSM	4 band 850/900/1800/1900 MHz 3GPP Release 7 PBCCH support	Support GSM/E-GSM/DCS/PCS

Sensitivity

This table describes the sensitivity ranges:

GSM850/E-GSM900 @ 25 °C (77 °F)	-110 dBm, Downlink RF level @ BER Class II < 2.4 %
SensitivityGSM850/E-GSM900 @ 25 °C (77 °F)	-109 dBm, Downlink RF level @ BER Class II < 2.4 %
UMTS 800 (band VI)	-111 dBm, Downlink RF level for RMC @ BER < 0.1 %
UMTS 850 (band V)	-112 dBm, Downlink RF level for RMC @ BER < 0.1 %
UMTS 900 (band VIII)	-111 dBm, Downlink RF level for RMC @ BER < 0.1 %
UMTS 1700 (band IV)	-111 dBm, Downlink RF level for RMC @ BER < 0.1 %
UMTS 1900 (band II)	-111 dBm, Downlink RF level for RMC @ BER < 0.1 %
UMTS 2100 (band I)	-111 dBm, Downlink RF level for RMC @ BER < 0.1 %

External Antenna

The external antenna is connected to the modem via the SMA/M connector.

This table describes the external antenna characteristics:

External Antenna Characteristics	
Antenna frequency range	824...960 MHz (GSM 850, GSM 900, UMTS B5, UMTS B6, UMTS B8) 1710...2170 MHz (GSM 1800, GSM 1900, UMTS B1, UMTS B2, UMTS B4)
Impedance	50 Ω nominal
DC impedance	0 Ω
Gain	< 4.25 dBi for 850 MHz < 7.30 dBi for 1700 MHz < 2.74 dBi for 1900 MHz
VSWR (Rx max TX max)	< 2:1 typical < 3:1 acceptable
Polarization	Linear

Environmental Characteristics

General

This table describes the environmental characteristics of the modem:

Environmental Characteristics	
Operating temperature	–20...60 °C (–68...140 °F)
Storage temperature	–40...85 °C (–104...185 °F)
Operating humidity without condensation	HR < 70% at 55 °C (131 °F)
Atmospheric pressure	700...1060 hPa (10287...15577 psi) (Altitude -400...3000 m (-1312...9842 ft))

Standards/Conformities

Description

The product conforms to the following requirements:

- R&TTE 1999/5/EC directive
- EN 301 511: V9.0.2
- EN 300 440-1 V1.6.1
- EN 300 440-2 V1.4.1
- EN 301 908-1: 2011-05 V5.2.1
- EN 301 489-1: 2011 V1.9.2
- EN 301 489-3: 2013 V1.6.1
- EN 301 489-7: 2005 V1.3.1
- EN 301 489-24: 2010 V1.5.1
- EN 50385: 2002 and EN 50383: 2010
- EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013

For product compliance and environmental information (RoHS, REACh, PEP, EOLI, etc.), refer to *http://www.schneider-electric.com/green-premium*.

Protections

Overvoltage

The modem design helps protect it against voltages over 32 Vdc. The power supply is disconnected in order to help protect the internal components against overvoltage when the supply voltage exceeds 32 Vdc.

Chapter 4
Installing the Modem

Overview

This chapter describes how to mount, install, and remove the SR2MOD02/03 modem.

What Is in This Chapter?

This chapter contains the following topics:

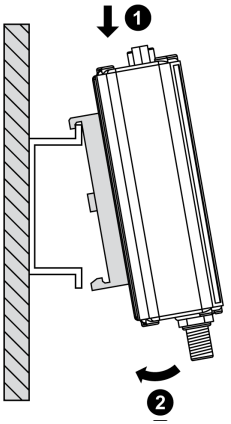
Mounting the Modem

Mounting Using DIN Rail Mounting Clip

The modem is supplied with a DIN rail mounting clip mounted on the case. The DIN rail mounting clip allows mounting on a DIN Rail IEC/EN 60715/DIN 35 x 7.5 mm (1.38 x 0.3 in).

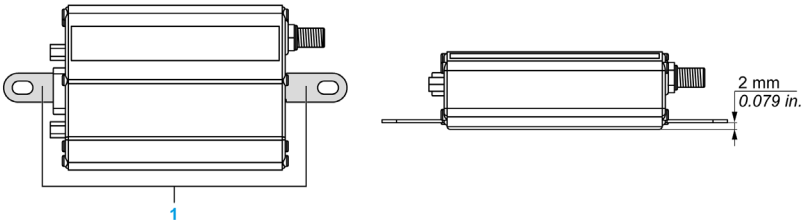
Execute step 1 (pressure) to mount the modem on DIN rail, then step 2 (pivot).

This figure describes the step 1 and step 2 of mounting the modem:



Mounting Procedure Using 2 Mounting Brackets

Use the supplied mounting brackets when surface mounting the modem as shown in the given figure:

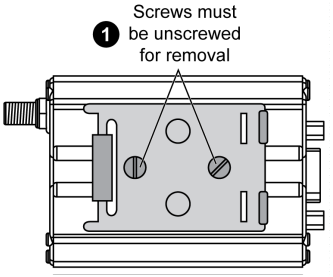
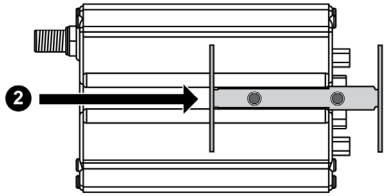
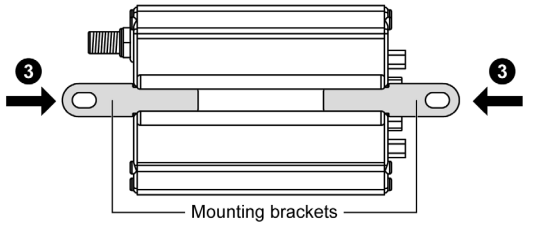


1 Mounting brackets

Refer also to the drilling dimensions *(see page 35)*.

NOTE: The modem has to be mounted to a flat surface when applying the mounting brackets. The maximum height of the screw head is 2 mm.

This table describes the removal of the mounting brackets:

Step	Action
1	Remove the DIN rail mounting clip before installing the surface mounting brackets. 
2	Remove the 2 mounting clips retaining the screws. 
3	Slide the mounting clip off the modem. 

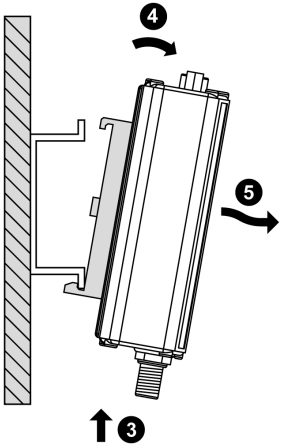
Removing the Modem

Removing Using DIN Rail Mounting Clip

The DIN rail mounting clip allows removal of the modem from a DIN rail IEC/EN 60715/DIN 35 x 7.5 mm (1.38 x 0.3 in).

Execute step 3 (pressure) to remove the modem from the DIN rail, then steps 4 and 5 (pivot and remove).

This figure describes the steps 3, 4, and 5 of removal procedure:

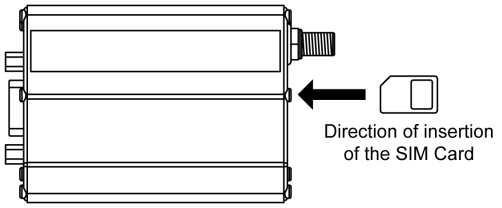


Modem Installation

Description

To install the modem, perform the following operations with the modem turned off:

1. Remove the SIM card cover on the rear side.
2. Carefully insert the SIM card into its holder.



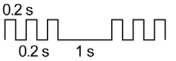
3. Put the SIM card cover on the rear side.
4. Connect the antenna to the SMA connector.
5. Connect the 15 pin to 9 pin adapter cable to the female connector of the modem on one side and to the RS 232 serial cable (SR2CBL07, TCSMCN3M4M3S2 or others) on the other side.
6. Connect the free RS 232 cable to the device.
7. Connect the supply cable to an external regulated DC source.
8. Connect the supply cable to the modem and turn the power supply on. The modem will search the network bands and the LED will illuminate.
9. Verify the LED status to ensure that the modem is connected to the desired network (2G or 3G). If necessary, you can manually select the network by following the network selection procedure *(see page 47)*.
10. The modem is now ready to be configured.

Refer to AT Commands *(see page 56)* for the description of the commands.

LED Status

The LED that is located on the side of the modem *(see page 25)* indicates the state of the modem.

This table provides the meaning of the different states of the LED *(see page 25)*:

Modem activity	LED	
	Status	Description
Not ready or no power supply	OFF	The modem is not powered or is in the RESET phase.
Ready but not connected to network	ON	The modem is powered and is ready to function. This occurs when the PIN code has not been entered or the antenna is not connected.
Searching for network	3 flashes of 0.2 sec. for every 2 sec. 	This occurs when the modem has not been recognized by the network.
Ready and connected to GSM network 2G	1 flash of 0.5 sec. for every 1.5 sec. 	The modem is powered and currently connected to 2G network.
Ready and connected to UMTS/HSPA network 3G	2 flashes of 0.1 sec. for every 1.5 sec. 	The modem is powered and currently connected to 3G network.
Transmission mode (2G/GSM)	1 flash of 0.2 sec. for every 0.8 sec. 	This occurs when data is being transmitted/received.

Network Type Selection by SMS

You can manually select the type of network (2G or 3G) by sending an SMS to the modem (SIM card phone number):

Step	Action
1	To select 2G network, send `XXXX AT+EGRAT=0`. To select 3G network, send `XXXX AT+EGRAT=2` where `XXXX` is the modem password (0000 by default). **NOTE:** The modem password is not the same thing as the PIN code for the SIM card. Refer to Main AT Commands *(see page 57)* for defining the password.
2	Verify the LED status to ensure that the modem is connected to the desired network (2G or 3G). **NOTE:** Due to internal network exchange mechanism, the network manual selection can take until 60 seconds.

If the type of network was manually selected and is now unavailable, you must manually select the other type of network:

Step	Action
1	Turn off the power supply.
2	Remove the SIM card.
3	Insert another SIM card compatible with a locally available network.
4	Turn on the power supply.
5	Wait for the modem to be connected to a network.
6	Turn off the power supply.
7	Insert the SIM card removed in step 2.
8	Turn on the power supply.
9	Perform the manual network type selection procedure.

Chapter 5
Modem Communication

Overview

This chapter describes the verifications and the AT commands in SR2MOD02/03 modem.

What Is in This Chapter?

This chapter contains the following sections:

Section 5.1
Verification

Overview

This section provides the verifications necessary for the SR2MOD02/03 modem.

What Is in This Section?

This section contains the following topics:

Modem Communication Verification

General Description

Connect the RS 232 on the PC COM port.

Configure the DTE RS 232 port according to the type of the modem, as described in the table:

Parameters	Description	
	SR2MOD02	SR2MOD03
Data rate	115200 bauds	19200 bauds
Data size	7 bits	8 bits
Parity	Even parity	No parity
Stop bits	1 Stop bit	1 Stop bit
Flow control	hardware flow control activated	hardware flow control deactivated
AT commands echo	Echo deactivated	Echo deactivated
DSR signal	DSR 1	DSR OFF
Ring register	S0 = 0 (no automatic answer)	S0 = 2 (answer after 2 rings)

Enter the command `AT(CR)` with the Windows hyperterminal communication application. The modem responds with `OK`.

If the modem does not respond, then:

- Verify the RS 232 connection between DTE and the modem (DCE).
- Verify the configuration of the COM port on the DTE.

Examples of AT Commands

Some of the AT commands that can be sent to the modem once the communication is established and verified are given here:

- `AT+CGSN`: The modem responds with a 15-digit number.
- `AT+CPIN = xxxx`: Enter the code of the SIM card xxxx (if active).
- `AT+CSQ`: Verify the GSM/UMTS/HSPA signal reception level.
- `AT+CREG?`: Verify the registration of the modem on the network.
- `ATD<telephone number>`: Start a voice call.
- `ATH`: Hang-up (end the call).

For more information about AT commands and their associated parameters, refer to Appendix A *(see page 65)*.

Received Signal Quality Verification

General Description

The modem establishes a call, only if the received GSM/UMTS/HSPA signal is of a sufficient level. The AT+CSQ command restores the reception level (RSSI) of the signal sent by the closest base transceiver station (BTS), and the signal quality (QUAL).

The command AT+CSQ restores the signal level from the BTS on the subscribed operator network when it is used with a SIM card and the PIN code is entered.

The use of this command without a SIM card simply indicates the closest BTS, as the modem cannot identify the subscription. Therefore, do this test with the SIM card present.

The signal quality parameter qual is verified during a call (ATD<telephone number>). When the call succeeds with CONNECT response, enter the sequence +++ in less than 1 second. The modem responds with OK.

AT+CSQ Command and Responses

Enter the command AT+CSQ, using a communication application to verify the signal quality.

The response is +CSQ: <rssi>,<qual>:

Parameter	Description	Values in 2G	Values in 3G
rssi	Received Signal Strength Indication ● In 2G, remaps the RXLEV of the serving cell or the RXLEV of the GSM dedicated channel, ● In 3G, remaps the Received Signal Code Power (RSCP) of the current cell.	• 0: -113 dBm or less • 1: -111 dBm • 2...30: from -109...-53 dBm with 2 dBm steps • 31: -51 dBm or greater • 99: not known or not detectable or currently not available	
qual	Signal quality	• 0: BER < 0.2% • 1: 0.2% < BER < 0.4% • 2: 0.4% < BER < 0.8% • 3: 0.8% < BER < 1.6% • 4: 1.6% < BER < 3.2% • 5: 3.2% < BER < 6.4% • 6: 6.4% < BER < 12.8% • 7: BER > 12.8%	• 0: ECN0_LEV >= 44 • 1: 38 <= ECNO_LEV < 44 • 2: 32 <= ECNO_LEV < 38 • 3: 26 <= ECNO_LEV < 32 • 4: 20 <= ECNO_LEV < 26 • 5: 14 <= ECNO_LEV < 20 • 6: 8 <= ECNO_LEV < 14 • 7: ECNO_LEV < 8

NOTE: During the radio channel reconfiguration (for example, handover), invalid measurements can be returned for a short transitory, because the MT must compute them on the newly assigned channel.

Reception Level for the Modem

The modem will function properly with a minimum `<rssi>` value from 11...15. The signal value below 10 is insufficient. The modem cannot function depending on the geographical situation or the mobility of the vehicle. The signal value above 15 is sufficient to establish a connection.

For more information about AT commands, refer to Appendix A *(see page 65)*.

PIN Code Verification

General Description

The PIN code is necessary to make or receive a call from the network. You can modify the PIN code and it is stored on the SIM card.

AT+CPIN? Command and Response

Enter the command AT+CPIN?, using a communication application to verify the previously entered PIN code.

This table describes the main responses from the modem:

Command	Response	Interpretation
AT+CPIN?	+CPIN: ERROR	The SIM card is absent or unknown.
	+CPIN: READY	The PIN code is correct.
	+CPIN: SIM PIN	The PIN code is incorrect or not yet entered
	+CPIN: SIM PUK	The PUK code is required

For more information about AT commands, refer to Appendix A *(see page 65)*.

Verifying Modem Registration on Network

General Description

For this verification, confirm that a valid SIM card is present in the SIM card reader of the modem.

AT Commands for Modem Registration Verification

Enter the given AT commands, using a communication application:

- `AT+CPIN = xxxx`: Enter the PIN code with the command. The operator has 3 attempts to enter the PIN code correctly. After the third attempt, only the PUK code (supplied by the operator) allows a new PIN code to be entered.
- `AT+CREG?`: This verifies the network registration status. The response is in the format `+CREG: <mode>,<stat>`, where:
  - `<Mode>` = unsolicited registration message configuration
  - `<Stat>` = registration status

This table describes the main responses from the modem:

Command	Response	Interpretation
`AT+CREG?`	`+CREG: 0,0`	The modem is not recognized by the network.
	`+CREG: 0,2`	The modem is searching for a network operator.
	`+CREG: 0,1`	The modem is attached to a local operator.
	`+CREG: 0,5`	The modem is attached to an operator in roaming mode.

NOTE: If the modem does not register, verify the antenna connection and the receive signal level. For more information about AT commands, refer to Appendix A *(see page 65)*.

Section 5.2
AT Commands

Overview

This section provides information about the AT commands that is used for configuring and using the SR2MOD02/03 modem.

What Is in This Section?

This section contains the following topics:

Main AT Commands (HAYES)

Description

This table describes the main AT commands useful for the control of the modem:

Description	AT Command	Response	Interpretation
Enter the PIN code	`AT+CPIN = xxxx` (xxxx = PIN code)	`OK`	PIN code accepted
		`+CME ERROR: 16`	PIN code incorrect(1)
		`+CME ERROR: 3`	PIN code already entered(1)
Verification of network registration	`AT+CREG?`	`+CREG: 0,1`	The modem is attached to a local operator
		`+CREG: 0,5`	The modem is attached to an operator in roaming mode
		`+CREG: 0,2`	The modem is searching for a network operator
		`+CREG: 0,0`	The modem is not recognized by the network
Reception of an incoming call(2)	`ATA`	`OK`	Reply to the call
Make a voice call	`ATD<telephone number>;` **NOTE:** The semicolon at the end of the sequence specifies a voice call.	`OK`	Communication established
		`+CME ERROR: 11`	PIN code not entered
		`+CME ERROR: 3`	There is no credit or the communication has already been established
Make an emergency call (112)	`ATD112;`	`OK`	Communication established
Enter a password for modem configuration by SMS	`AT+EGSPWD = xxxx` (xxxx = password default value is 0000)	`OK`	Password accepted
Lost communication	–	`NO CARRIER`	–
Hang-up	`ATH`	`OK`	–

(1) The AT command `AT+CMEE = 1` allows display of extended error codes. The AT command `AT+WIND = 63` allows display of the change of status of the SIM card and to check states of the modem drivers.

(2) The AT command `AT+CRC = 1` displays more detailed ring information indicating call type (voice, data, or fax) of an incoming call. These commands are saved with the command `AT&W`. For example: For VOICE: `+CRING: VOICE`, for DATA: `+CRING: REL ASYNC`, and for FAX: `+CRING: FAX`

For more information about AT commands, refer to Appendix A *(see page 65)*.

Deactivated AT Commands ECHO

Description

In case no echo returns, when the operator enters an AT command, it could be that:

- The echo function of the modem is deactivated (setting by default).
- The local echo of the communication application is not activated.

NOTE: The echo is configured by the command `ATE` and requires a back-up with the command `AT&W`.

Activation of Modem Echo

Enter the command `ATE` to activate the modem echo.

Execute the given actions when using a communication application to send AT commands to the modem:

- Deactivate the local echo in your communication application.
- Activate the modem echo (enter the command `ATE1`).

NOTE: For a communication machine to machine with the modem, deactivate the modem echo (enter the command `ATE0`) to avoid the CPU from getting redundant responses.

For more information about the echo AT command refer to Appendix A *(see page 72)*.

Chapter 6
Troubleshooting

Troubleshooting

Removing Power of the Unit

Do not remove power to the modem while in communication or dialog without first finishing the communication and then detaching from the network.

⚠ CAUTION
LOSS OF DATA Do not intentionally remove power to the modem and/or the control system that it is connected to during on-going communications over the modem. **Failure to follow these instructions can result in injury or equipment damage.**

To help avoid network congestion when it is required to remove power from the modem, it is necessary to follow the given steps:

- Execute the command `AT+CPOF`. In case this is not done correctly, the modem can remain registered on the network.
- Send the command `AT+CPOF` or `AT+CFUN = 0` (identical functions) before removing power in dialog mode (no communication).

The modem returns OK and is no longer registered on the network. The radio module shifts into the standby mode and then the power is removed.

RS 232 (V24) Communication Troubleshooting

The table describes a list of possible causes and solutions, in case the modem does not respond to any of the AT commands via the RS 232:

Modem Returns	Verify	Action
Nothing	The modem is correctly powered.	Ensure that the modem is connected to an external regulated power source between 7.2...32 Vdc. For more details, refer Power supply *(see page 32)*.
	The serial cable is connected at both ends (PC and modem).	Verify the connection of the serial cable.
	The serial cable is correctly wired. Refer to the Table *(see page 26)* describing the connector pin assignment of 4-pin micro FIT female connector.	Wire the serial cable. Refer to the Table *(see page 26)* describing the connector pin assignment of 4-pin micro FIT female connector.
Nothing or random characters	The communication terminal is correctly configured on the PC.	Ensure that the terminal configuration corresponds to that of the modem. Refer to the Modem Communication Verification *(see page 51)* for factory configuration.
	There is no other application using the same port thus creating a conflict.	Close the conflicting application.
	The modem echo is deactivated and without message reporting.	Enter the command `ATE1Q0` followed by `AT&W` if a backup is required.

ERROR Message

The modem returns the message ERROR (in response to an AT command) in the given cases:

- The COM port is not directed to the modem but to another modem. Enter the command `AT1`. The response is `WAVECOM MODEM`. Other responses indicate a dialog with another modem. Verify the COM port used in the communications application.
- The syntax of the AT command is incorrect. Re-enter the command. (Refer to Appendix A *(see page 65)* for a list of AT commands).
- When the syntax of the AT command is correct, but with incorrect parameters follow the given steps:
  - Enter the command `AT+CMEE = 1` to obtain the error message with its error code instead of the message ERROR
  - Enter the AT command which previously caused an inaccuracy to obtain the error code again. In the case of a detected error, the response is in the form: `+CME ERROR: <error code>` or `+CMS ERROR: <error code>`

For more information about error codes returned by the command `AT+CMEE`, refer to Appendix A *(see page 65)*.

NOTE: Let the modem return error codes (enter the command `AT+CMEE = 1`).

NO CARRIER Message

The table describes a list of possible causes and solutions, in case the modem responds with the NO CARRIER message after an attempted call:

Modem Returns	Verify That	Action
NO CARRIER	The received signal is strong enough.	Verify the received signal quality. Refer the Receive Signal Quality Verification *(see page 52)*.
	The modem is registered on the network.	Verify network registration. Refer the Modem Registration Verification *(see page 55)*.
	The antenna is correctly connected.	Check the antenna installation.
NO CARRIER (when attempting a voice call)	The semi-colon (;) has been entered immediately after the telephone number in the AT command.	Ensure that the semi-colon (;) has been entered immediately after the telephone number in the AT command. For example: ATD0123456789
NO CARRIER (when attempting a data call)	The SIM card is configured for data/fax calls.	Ensure that the SIM card is allowed to make data/fax calls (check with the SIM card supplier).
	The selected modulation type is supported by the called number.	Ensure that the selected modulation type is supported by the called number.
	The selected modulation type is supported by the network.	Ensure that the selected modulation type is supported by the network. If not, select a compatible modulation type with the command `AT+CBST = 0,0,1`.(1)
1 For further information concerning AT commands, refer to Appendix A *(see page 65)*.		

Use the command `AT+CEER` to see the extended error codes.

This table describes a list of error codes and their meanings:

Error Code	Description	Observations
1	Unassigned (unallocated) number	–
16	Normal call clearing	–
17	User busy	–
18	No user responding	–
19	User alerting, no answer	–
21	Call rejected	–
22	Number changed	–
31	Normal, unspecified	–
50	Requested facility not subscribed	Check the subscription (data subscription availability).
68	ACM ≥ ACMmax	No more SIM card or credit card expired.
252	Call barring on outgoing calls	–
253	Call barring on incoming calls	–
3, 6, 8, 29, 34, 38, 41, 42, 43, 44, 47, 49, 57, 58, 63, 65, 69, 70, 79, 254	Network cause	Refer to Appendix A *(see page 65)* or check with the operator.

NOTE: For codes and information, refer to Appendix A *(see page 65)*.

Appendices

What Is in This Appendix?

The appendix contains the following chapters:

Chapter	Chapter Name	Page
A	AT Commands	65
B	Modem Configuration	79

Appendix A
AT Commands

Overview

This appendix describes commonly used AT command based messages between an application and the SR2MOD02/03 modems.

For more information about AT commands, refer to the “AT® Commands Interface Guide for Open AT Firmware V6.63” at http://www.ercogener.com.

What Is in This Chapter?

This chapter contains the following topics:

Basic AT Commands

Introduction

This topic describes the following basic AT command based messages between an application and the SR2MOD02/03 modems:

- Attention Command *(see page 66)*
- Repeat Last Command *(see page 66)*
- Manufacturer Identification *(see page 67)*
- Hardware Version *(see page 67)*
- Request Revision Identification *(see page 67)*
- Request Identification Information *(see page 68)*
- Save Configuration *(see page 70)*
- Restore Factory Settings *(see page 70)*
- Restore Configuration from non-volatile memory *(see page 70)*
- Display Configuration *(see page 70)*
- Address Type Selection *(see page 71)*

Attention Command

The Attention Command queries the modem to affirm that it is present and in communication with the application.

Command Format	Command Example	Response Example
`AT`	AT	`OK`

Repeat Last Command

The Repeat Last Command repeats the last command of the open session.

NOTE: The A/ command itself cannot be repeated.

If the Repeat Last Command is the first command of the open session, the response is `OK` without any treatment.

Command Format	Command Example	Response Example
`A/`	A/	`OK`

Manufacturer Identification

This command returns the identification of the manufacturer of the communication module.

If the Manufacturer Identification command is the first command of the open session, the response is `OK` without any treatment.

Command Format	Command Example	Response Example
`AT+CGMI`	AT+CGMI	`Sierra Wireless` `OK`

Hardware Version

This command returns the hardware version of the communication module.

Command Format	Command Example	Response Example
`AT+WHWV`	AT+WHWV	`Hardware Version 4.14` `OK`

Request Revision Identification

This command returns the firmware version of the embedded module.

Command Format	Command Example	Response Example

`AT+CGMR`	AT+CGMR	`R7.43.0.201003261552.WMP50`
		`2139952 032610 15:52`
		`OK`

Defined Values:

`SW release`	Software release version number
`WCPU`	Type of module embedded
`size`	Firmware size in bytes
`date`	Date (mmddyy) of firmware generation
`time`	Time (hh:mm) of firmware generation

Request Identification Information

This command returns specific information on one or more lines of text concerning the embedded module.

Command Format	Command Example	Response Example
`ATI<n>`	ATI6	`DATA RATES: AUTOBAUD,300,1200,1200/75, 2400,4800,9600,14400`

Defined Values:

0	Embedded module with the 2nd core: • display manufacturer identification (equivalent to +CGMI, refer to these commands for more precision) Embedded module without the 2nd core: • display manufacturer followed by model identification (equivalent to +CGMI and +CGMM, refer to these commands for more precision)
3	Display revision identification (equivalent to +CGMR)
4	Display embedded module configuration in RAM (equivalent to &V0)
5	Display embedded module configuration in EEPROM (equivalent to &V1)
6	Display embedded module data features. Lists the supported data rates, data modes and fax classes
7	Display embedded module voice features
8	Embedded module with the 2nd core: • display software version followed by the chip Id Embedded module without the 2nd core: • “OK”

9	Display component details: Downloader, Firmware, embedded Open® AT application (Developer Studio version used to build it, Integrated Plug In version), memory. The response is divided into four groups: ● <Component> ● <Version>[, <Name>, <Company>, <Size>, <TimeStamp>, <Checksum>, <Offset>] ● [-<SubComponent>, <SubComponentVersion>] ● <MemoryType>, <MemorySize> [<InfoTage>, <InfoValue>]		
	Parameter	Data type	Description
	<Component>	ascii string	embedded software component type; values: "DWL", "FW", "OAT", "3G+"
	<Version>	ASCII string	version of the software component
	<Name>	ASCII string	component name
	<Company>	ASCII string	component company
	<Size>	integer	component size in bytes
	<TimeStamp>	ASCII string	component time stamp
	<Checksum>	ASCII string	component check sum
	<Offset>	ASCII string	offset address of the component
	<SubComponent>	ASCII string	subcomponent name: this field is filled by Developer Studio (supported from version 1.1)
	<SubComponent Version>	ASCII string	subcomponent version: this field is filled by Developer Studio (supported from version 1.1)
	<MemoryType>	ASCII string	“ROM” or “RAM”
	<MemorySize>	integer	size of the <MemoryType> in bytes, in hexadecimal, set at the upper roundish value (100000 = 8 Mb, 200000 = 16 Mb, 400000 = 32 Mb, 800000 = 64 Mb, …)
	<InfoTag>	ASCII string	Information Tag, the value is the parameter <InfoValue>. Current supported value: "DWLNAME")
	<InfoValue>	ASCII string	Information Value. For "DWLNAME" information Tag: Type of the correct DWL file type to be downloaded in the embedded module, based on the product name.)

Save Configuration

This command writes the active configuration to non-volatile memory (EEPROM).

Command Format	Command Example	Response Example
AT&W	AT&W	OK

Restore Factory Settings

This command restores configuration settings to the factory default values.

Command Format	Command Example	Response Example
AT&F	AT&F	OK

Restore Configuration from non-volatile memory

This command restores the previously saved configuration from non-volatile memory (EEPROM).

Command Format	Command Example	Response Example
ATZ	ATZ	OK

Display Configuration

This command returns the saved configuration of the embedded module.

Command Format	Command Example	Response Example
AT&V	AT&V	Q:0 S0:000 S2:043 S3:013 S4:010 S5:008 +CR:0 +CRC:0 +CMEE:0 +CBST:0,0,1 +URAT:0 +UREG:0,0 &C:1 &D:2 +IPR:115200 +ICF:3,4 +IFC:0,0 OK

Address Type Selection

This command specifies the type of number for dialing commands according to GSM/UMTS/HSPA specifications.

Command Format	Command Example	Response Example
AT+CSTA=<type>	AT+CSTA=145	OK
NOTE: In the above example, the international access code character "+" will be automatically added to the outgoing call.		

Defined Values:

129	ISDN / telephony numbering plan, national / international unknown. The '+' must be added to the number for international calls; otherwise it is assumed to be a national number.)
145	ISDN / telephony numbering plan, international number. Number is assumed to be international and will automatically have the '+' added to the dialing string.

NOTE: The +IPR value is not returned when <n> = 2.

Serial Port AT Commands

Introduction

This topic describes the following serial port AT command based messages between an application and the SR2MOD02/03 modems

- Echo *(see page 72)*
- Fixed DTE Rate (baud rate) *(see page 73)*
- Character Framing *(see page 74)*

Echo

This command is used to determine whether the embedded module echoes characters received by the application:

Command Format	Command Example	Response Example
`ATE[<n>]`	ATE1	`OK`
NOTE: In the above example, the international access code character "+" will be automatically added to the outgoing call.		

Defined Values:

0	Characters are not echoed (default value if <n> omitted).
1	Characters are echoed.

NOTE: The <n> parameter is stored in EEPROM using the Save Configuration *(see page 70)* (AT&W) command.

Fixed DTE Rate (baud rate)

This command specifies the data rate at which the embedded module will accept commands:

Command Format	Command Example	Response Example
ATE+IPR=<rate>	ATE+IPR=9600	OK
NOTE: In the above example, the data rate is set to 9600 bps.		

Defined Values:

0	Enables autobauding.
300	–
600	–
1200	–
2400	–
4800	–
9600	–
19200	–
38400	–
57600	–
115200	Command default value.
230400	–
460800	–
921600	–

NOTE:

- The <n> parameter is stored in EEPROM using the Save Configuration *(see page 70)* (AT&W) command.
- When starting up, if autobaud is enabled and no Attention *(see page 66)* (AT) command has yet been received, the product sends all unsolicited responses (like RING) at 9600 bauds.
- The serial autobaud feature is supported, and covers the following serial speeds (only): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 bps. Beyond those serial speeds, correct operation of the embedded module is not supported.
- Any AT command issued by the DTE must start with both capital ‘A’ and ‘T, (or ‘/’) or both lower case ‘a’ and ‘t’ (or ‘/’), otherwise the DCE may return some characters and become desynchronized. If this happens, the DTE simply issues ‘AT\r’ (at 2400 or 4800 baud) once or twice or just ‘AT’ (at 9600 baud) to resynchronize the embedded module.
- The DTE waits for 1ms after receiving the last character of the AT response (which is always ‘\n’ or 0x0A) to send a new AT command at either the same rate or a new rate. If this delay is ignored, the DCE can become desynchronized. Once again, sending ‘AT\r’ once or twice or just ‘AT’ causes the DCE to recover.

Character Framing)

This command is used to determine the local serial port start-stop (asynchronous) character framing used by the embedded module:

Command Format	Command Example	Response Example
`ATE+ICF=<format>,[<parity>]`	ATE+IPR=9600	`OK`

NOTE:
- In the command format, <parity> is an optional parameter.
- In the above example, the response is 8 data bits, 1 parity, 1 stop, odd parity.

Defined Values:

<format>	
1	8 data, 2 stop, <parity> parameter is ignored
2	8 data, 1 parity, 1 stop, if no <parity> provided 3 is used by default as <parity> value.
3	8 data, 1 stop, <parity> parameter is ignored. This is the default value.
4	7 data, 2 stop, <parity> parameter is ignored.
5	7 data, 1 parity, 1 stop, if no <parity> provided, 3 (space) is used by default as <parity> value.
6	7 data, 1 stop, <parity> parameter is ignored.
<parity>	
0	Odd
1	Even
2	Mark
3	Space
4	None. This is the default value.

NOTE: The <format> and <parity> parameters are stored in EEPROM using the Save Configuration *(see page 70)* (AT&W) command, and the default values can be restored using the restore factory settings *(see page 70)* (AT&F) command.

Call AT Commands

Introduction

This topic describes the following call AT command based messages between an application and the SR2MOD02/03 modems:

- Dial Command *(see page 75)*
- Redial Last Telephone Number *(see page 77)*
- Answer Incoming Call *(see page 77)*
- Hang-Up Call *(see page 77)*
- Automatic Answer *(see page 77)*

Dial Command

This command is used to dial an outgoing call to a specific number. It also allows an application to dial emergency call numbers and specify emergency call codes.

According to 3GPP specifications, only several numbers should be considered as emergency numbers:

- without a SIM: 112, 911, 000, 08, 110, 999, 118 and 119
- with a SIM: 112, 911 and numbers present in the EFECC SIM file

All others numbers will be considered as GSM numbers.

The ATD command is used to set a voice, data or fax call. As per GSM 02.30, the dial command also controls supplementary services.

The following emergency numbers are available without a SIM card: 000, 08, 110, 112, 118, 119, 911 and 999.

The following Emergency Numbers are available with a SIM card:

- when EFECC file is missing from SIM: 112 and 911
- when SIM includes an EFECC file: 112, 911 and any emergency numbers available in the EFECC file

Command Format	Command Example	Response Example
`ADT<nb>,[<I>] [<G>] [;}`	ATD+33412345678	`CONNECT 9600`
NOTE: In the above example, the data call succeeds.		

Defined Values:

<nb>	Destination phone number (ASCII string) or GSM sequence 0-9,*,#,+,A,B,C,D,P
<I>	CLIR supplementary service subscription. If present, the CLIR supplementary service subscription is overridden temporarily for this call only: ● I = activate (disable presentation of own phone number to remote) ● i = deactivate (enable presentation of own phone number to remote)
<G>	CUG supplementary service information. If present, the CUG supplementary service information is overridden temporary for this call only: ● G = activate ● g = deactivate
<;>	Indicates a voice call. If omitted, data or fax call is assumed

NOTE:

- For an international number, the local international prefix does not need to be set (usually 00) but must be replaced by the '+' character.
- Note that some countries may have specific numbering rules for their GSM handset numbering.
- An outgoing call attempt can be refused if the AOC service is active and credit has expired (NO CARRIER).
- As per GSM 02.30, GSM sequences may be controlled using dial commands. These sequences can contain "*", "#", but ";" is forbidden in the sequence. For example, to invoke or suppress CLIR service temporally, ATD*31#<nb>[;] and ATD#31#<nb>[;] can be used (with „;? at the end, a voice call will be launched).
- If the FDN phonebook is activated, the call forwarding sequences are allowed only if they are present in the FDN.
- A category can be filled for an emergency call. To use this specificity, the following syntax should be used:
  ATD<nb>#<category>
  where:
  - <nb> is the emergency call
  - <category> is a bit field with the following description:
    - bit 1: police
    - bit 2: ambulance
    -bit 3: fire brigade
    - bit 4: marine guard
    - bit 5: mountain rescue
    - bit 6: manually initiated e-call
    - bit 7: automatically initiated e-call
    - bit 8: reserved, set to "0"

  The <category> range is [1-127]. If an out of range value is filled and if the <nb> is an emergency call, this field is not taken into account by the embedded module and the emergency call is initiated (without this information).

If the <nb> number is not an emergency number, the <category> field is not taken into account and a normal call is initiated by the embedded module.
If bit 6 and bit 7 are set to 1, the embedded module automatically set bit 6 to 0 and keep bit 7 to 1.

Redial Last Telephone Number

This command is used by the application to redial the last number used in the dial command:

Command Format	Command Example	Response Example
ATDL	ATDL	0033412345678 OK

Answer Incoming Call

When the product receives a call, it sets the Ring Indicator signal and sends the ASCII "RING" or "+CRING: <type>" string to the application (+CRING if the cellular result code +CRC is enabled). Then it waits for the application to accept the call with the ATA command:

Command Format	Command Example	Response Example
ATA	ATA	OK

Hang-Up Call

The ATH (or ATH0) command is used by the application to disconnect the remote user. In the case of multiple calls, all calls are released (active, on-hold and waiting calls):

Command Format	Command Example	Response Example
ATH[<n>]	ATH	OK

Defined Values:

0	Ask for disconnection.
1	Ask for outgoing call disconnection.

Automatic Answer

This command determines and controls the product automatic answering mode:

Command Format	Command Example	Response Example
ATS0[<value>]	ATS0=3	OK
NOTE: In the example, an automatic answer occurs after three rings.		

Defined Values:

<value>	The number of rings before automatically answering a call.

Appendix B
Modem Configuration

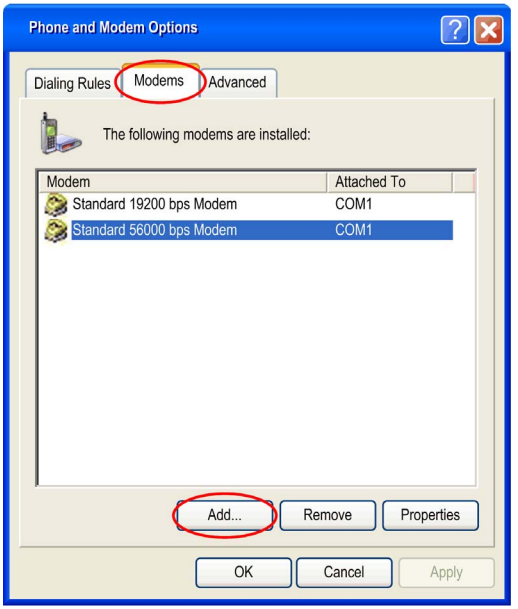
Reconfiguring the Modem

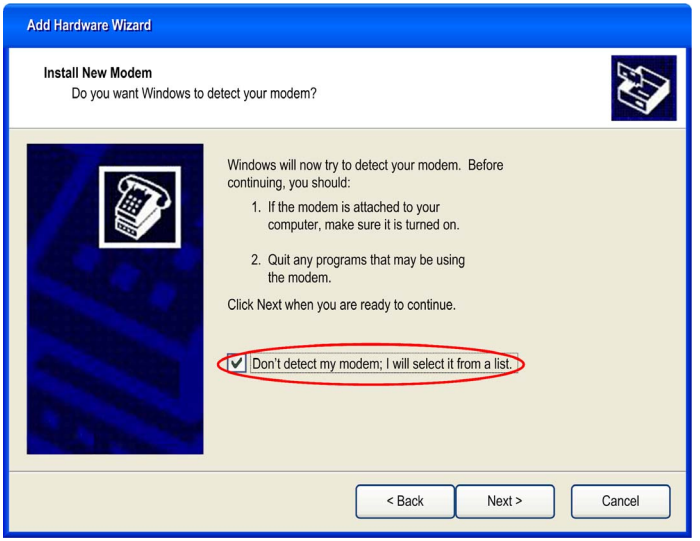
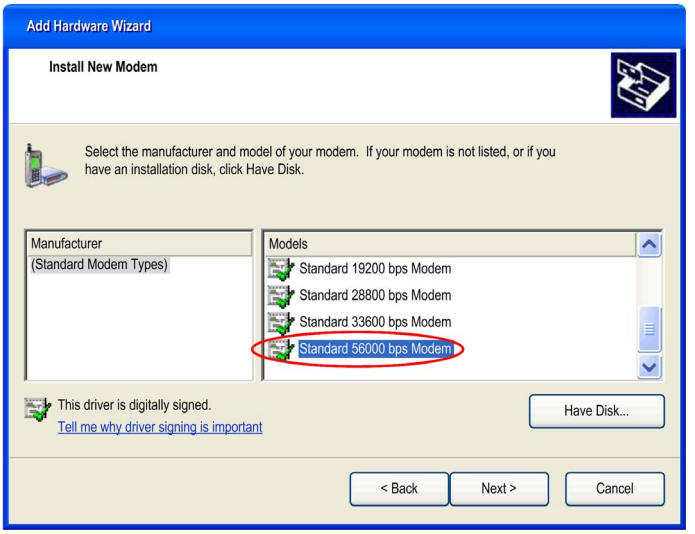
Modem Configuration

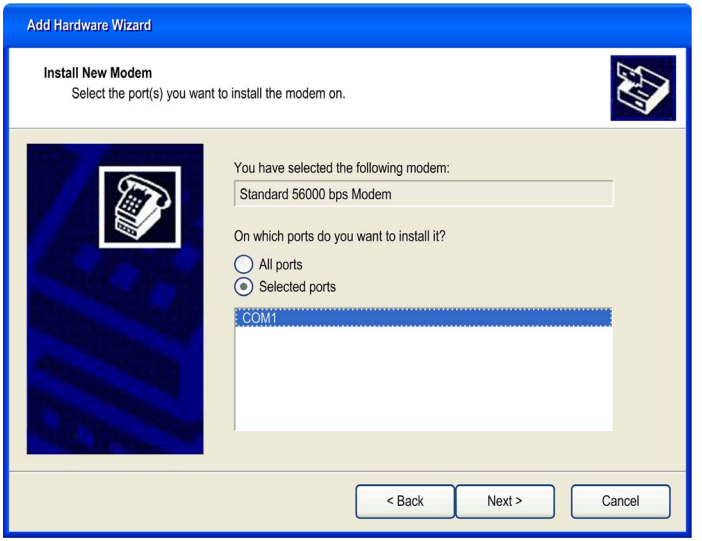
Your SR2MOD02/03 modem comes pre-configured from the factory for use with controllers. However, if you need to edit the default modem configuration, or if the modem loses its configuration, refer to the following procedure for reconfiguring your modem.

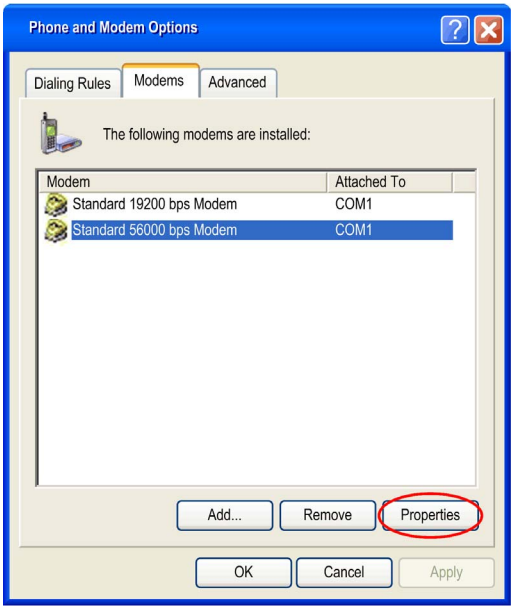
For more information, refer to Modem Communication Verification *(see page 51)*.

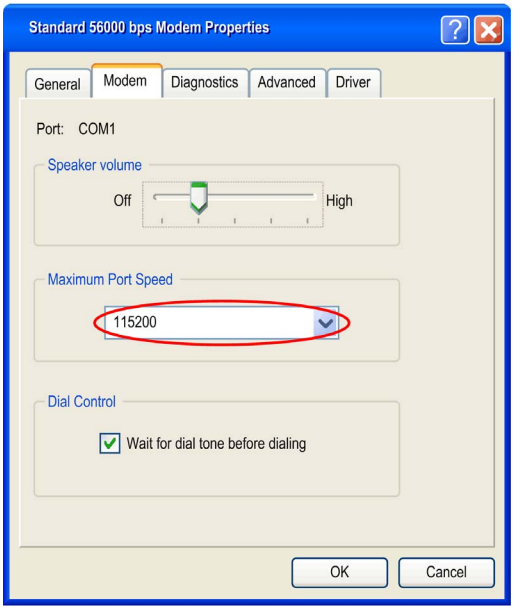
This table describes the steps to follow to add a modem using Windows:

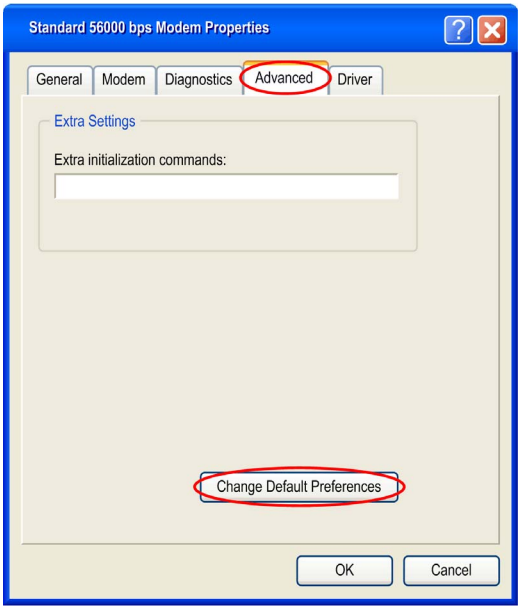
Step	Action
1	Select the **Start** menu.
2	In the **Control Panel**, select **Phone and Modem Options**.
3	Click **Modems** then click **Add**. 

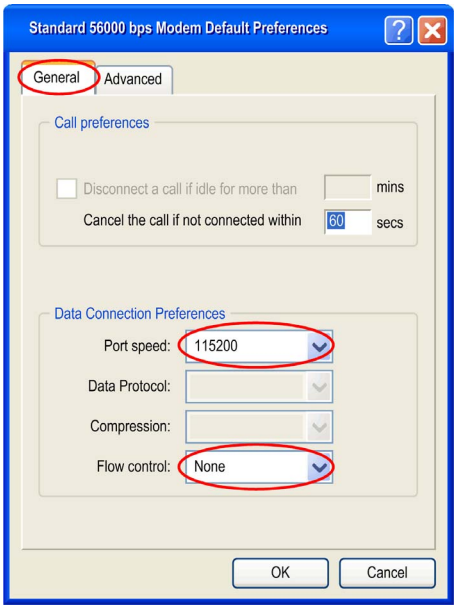
Step	Action
4	Select the **Don't detect my modem; I will select it from a list** checkbox and click **Next** to continue. 
5	Select **Standard 56000 bps Modem** from the **Models** list and click **Next** to continue. 

Step	Action
6	Select the communication port where the modem is connected and click **Next** to proceed to the next window. 

Step	Action
7	After installation, it is necessary to configure the communication port link to the modem. Select the **Standard 56000 bps Modem** from the modem list and click **Properties** tab. 

Step	Action
8	Click the **Modem** menu tab in the **Standard 56000 bps Modem Properties** window. Set **115200** as the **Maximum Port Speed**. 

Step	Action
9	Select the **Advanced** menu tab in the **Standard 56000 bps Modem Properties** window and click **Change default preferences**. 

Step	Action
10	Click the **General** menu tab on the **Standard 56000 bps Modem Default Preferences** window. Set the **Port Speed** and **Flow control** to **115200** and **None** respectively. 

Step	Action
11	Click the **Advanced** menu tab on the **Standard 56000 bps Modem Default Preferences** window. Enter the **Hardware settings** parameters according to the modem configuration *(see page 51)* (for SR2MOD02 and SR2MOD03). 
12	Restart the PC and modem.

Glossary

A

AC
alternative current

ACM
accumulated call meter

AT
attention (prefix for modem commands)

B

BTS
base transceiver station

C

CLK
clock

CMOS
complementary metal oxide semiconductor

CS
coding scheme

CTS
clear to send

D

dB
decibel

dBc
decibel relative to the carrier power

dBi
decibel relative to an isotropic radiator

dBm
decibel relative to one milli-watt

DC
direct current

DCD
data carrier detect

DCE
data communication equipment

DCS
digital cellular system

DSR
data set ready

DTE
data terminal equipment

DTMF
dual tone multi-frequency

DTR
data terminal ready

E

E-GSM
extended GSM

EEPROM
electrically erasable programmable read-only memory

EFR
enhanced full rate

EMC
electromagnetic compatibility

EMI
electromagnetic interference

ESD
electrostatic discharges

ETSI
European telecommunications standards institute

F

FIT
series of connectors (micro-FIT)

FR
full rate

FTA
full type approval

G

GCF
global certification forum

GND
protective ground

GPIO
general-purpose input output

GSM
global system for mobile communications

H

HR
half rate

HSPA
high speed packet access

I

I
input

I/O
input / output

IEC
international electrical commission

IMEI
international mobile equipment identification

L

LED
light emitting diode

Little-endian
low-order byte of the number is stored in memory at the lowest address, and the high-order byte at the highest address.

M

MAX
maximum

ME
mobile equipment

MIC
microphone

MICRO FIT
family of connectors from Molex

MIN
minimum

MNP
Microcom networking protocol

MO
mobile originated

MS
mobile station

MT
mobile terminated

N

NOM
nominal

O

O
output

P

Pa
pascal (for speaker sound pressure measurements)

PBCCH
packet broadcast control channel

PC
personal computer

PCL
power control level

PDP
packet data protocol

PIN
personal identity number

PLMN
public land mobile network

PUK
personal unblocking key

R

RF
radio frequency

RFI
radio frequency interference

RI
ring indicator

RMS
root mean square

RTS
request to send

RX
receive

S

SIM
subscriber identification module

SMA
subminiature version A RF connector

SMS
short message service

SNR
signal-to-noise ratio

SPI
serial peripheral interface

SPK
speaker

SPL
sound pressure level

SRAM
static RAM

T

TDMA
time division multiple access

TPC/IP
transmission control protocol / Internet protocol

TU
typical urban fading profile

TUHigh
typical urban, high speed fading profile

TX
transmit

TYP
typical

U

UMTS
universal mobile telecommunications system

UTC
universal time clock

V

VSWR
voltage stationary wave ratio