

User's Guide

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The availability of particular products may vary by region. Please check with the Nokia dealer nearest to you.

1. For your safety



Read these simple guidelines. Breaking the rules may be dangerous or illegal. Further detailed information is given in this manual.



INTERFERENCE

All wireless equipment may get interference which could affect performance.



QUALIFIED SERVICE

Only qualified service personnel must repair equipment.

INSTALLATION

Follow the installation instructions. Use only approved accessories.



CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.



MAKE BACKUP COPIES

Remember to make backup copies of all important data.



EMERGENCY CALLS

This terminal, like all wireless equipment, operates using radio signals, wireless and landline networks as well as user-programmed functions which cannot guarantee connection in all conditions. Therefore, you should never rely solely upon any wireless equipment for essential communications (e.g. medical emergencies.)

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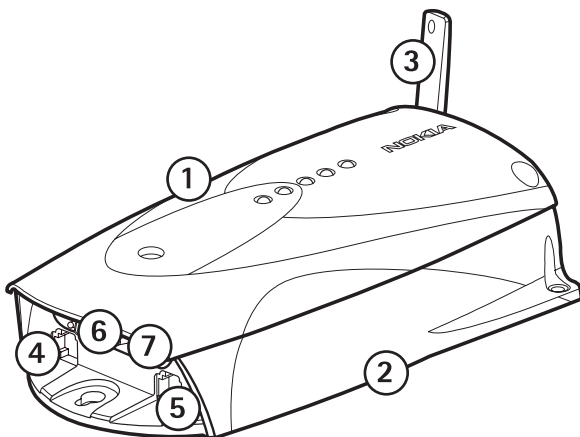
2. Introduction

Congratulations on your purchase of the Nokia 22 PBX connectivity terminal. The Nokia 22 features two Private Branch Exchange (PBX) interfaces. In addition to PBX connectivity solutions, the Nokia 22 can also be used in conjunction with other fixed GSM solutions and various data solutions.

You may find more information of Nokia 22 and downloadable files on the Nokia web site www.nokia.com.

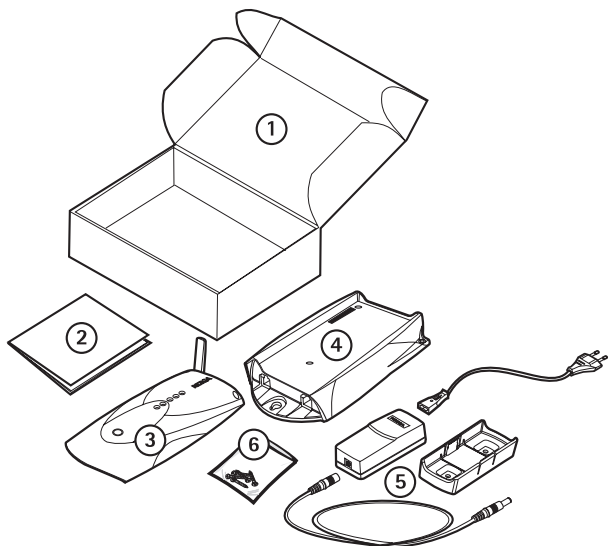
The Nokia 22 incorporates:

- GSM terminal (1)
- application module (2)
- antenna (3)
- PBX extension connector (4)
- PBX trunk connector (5)
- RS-232 data connector (6)
- power supply connector (7)



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■ Package contents



- 1 Nokia 22 sales package
- 2 Nokia 22 User's Guide
- 3 Nokia 22 GSM terminal
- 4 Application module
- 5 Power source with a wall rack, AC and DC cables
- 6 Screws

■ Network services

The cellular device described in this user guide is designed to be used as an end-user terminal on the GSM 900 and GSM 1800 networks and on the GSM 900/1800 dual band network. For information on different

network services operational in GSM networks, please consult your network service provider.

Note that dual band functionality is a network-dependent feature. Check with your local service provider if you can subscribe to and use the dual band functionality.

3. Setting up the terminal

If you use the Nokia 22 Configurator Software, refer to the Operator's Guide supplied with the software for instructions on how to use the terminal.

To use the Nokia 22 for the first time, proceed as follows:

- 1 Install the SIM card.
- 2 Mount the GSM terminal on the application module.
- 3 Connect the terminal to a DTMF telephone or to a PBX.
- 4 Connect the power supply to the terminal and to an AC wall outlet.
- 5 Enter the PIN code if your SIM card requires it.
- 6 Check the signal strength.
- 7 Make a test call.

Caution: In order to comply with RF exposure requirements, install the terminal so that a minimum distance of 20 cm can be maintained between the antenna and all persons. If you use an external antenna, install the antenna so that a minimum distance of 20 cm can be maintained between the antenna and all persons, with antenna gain not exceeding 3 dBi.

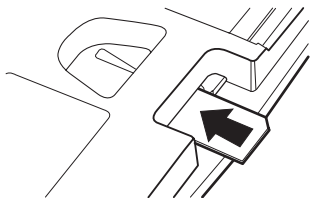


Warning! To avoid damage to the SIM card, do not connect the power supply to an AC wall outlet before you have installed the SIM card and mounted the GSM terminal on the application module.

Installing the SIM card

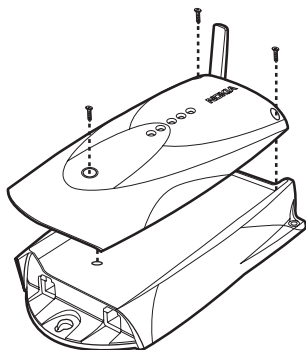
Keep all miniature SIM cards out of the reach of small children. The SIM card and its contacts can easily be damaged by scratches or bending, so be careful when handling, inserting or removing the card.

Insert the SIM card ensuring that the golden contact area is facing downwards.



Mounting the GSM terminal

Mount the GSM terminal on the application module using the three screws supplied with the terminal.



Connecting a telephone

Connect a DTMF telephone to the trunk connector.



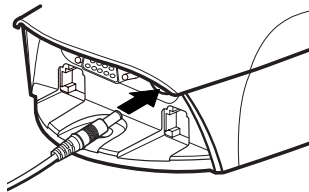
Warning! To avoid damage to the devices, the telephone must be connected to the trunk connector with a standard 6/6-pin RJ-11-connector that has only its two middle pins connected.

The distance between the telephone or a PBX and Nokia 22 should not be less than 1 meter. Distance from one Nokia 22 terminal to another Nokia 22 should be greater than 30 cm. In case of interferences, try to increase the distance inbetween.

About connecting Nokia 22 to the PBX (Private Branch Exchange), see the next chapter "PBX installation".

Connecting the power supply

- 1 Connect the power cord from the power supply to the terminal.
- 2 Connect the power supply to an AC wall outlet.



Entering the PIN code

The PIN (Personal Identification Number) code protects your SIM card against unauthorised use. It is usually supplied with the SIM card. Use the telephone connected to the terminal to enter the PIN code.

When light indicator 4 blinks, lift the receiver. When the *enter PIN* tone is heard, enter the PIN code followed by #. The *OK* tone is heard and light indicator 3 lights up. If the operation fails, see *Entering PIN code does not succeed* on page 21.

If the AutoPIN feature is active, the terminal automatically enters your PIN code the next time the power is switched on.

Checking the signal strength

To check the signal strength, lift the receiver of the telephone connected to the terminal and key in 777**#. Make sure the signal strength is adequate to make and receive calls. The signal strength is indicated by the light indicators for approximately one minute (see *Light indicators* on page 16).

Making a test call

Make the test call using the telephone connected to the terminal. To adjust the volume, key in 0**x during the call. The 'x' represents a value ranging from 1 (the lowest volume level) to 10 (the highest volume level).

4. PBX installation

For detailed information on how to connect the Nokia 22 to a PBX, contact your service provider.

This section informs of the mandatory settings needed when connecting the Nokia 22 to a PBX. For more information about PBX configuration, contact your PBX service provider.

■ Connecting the terminal to a PBX trunk line

- 1 Disconnect the terminal's power supply from the AC wall outlet.
- 2 Connect the terminal to the PBX trunk line using an RJ-11 cable.
- 3 Connect the power supply to the terminal.

If the AutoPIN feature is active, the terminal attempts to connect to the network within 20-30 seconds. If the AutoPIN feature is not active, light indicator 4 starts to blink and you have to enter your PIN code before the network connection can be established.

The network connection is established when light indicator 3 lights up
The PBX trunk line connection is established when light indicator 1 lights up.



Warning! Inappropriate installation of the Nokia 22 terminal to a PBX may damage the PBX or the Nokia 22 terminal. If an extension line of the PBX is connected to the terminal's trunk connector, the devices attempt to feed current to each other and they can be damaged.

To avoid damage to the devices, an analogue trunk line of the PBX must be connected to the terminal's trunk connector with a standard 6/6-pin RJ-11 cable that has only its two middle pins connected. An analogue extension line of the PBX must be connected to the terminal's extension connector with a standard 6/6-pin RJ-11 cable that has only its two middle pins connected. Note that the terminal's trunk and extension connectors cannot be used at the same time to connect a device.

Do not connect the Nokia 22 to a digital (ISDN) interface of a PBX.

Making an incoming test call

Make a call to the terminal's GSM number. For details on the number, contact your service provider. The terminal redirects the call to the switching centre and sends a ringing tone to the PBX trunk line. The switching centre then answers and redirects the call.

Making an outgoing test call

The PBX must be configured to route certain outgoing numbers (for example numbers with a mobile prefix) to the trunk line the Nokia 22 is connected to before an outgoing call can be made. When the PBX sends a number to the terminal, the terminal connects the call.

■ Connecting the terminal to a PBX extension line

- 1 Disconnect the terminal's power supply from the AC wall outlet.
- 2 Connect the terminal to the PBX extension line using an RJ-11 cable.
- 3 Connect the power supply to the terminal.

If the AutoPIN feature is active, the terminal attempts to connect to the network within 20–30 seconds. If the AutoPIN feature is not active, light indicator 4 starts to blink and you have to enter your PIN code before the network connection can be established.

The network connection is established when light indicator 3 lights up. The PBX trunk line connection is established when light indicator 1 lights up.



Note: When the Nokia 22 terminal is connected to an extension line of a PBX, some precautions must be taken into account. If no calling restrictions have been set up, any caller calling the Nokia 22 terminal's GSM number gains access to the outgoing PBX trunk line and can make phone calls that are charged to the PBX owner.

To prevent this situation, the PBX must be configured to deny any outgoing calls coming from the extension line the Nokia 22 is connected to. If the PBX cannot be configured in such a way, it is possible to configure the Nokia 22 to automatically call a predefined extension number when it receives a GSM call.

For further information about PBX configuration, see your PBX user's guide.

Call monitoring

A PBX tells to the Nokia 22 that the call is disconnected by providing either a busy tone or a silence to Nokia 22. To clear the call to GSM network, the Nokia 22 shall be selected to monitor either one of those. The default is monitoring silence.

Setting up the busy tone monitoring

When the Nokia 22 is used in the extension mode with a PBX, there is a need for the detection of the busy tone in the PBX. Tone detection is needed because the PBX emits the tone when the hook on transition occurs in the extension line.

The Tone Teaching feature in Nokia 22 is used to teach the Nokia 22 the busy tone of each PBX.

After the Nokia 22 has physically been installed to the final position, the learning mode can be activated:

- 1 Call from another extension to the extension where Nokia 22 is installed.
- 2 After you get the dial tone from Nokia 22, dial
`**#####**1234#88*own_ext_number#`
(own_ext_number is the extension number where you are commanding the Nokia 22 from)
- 3 After the last digit (#), put the receiver down, and wait until the Nokia 22 calls you back.
- 4 When the phone in the extension rings, pick up the receiver, and listen to the tone:
 - If you hear a busy tone, the learning did not succeed, and you should repeat the steps
 - If you hear the command query beep (three beeps), Nokia 22 has learned the busy tone

Set the hook on, and wait for 60 seconds. The Nokia 22 will reboot itself before it is ready for use.

Making an incoming test call

Make a call to the terminal's GSM number. For details on the number, contact your service provider. The terminal answers the call and places the PBX extension line off-hook. The PBX then emits a dial tone and you can dial an extension number or outgoing number. After that, the PBX connects the call.

Making an outgoing test call

Make a call to the PBX extension number the terminal is connected to. The terminal answers the call. After that, a dial tone is heard, provided that the terminal has been set to emit a dial tone, and you can dial the desired number. The terminal connects the call.

The PBX can also be configured to automatically route certain numbers.

Functionality in extension mode

Outgoing call on the extension line, mode A

- 1 User keys in the number of the extension to which the Nokia 22 is connected.
- 2 Terminal answers the call and emits a dial tone.
- 3 User keys in the B subscriber's number.
- 4 Terminal establishes the call.

Outgoing call on the extension line, mode B

- 1 User keys in the number of the extension where the Nokia 22 is connected.
- 2 Terminal answers the call and provides silence.
- 3 User keys in the B subscriber's number.
- 4 Terminal establishes the call.

Incoming call on the extension line, mode A

- 1 Terminal answers the call and opens the extension line.
- 2 PBX emits a dial tone.
- 3 User enters an extension number or outgoing number.
- 4 PBX routes the call as if the call would come from an extension telephone.

Incoming call on the extension line, mode B

- 1 Terminal answers the incoming call and opens the extension line.
- 2 Terminal sends a predefined number to the PBX extension.
- 3 B subscriber answers the call.

5. Light indicators

- Light indicators 1 and 2 indicate the state of the application module.
- Light indicators 3, 4 and 5 indicate the state of the GSM terminal.
- The light indicators display the signal strength for approximately one minute if you key in 777**# using the telephone connected to the terminal.

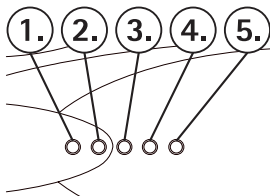


Table 1. Application module light indicators.

1	2	Description
-	On	The extension mode is active.
On	-	The trunk mode is active.

Table 2. GSM terminal light indicators

3	4	5	Description
-	-	-	Power is off.
Blinking	-	-	Power is on. The terminal is attempting to connect to the telephone network.
On	-	-	In service.
On	-	On	Call in progress.
On	Blinking	-	The terminal has received a call.
-	Blinking	-	Enter the PIN code.
Blinking	Blinking	-	Enter the PUK code.
On	On	On	The terminal has received an SMS message or voice mail.

3	4	5	Description
On	On	Blinking	The terminal has no space for new SMS messages. The oldest message is automatically deleted.
-	Blinking	Blinking	Install the SIM card.
Blinking	Blinking	Blinking	An error has occurred. Contact service personnel.

Table 3. Signal strength.

1	2	3	4	5	Signal strength
Blinking	-	-	-	-	No signal.
On	-	-	-	-	Approx. -105dBm
On	Blinking	-	-	-	Approx. -100dBm
On	On	-	-	-	Approx. -95dBm
On	On	Blinking	-	-	Approx. -90dBm
On	On	On	-	-	Approx. -85dBm
On	On	On	Blinking	-	Approx. -80dBm
On	On	On	On	-	Approx. -75dBm
On	On	On	On	Blinking	Approx. -70dBm
On	On	On	On	On	Approx. -65dBm

6. Tone indicators

The following tones indicate the state of the terminal when a telephone is used to change the terminal's settings or to check whether the terminal has received new SMS messages.

Tones	Description
-----	Enter SIM card
- _ _ - _ _ _ - _ _	Enter PIN code
-- _____	Enter PUK code
-----	Error
_____	OK
-- -- -- -- -- -- -- --	SMS received

7. Nokia 22 accessories

For details and availability of Nokia 22 Accessories, contact your local dealer.

- **Power supply (ACW-5)** Supplied with the terminal.
- **Backup battery set** Features a backup battery (BBW-4) and power supply (ACW-4).
- **Data package** Features an RS232 data cable and an AT-command guide.
- **Antenna adapter (XRP-3)** Allows an external antenna to be connected to the terminal.
- **Configurator software** For a more advanced configuration of the terminal. Features the software, a cable and an Operator's Guide.

8. Troubleshooting

For more information on troubleshooting, please see FAQ (Frequently Asked Questions) at www.nokia.com.

■ First things to check

- 1 If a telephone is connected to the terminal, check that it is connected to the trunk connector and that the connection is firm.
- 2 Check that the power supply is firmly connected to the terminal and to an AC outlet.
- 3 Check that the antenna is firmly connected to the terminal.

■ Dial tone is not heard

If the dial tone is not heard when you lift the receiver of the telephone connected to the terminal:

- 1 Check that the power supply is firmly connected to the terminal and to the AC wall outlet.
- 2 Check the light indicators for further information.
- 3 If the dial tone is still not heard, disconnect the power supply from the AC wall outlet and then reconnect it.

■ Noise is heard during a call

The terminal may be too close to a telephone or another electronic device. Position the terminal and the devices possibly interfering with the terminal further apart from each other.

■ Reception is poor

If there are problems with reception, for example interruptions in speech, the signal may be too weak. Check the signal strength. If the signal is weaker than -95 dBm, move the terminal to another location. If the terminal does not receive a stronger signal, contact your service provider.

■ Entering PIN code does not succeed

If entering the PIN code fails three times, the code is blocked. You can unblock it by entering your PUK (Personal Unblocking Key) code. The PUK code may be supplied with the SIM card. If not, contact your local service provider for the code. If you lose the code, contact your service provider. When the PIN code is blocked, light indicators 3 and 4 blink. To unblock the code, proceed as follows:

- 1 Lift the receiver of the telephone connected to the terminal. When the *enter PUK code* tone is heard, enter your PUK code followed by #.
- 2 Enter a new PIN code (4 -- 8 digits) followed by # when light indicator 4 blinks and the *enter PIN code* tone is heard.
- 3 Confirm the new PIN code by re-entering the code followed by #.

■ Nokia 22 cannot be reached in extension mode

Check that the LED 2 is lit. Check also that the extension line is connected to the 'ext' connector. Reboot the terminal and make sure that before powering up the terminal, Nokia 22 is properly connected to the extension line.

9. Technical specifications

Dimensions	182 x 101 x 46 mm without dual-band antenna
Weight	420 g

Power supply ACW-5

Charger type	Switched mode power supply
AC mains plug type	Europe, UK, US
Voltage	13.5 V
DC connector	750 mA
Operating range	90-264 Vac
Frequency range	47-63 Hz
Weight	70 g + cables
Volume	< 110 cm ³
Cable length	AC 1500 mm, DC 1500 mm

Environmental specifications

Operating conditions	0C...+55C
Storage conditions	-40C...+70C

Relative humidity range under normal operating conditions 20...75%. The terminal is not protected against ingress of water or liquids of any type.

External antenna specifications

Operating frequency range	890 - 960 MHz and 1710 - 1880 MHz
Nominal antenna cable impedance	50 Ohm
Antenna cable connector	Standard FME male connector

Electro-magnetic compatibility (Europe)

The GSM terminal is tested for electro-magnetic compatibility (EMC) according to the ETS 300 342-1/13/standards.

The application module fulfils the ITU-T standard and the ETS 300-001 specifications for PBX extension and trunk connections. The module supports also ETS 300-659 Calling Line Identification (FSK and DTMF).

10. Important safety information

The Nokia 22 power supply ACW-5 converts line voltage of 110V/220V/230V AC to low voltage DC.

Note: The power supply socket should be easily accessible and it must not be covered. The power supply is insulation class 2 covered.

WARNING! Dangerous voltage. Do not attempt to open the casing.

Note! This power supply is for indoor use only ! Do not expose the unit to water, rain or dust.

The power supply should be disconnected from the socket when the terminal is not in use for a prolonged period of time or when the power supply is not connected to the terminal.

When you disconnect the power cord of the power supply, grasp and pull the plug, not the cord.

IMPORTANT! Use only the power supply approved by Nokia. The use of any other types will invalidate any approval or warranty applying to the terminal, and may be dangerous.

Operating environment

Operation of any radio transmitting equipment, including the Nokia 22 terminal, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device if you have any questions. Other electronic equipment may also be subject to interference.

As with other radio transmitting equipment, users are advised that for the satisfactory operation of the equipment and for safety reasons, it is recommended that the equipment should only be used in the normal operating position.

Only qualified service personnel should service the terminal. Faulty service may be dangerous and may invalidate any warranty applicable to the terminal.

Do not cover the terminal.

Do not use the terminal in an environment where strong radiation or magnetic fields may exist. Note that the terminal is for indoor use only.

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

Emergency calls

Remember, to make or receive any calls the terminal must have sufficient power and be properly installed in a service area with adequate signal strength.

Emergency calls may not be possible on all wireless networks or when certain network services and/or product features are in use. Check with the network service provider.

When making an emergency call, remember to give all the necessary information as accurately as possible.

Remember that your terminal may be the only means of communication at the scene of an accident - do not cut off the call until given permission to do so.

Note! Emergency numbers vary in different areas and countries. Check the local emergency number. In some networks, calls to the emergency number may be possible even without a SIM card.

11. Care and maintenance

Your Nokia 22 terminal is a product of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years. When using the terminal or any accessory:

- Keep it and all its parts and accessories out of the small children's reach.
- Keep it dry. Precipitation, humidity and liquids contain minerals that will corrode electronic circuits.
- Do not use or store it in dusty, dirty areas.
- Do not store it in hot areas. High temperatures can shorten the life of electronic devices and warp or melt certain plastics.
- Do not store it in cold areas. When the terminal warms up (to its normal temperature), moisture can form inside the terminal, which may damage electronic circuit boards
- Do not attempt to open it. Non-expert handling of the device may damage it.
- Do not drop, knock or shake it. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean it. Wipe it with a soft cloth slightly dampened in a mild soap-and-water solution.
- Do not paint it. Paint can clog the device and prevent proper operation.
- Use only the supplied or an approved replacement or external antenna. Unauthorised antennas, modifications or attachments could damage the terminal and may violate regulations governing radio devices.
- When dismantling the GSM terminal from the application module, first disconnect the power supply from the terminal.
- If the terminal or any of its accessories are not working properly, take them to your nearest qualified service facility. The personnel there will assist you, and if necessary, arrange for service.