NOKIA 32
PBX CONNECTIVITY TERMINAL
PRODUCT SPECIFICATION

NOKIA

Contents

GLOSSARY

PBX	Private Branch Exchange
GSM	Global System for Mobile communications
CSD	Circuit Switched Data
HSCSD	High Speed Circuit Switched Data
GPRS	General Packet Radio Service
SMS	Short Message Service
CLI	Calling Line Identification
CAI	Charge Advice Information
AAC	Automatic Area Code
AoC	Advice of Charge
IOF	Intensity of Field Strength
DTMF	Dual Tone Multi-frequency
PC	Personal Computer
PIN	Personal Identity Number

1.   GENERAL

Note: Further detailed information is given in the separate user's guide. Do not use this product specification in place of the complete user's guide, which provides important safety and maintenance information.

The Nokia 32 PBX connectivity terminal is a GSM device for compatible PBX (Private Branch Exchange) connections. The Nokia 32 terminal has connectors for PBX trunk and extension connections. The trunk connection can also be used for normal landline telephone connections substituting a fixed telephone line. The terminal supports data connections with CSD, HSCSD, and GPRS.

In the Nokia 32 terminal, the telephone line connections are provided with a standard two-wire connection through RJ-11 connectors. Both trunk and extension connections have dedicated RJ-11 ports. The data connection is provided via RS-232 connection over a D9 female connector. In addition, the Nokia 32 terminal has power supply and external antenna connectors. The internal antenna of the Nokia 32 terminal is used when there is no need for an external antenna.

The Nokia 32 terminal is intended to be used mainly as a GSM router with a compatible company PBX. Calls from a company to GSM numbers are routed via the Nokia 32 terminal to enable cost savings in GSM-to-GSM calls. The fixed telephone line is bypassed. The Nokia 32 terminal also enables using GSM network features in landline environment.

CSD, HSCSD and GPRS connections require network support. Contact your network operator for further details and availability.

Figure 1: Nokia 32 PBX connectivity terminal
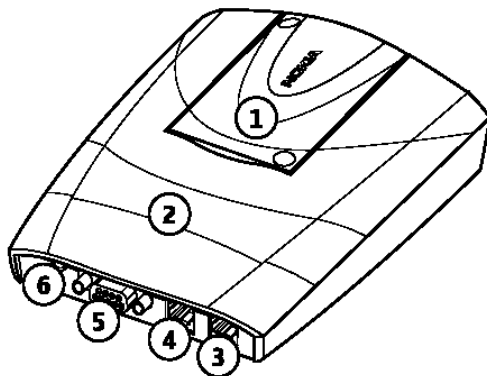
The Nokia 32 terminal incorporates:

- GSM terminal (1)
- PBX application module (2)
- PBX extension connector (3)
- PBX trunk connector (4)
- RS232 data connector (5)
- Power supply connector (6)

2. CONNECTORS

Figure 2: Connectors of the Nokia 32 terminal

Power supply connector   RS232 data connector   Trunk connector   Extension connector
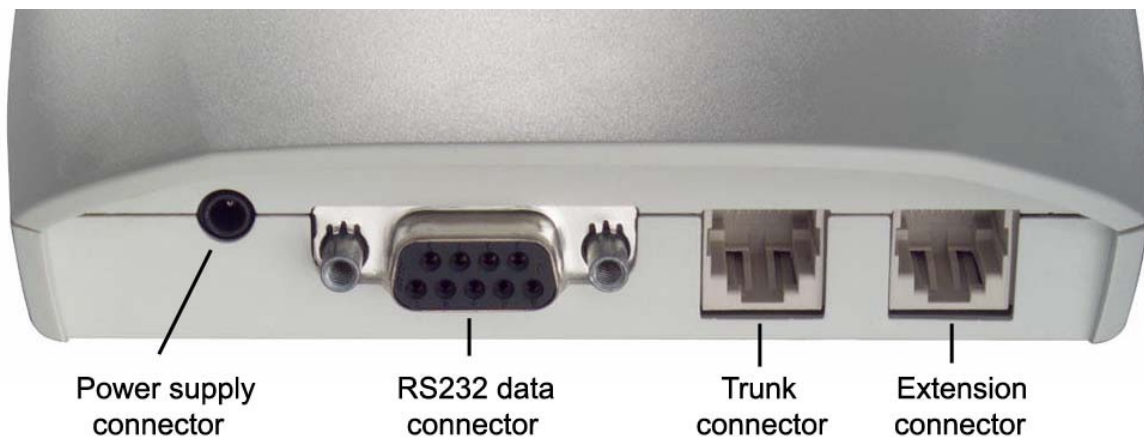
2.1 TRUNK CONNECTOR

The trunk connector of the Nokia 32 terminal is used for connecting the terminal to an analog trunk line of a compatible PBX or to an analog landline telephone. It is a 6-pin RJ-11 connector to which a two-wire cable is connected.

When the Nokia 32 terminal is connected to a trunk line of a compatible PBX, the PBX needs to be configured so that it routes calls to GSM networks via the Nokia 32 terminal. The users do not need to change their calling routines when the Nokia 32 terminal is used, since the PBX makes the call routings. When a call is coming to the Nokia 32 terminal from a GSM network (outside of the company), the call is usually directed to the switching centre of the company.

Figure 3 RJ-11 connector pin numbering
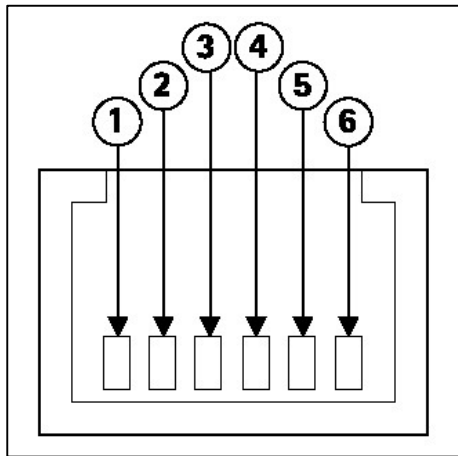
Note: The physical connector is upside down in the Nokia 32 terminal.

Table 1: Pin functions of the RJ-11 trunk connector

Pin	Name	Min	Typ	Max	Unit	Notes
1	TxDET_IF	-	3.3	-	V	TX detection for flashing
2	MBUS/RxD	-	3.3	-	V	MBUS for service mode/RxD for flashing
3/4	RING/TIP On hook state, HI_Z On hook state active Ringing state	 42 31 44	 48 37 48	 50 50 70	V (DC + AC)	Line/ringing voltage, between RING/TIP,
5	SCLK	-	3.3	-	V	Serial clock for flashing
6	GND	-	-	-		Ground for service mode

**Note:** To avoid damaging the terminal, do not connect any device to the pins 2, 5, or 6.

2.2 EXTENSION CONNECTOR

The extension connector of the Nokia 32 terminal is used for connecting the terminal to an analog extension line of a compatible PBX. It is a 6-pin RJ-11 connector to which a two-wire cable is connected. The extension connector is used only for PBX extension connections.

When the Nokia 32 terminal is connected to an extension line of a compatible PBX, the users need to select the extension line to which the Nokia 32 terminal is connected before dialling the desired GSM number. When calls are coming to the Nokia 32 terminal from a GSM

network, the caller can either select the extension line, or the Nokia 32 terminal can be configured to direct the call to a predefined extension number.

See Figure 2 for RJ11 connector numbering. Note that the physical connector in the Nokia 32 terminal is upside down.

Table 2: RJ-11 extension connector pin functions

Pin	Name	Min	Typ	Max	Unit	Notes
1	NC	-	-	-	-	Not connected
2	NC	-	-	-	-	Not connected
3	A	-	0	-	V (DC + AC)	Line voltage (DC) and Ringing voltage (25 Hz AC) (audio 300 – 3400 Hz), are PBX specified
4	B	-90	-75	-60	V (DC + AC)	Line voltage (DC) and Ringing voltage (25 Hz AC) (audio 300 – 3400 Hz), are PBX specified
5	NC	-	-	-	-	Not connected
6	NC	-	-	-	-	Not connected

2.3 DATA CONNECTOR

The data connector (D9 female connector) of the Nokia 32 terminal is used for connecting the terminal to any compatible device supporting RS-232 connection.

The Nokia 32 terminal can be used for various data applications using AT commands over RS-232. When connected to a compatible PC, the Nokia 32 terminal is installed as a wireless modem using the Nokia 32 modem driver, available at www.nokia.com.

The data functionality of the Nokia 32 terminal can be used for data transmission, PC fax use, and sending and receiving SMS. HSCSD (High Speed Circuit Switched Data) and GPRS (General Packet Radio Service) enable landline modem data rates in wireless environment.

To connect the Nokia 32 terminal to a compatible PC, you need a standard 9-pin RS-232 data cable. For the data connector pin signals and names, see below.

Figure 4: Nokia 32 terminal RS232 connector pin numbering
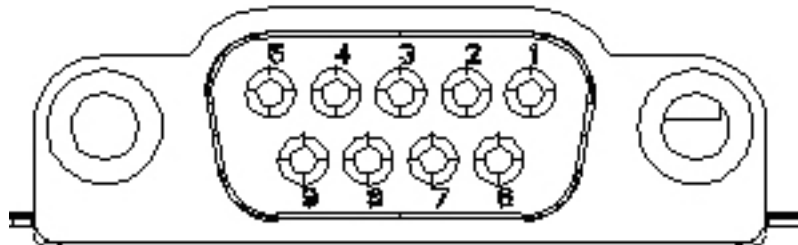
Note: The physical connector is upside down in the Nokia 32 terminal.

The signal levels are:

- Minimum: +/- 3 V

- Maximum: +/- 15 V

The Nokia 32 terminal sets the flow control signal (CTS) when it is ready to receive AT commands. The Nokia 32 terminal functions as a DCE (Data Communication Equipment / Modem) in a PC environment.

The signals are described in Table 7. The signals' electrical performances are compatible with the RS-232 standard with a maximum data rate of up to 115 200 bps.

Table 3: RS232 signals

| Terminal (DCE) D9 female pin#	Signals			PC (DTE) D9 male pin#
	Signal	**Name**	**Direction**	
1	DCD	Carrier detect	From GSM	1
2	RxD	Receive Data	From GSM	2
3	DxT	Transmit Data	To GSM	3
4	DTR	Data Terminal Ready	To GSM	4
5	GND	Signal Ground	-	5
6	DSR	Data Set Ready	From GSM	6
7	RTS	Request To Send	To GSM	7
8	CTS	Clear To Send	From GSM	8
9	RI	Ring Indicator	From GSM	9

2.4 POWER INTERFACE

The Nokia 32 terminal has a 3.0 mm DC plug for the Nokia ACW-5 power supply.

- DC input voltage range: 6.2 V – 14.0 V
- Positive is connected to the centre

2.5 CONNECTING THE NOKIA 32 TERMINAL TO A COMPATIBLE PBX

Figure 5: Nokia 32 terminal PBX connections
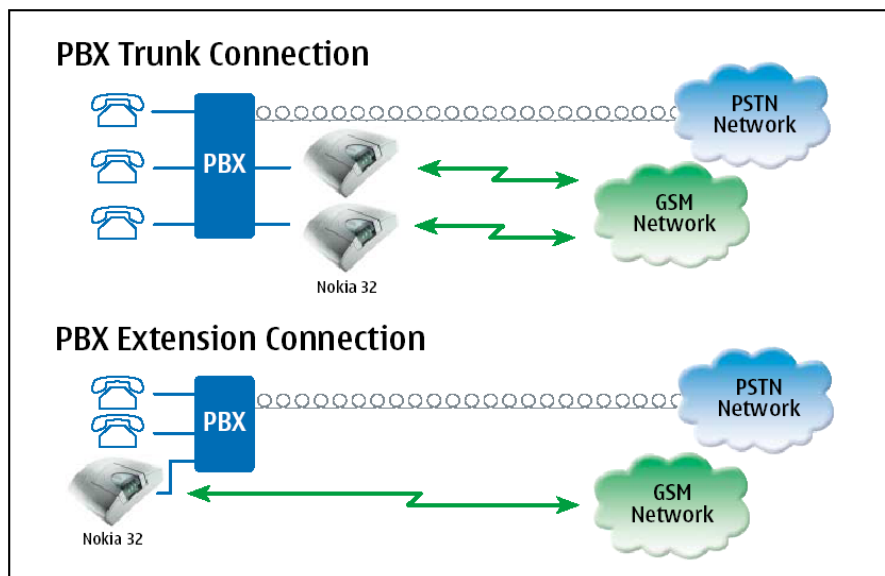
See chapters 1.1 and 1.2 for more information on the trunk and extension connectors.

3. USER INTERFACE

Three light indicators (LEDs) form the user interface of the Nokia 32 terminal. LED 1 shows the terminal status while the other two are reserved for the PBX application module after start-up. During start-up and special operations, all three light indicators indicate the status of the terminal. The functionality of the three light indicators in start-up, normal, and special situations is described in Tables 4, 5 and 6 respectively.

Table 4: Nokia 32 light indicators during start-up

LED 1	LED 2	LED 3	Description	
-	-	-	Power off	
Green scan	Green scan	Green scan	Power on, connecting to network	
-	Red blink	-	PIN query/ new PIN query	
-	Red blink	Red blink	PUK query	
			Intensity of Field Strength	
Red blink	-	-	Unacceptable	<- 105 dBm
Green blink	-	-		-105 …-100 dBm
Green			Weak	-100 …-95 dBm
Green	Green blink			-95 …-90 dBm
Green	Green		Moderate	-90 …-85 dBm
Green	Green	Green blink		-85 …-80 dBm
Green	Green	Green	Good	>-80 dBm

Table 5: Nokia 22 light indicators during normal operation

LED 1	LED 2	LED 3	Description
*	Green	Green	In service, trunk mode
Green	*	Green	In service, extension mode
*	*	Green blink	Call on
*	*	Green blink	Incoming call
*	*	Green/Red blink	Message received/ Voice mail in box
*	*	Red blink	Message storage full

Table 6: Nokia 32 light indicator status in special situations.

LED 1	LED 2	LED 3	Description
Green/Red blink	Green/Red blink	Green/Red blink	Insert SIM card
Red blink	Red blink	Red blink	Failure, contact service
Yellow	Yellow	Yellow	Initialising

4.   ENVIRONMENTAL SPECIFICATIONS

- Temperature range, operation: -10...+55 °C
- Temperature range, storage: -40...+85 °C
- Humidity range, operation: 20...75 % non-condensing
- Humidity range, storage: 5...95 % non-condensing
- The terminal is not protected against ingress of water.

5.   ACCESSORIES

A full range of accessories is available for the Nokia 32 PBX connectivity terminal:

- Nokia 32 Configurator software and configuration cable
- External antenna adapter XRM-1
- Backup battery BBW-6

6.   FEATURES

6.1   SUPPLEMENTARY SERVICES

These features are network services. They are special services provided by wireless network service providers and differ from one network and country to another. For details, check with the local network service provider. The Nokia 32 terminal supports the GSM Phase 2+ Supplementary Services

1. Number identification
2. Call forwarding
3. Call completion
4. In-call handling
5. Call transfer
6. Call restriction

7. High Speed Circuit Switched Data (HSCSD)

8. General Packet Radio Service (GPRS)

9. Security Options

6.2   SMS (SHORT MESSAGE SERVICE)

The Nokia 32 terminal supports both Mobile Originated (MO) and Mobile Terminated (MT) short message services with the help of AT commands. A compatible PC and a data cable are needed when using the SMS feature.

When an SMS message is received, it is indicated to the customer with the light and tone indicators.

6.3   VOICE MAIL

The Nokia 32 terminal supports the GSM network voice mail service. If the network sends an SMS of received voice mail, the terminal will indicate the received SMS with the light indicators and also by means of tone in the telephone set receiver.

6.4   HIGH SPEED CIRCUIT SWITCHED DATA (HSCSD)

The Nokia 32 terminal supports High Speed Circuit Switched Data that enables a data transmission speed of up to 43.2 kbps. The High Speed Circuit Switched Data (HSCSD) relies on the simultaneous use of multiple GSM timeslots. The HSCSD is a network service. For details, contact your service provider.

6.5   GENERAL PACKET RADIO SERVICE (GPRS)

GPRS utilises packet switched technology where information is transmitted in small bursts of data. The GPRS mobile station class of the Nokia 32 terminal is class B. This means that both GPRS connections and circuit switched connections are possible, although it has to be defined which one is used each time. The Nokia 32 supports GPRS multi-slot class 6, thus multiple timeslots can be used for data transfer at the same time: 3+1, 2+2 or 2+1 slots.

6.6   CALLING LINE IDENTIFICATION (CLI)

The Calling Line Identification (CLI) feature displays the caller's number with an external calling line display device. Two signalling methods are available, ETSI FSK (European Telecommunications Standards Institute Frequency Shift Keying) and DTMF (Dual Tone Multi Frequency). The signalling mode varies depending on the operator and the country. The default mode is ETSI FSK.

Note: To use this feature, you need a separate CLI device. Nokia does not provide CLI devices. For details and availability, contact your service provider.

6.7 CHARGE ADVICE INFORMATION (CAI)

The Charge Advice Information (CAI) feature indicates the approximate cost of the most recent calls and the total of calls in an external tariff pulse counter or display. The Nokia 32 terminal converts the GSM standard Advice of Charge (AoC) information to Charge Advice Information (CAI) tariff pulse (12/16 kHz) information, in which case an external tariff counter or display can be used. The terminal's CAI settings can be modified using the Nokia 32 Configurator Software.

Note: The actual invoice for calls and services from your service provider may vary, depending upon network features, rounding-off for billing, taxes and so forth.

Note: Data call costs cannot be shown on the display or counter. Nokia does not provide CAI devices. For details and availability, contact your service provider.

6.8 AUTOMATIC AREA CODE (AAC) AND ROUTING

The Automatic Area Code (AAC) feature allows the user to dial local numbers without a local area code in the GSM network. Before the number is sent, the Nokia 32 terminal adds a pre-programmed local area code automatically. The user can also specify that the terminal changes certain prefixes automatically, for example to provide a cost-effective route. The AAC and routing settings can be modified using the Nokia 32 Configurator Software.

6.9 FASTER CALL SETUP

Faster call set-up allows a faster call establishment. The last 10 different dialled numbers are stored in the memory of the Nokia 32 terminal. If the dialled number matches one of the stored numbers, the Nokia 32 terminal sends the number to the GSM network without waiting for further digits.

6.10 AUTOPIN SECURITY FEATURE

The Nokia 32 terminal has an AutoPIN security feature. It saves the PIN code in the terminal's memory when the code is entered for the first time or when the code is changed. In addition, the AutoPIN feature enables device recovery after occasional power cuts without on-site intervention. The terminal enters the PIN code automatically the next time it switches on and requests the PIN code.

Use of the SIM card in other terminals or mobile phones can be prevented. The user does not have to know the PIN code. However, other SIM cards can be used with the terminal. The AutoPIN feature can be deactivated using the Nokia 32 Configurator Software.

The default value is that the AutoPIN feature is active.

7. TECHNICAL SPECIFICATIONS

Nokia 32 technical data

Size:	121 x 158 x 45 mm
Weight:	239 g
Operating temperature:	-10 C to +55 C
Storage temperature:	-40 C to +85 C
Humidity range, operation:	20 – 75 %
Humidity range, storage:	5-95 %
Operating networks	EGSM900/GSM1800
	or GSM850/1900

Input voltage:	Absolute min 6.2 V
	Absolute max 14.0 V

Small size SIM cards supported

RF Power	2W/1W (900/1800 Mhz)
	2W/1W (850/1900 Mhz)

Telephone/ PBX trunk interface

Line voltage high impedance mode	50 V
Line impedance	600 Ω

Extension interface

Off hook AC impedance	600 Ω
Loop DC current	15 – 120 mA

Power supply ACW-5

Voltage	13.5 V
DC current	750 mA
Operating range	90 – 264 Vac
Frequency range	47-63 Hz

Weight	70g + cables
Volume	$<110\text{cm}^3$

Antenna

Antenna integrated. Use of external antenna supported with XRM-1 antenna adapter.

RS-232

D9 female connector for standard level RS-232 available. Supports AT commands (ITU-T V. 25ter, ETS GSM 07.07, ETS GSM 07.05)