

Depending on the available infrastructure and transmission requirements various modems and routers are available for the remote communication with SIPROTEC protection devices, using DIGSI. The existing infrastructure may consist of analog or digital (ISDN) transmission networks, which may be private (internal telephone system) or a leased line. This may determine the corresponding combinations of the modems or routers. A suitable combination usually consists of a desktop device with plug adapter in the office, and a rail mounted device in the substation (see application examples). The rail mounted devices may be operated with an optional wide-range power supply adapter with all alternating current networks as well as station batteries.



Pocket Modem / ISDN



Modem 56k / ISDN TA



Modem / ISDN Router

The desktop analog modem „Pocket 56k“ as the office device and the rail-mounted “Modem 56k in the substation ensure a secure serial data communication with SIPROTEC 3 devices using 8E1 (with Parity-Bit) up to 19,2 kBd, or with SIPROTEC devices using 8N1 up to 57,6 kBd.

With the same analog modem „Pocket 56k“ in the office it possible to establish a connection to SIPROTEC 4 devices with EN 100 interfaces in a local Ethernet network by using the rail-mounted modem router “MoRoS Modem 56k“in the substation.

Using the digital modem “Pocket ISDN“ as a desktop device in the office and the „ISDN TA“ as a rail mounted device in the substation, ensures a secure serial data communication with SIPROTEC 3 devices using 8E1 (with parity bit) up to 19,2 kB, or with SIPROTEC 4 devices using 8N1 up to 57,6 kB.

With the same digital modem “Pocket ISDN“ in the office, it is possible to also communicate with SIPROTEC 4 devices with an EN 100 interface module in a local Ethernet network, using a rail-mounted ISDN router “MoRoS ISDN“ in the substation

Other combinations, especially with devices from other manufacturers are strictly not recommended.

All versions are suitable for application in control systems, and substations as well as in the areas of energy supply and distribution. The modems may be utilised internationally (certificates of approval see “Technical Data”). As a rule, no certification is required for use in internal networks.

Application 1

“Remote operation of SIPROTEC 3 devices via modem“

This application example illustrates the remote operation of SIPROTEC 3 protection devices with optical interface and compact protection devices with RS 485 interface, using analog modems (7XV5820-1 and -5) or digital ISDN modems (7XV5820-2 and -6). The connection to protection or bay control RTU via optical interface is done with a star configuration using cascadable star couplers. The compact protection devices with RS 485 interface are connected via a FO-RS 485 converter and the RS 485 bus system 7XV5103. SIPROTEC 4 devices may, depending on the available service interface be connected optically or electrically.

To ensure secure lightning protection there should always be a galvanic separation between the substation modem and the protection devices by means of an optical barrier. The substation modem with the RS 232-FO converter 7XV5652 is preferably located in a communication or control room while the star coupler 7XV5450 or FO-RS 485 converter 7XV5650/51 is located in the first protection cubicle. If the protection devices have to be controlled centrally in the substation using a notebook this is achieved by plugging a DIGSI cable to the first star coupler which disables the optical interface and enables the RS 232 connection.

The communication with the modems is transparent. A secure data transfer to the SIPROTEC 3 devices is obtained with the data format 8E1 (with parity bit), the baud rate depends on the slowest device (9,6 kB or 19,2 kB) and must be set equal for all devices. The SIPROTEC 4 devices can then only be operated with this relatively slow data rate from a SIPROTEC 4 point of view.

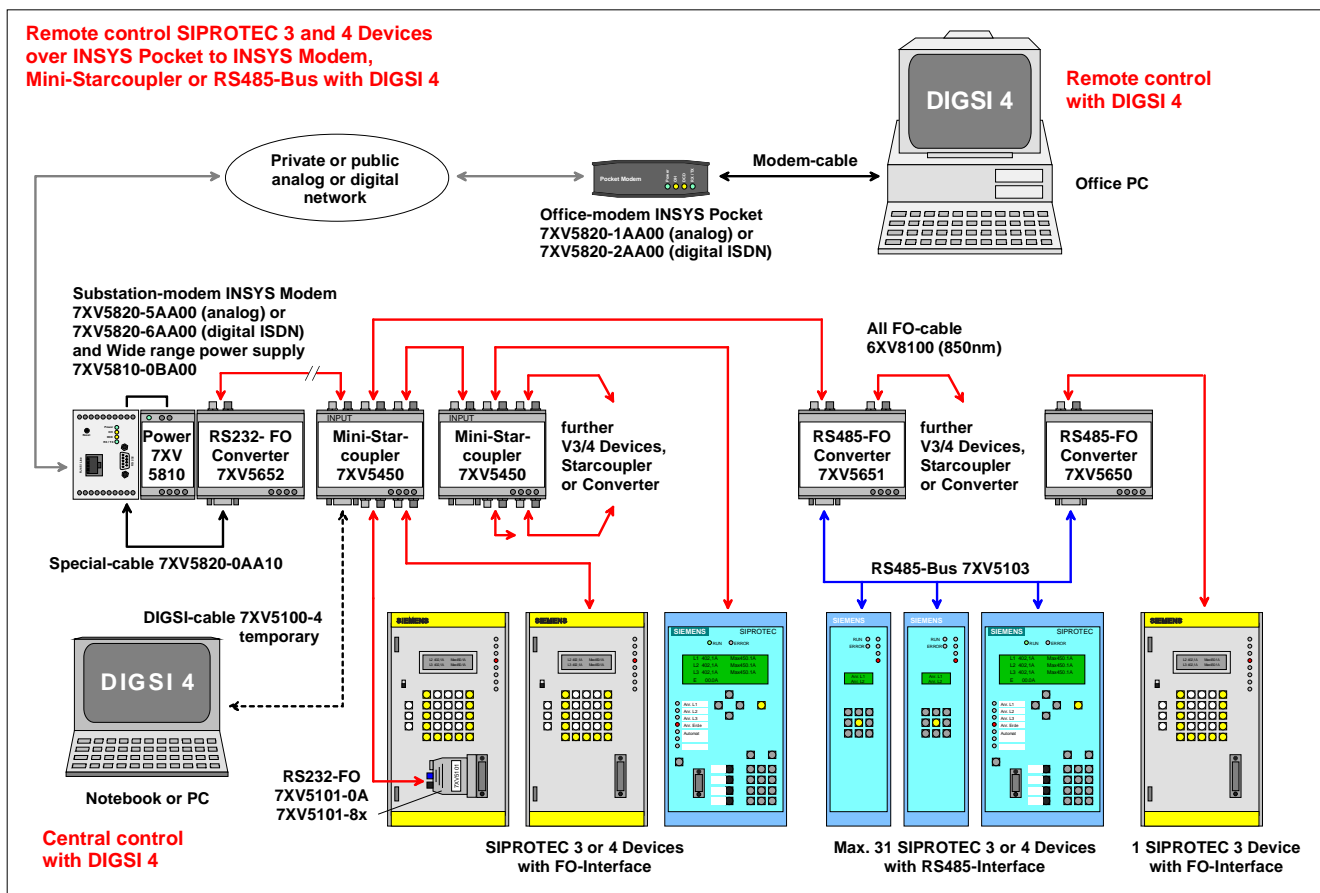


Figure: Application 1

Application 2

“Remote operation of SIPROTEC 4 devices via modem“

This application example illustrates the remote operation of SIPROTEC 4 devices with optical or RS 485 interface via analog modems (7XV5820-1 and -5) or the very much faster digital ISDN modems (7XV5820-2 and -6). The connection of the protection or RTU devices with optical interface is done via cascadable star couplers. The devices with RS 485 interfaces are connected via the FO-RS 485 converter and the RS 485 bus system 7XV5103.

To ensure secure lightning protection of the RS 485 bus there should always be a galvanic separation between the substation modem and the protection devices by means of an optical barrier. The substation modem with the RS 232-FO converter 7XV5652 is preferably located in a communication or control room while the first FO-RS 485 converter 7XV5651/50 is located in the first protection cubicle. (“A1”)

If the protection devices must be centrally controlled in the substation then an additional star coupler must be used (“A2”). By plugging the DIGSI cable into the first star coupler, the optical interface is disabled and the RS 232 connection is established. If no mini star coupler is being used, the central operation is only possible via the electrical interface of the RS 232-FO converter. The modem plug must be disconnected for this purpose.

A secure communication via the modems is possible with the standard data format 8N1, with data compressions and error correction. The baudrate is given by the slowest device (38,4 kB or 57,6 kB) and must be set the same on all devices.

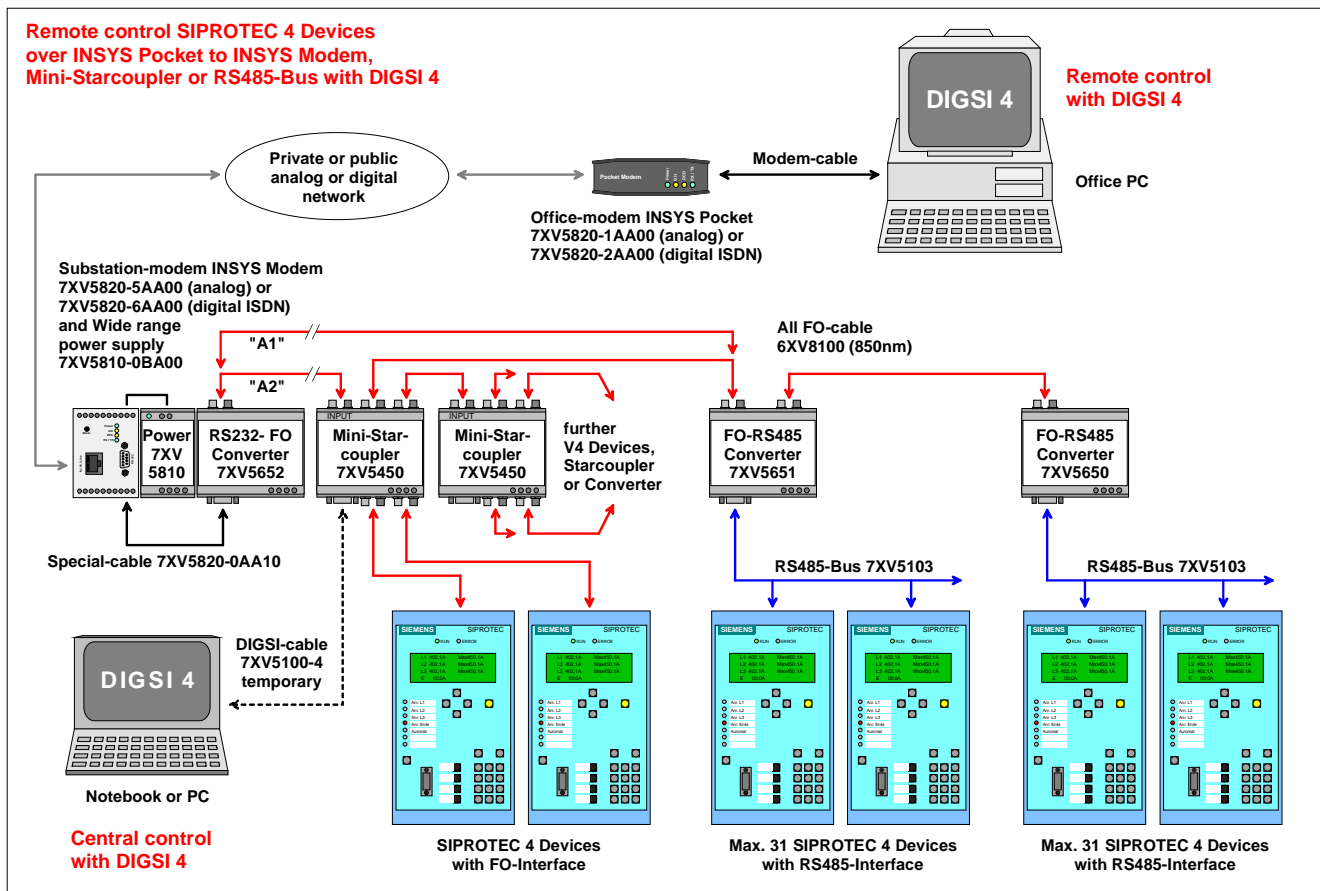


Figure: Application 2

Application 3

“Remote operation of SIPROTEC 4 devices with Ethernet-interfaces via Modem-Router“

This application example shows the remote operation of SIPROTEC 4 protection devices with optical or electrical EN100 Ethernet interface via an analog or digital ISDN office modem, (7XV5820-1 or -2), to a modem or digital ISDN router (7XV5820-7 and -8). This router with integrated 4-way switch together with the RUGGETCOM switches connected via a patch cable make up a local subnet.

The protection or RTU devices with optical EN100 interface are connected with a ring-structure to the RUGGETCOM switches. The protection / RTU devices with electrical EN100 interface are directly connected with the modem-router and switch or to the electrical interfaces of the RUGGETCOM switches by means of double-screened patch cables. To minimise any possible interference, the electrical connections with patch-cables should be kept as short as possible.

The remote connection from the office to the substation is established by means of a password protected DUN connection under Windows. Subsequently the connection is “transparent” and the protection devices can be operated with DIGSI 4 in the local subnet with their own IP addresses.

If the protection devices are to be conveniently centrally controlled with a note book in the substation, the notebook with Ethernet interface may be logged into the local subnet with a patch cable.

Secure communication via modems is done at 57,6 kB, the standard data format 8N1 with data compression and error correction.

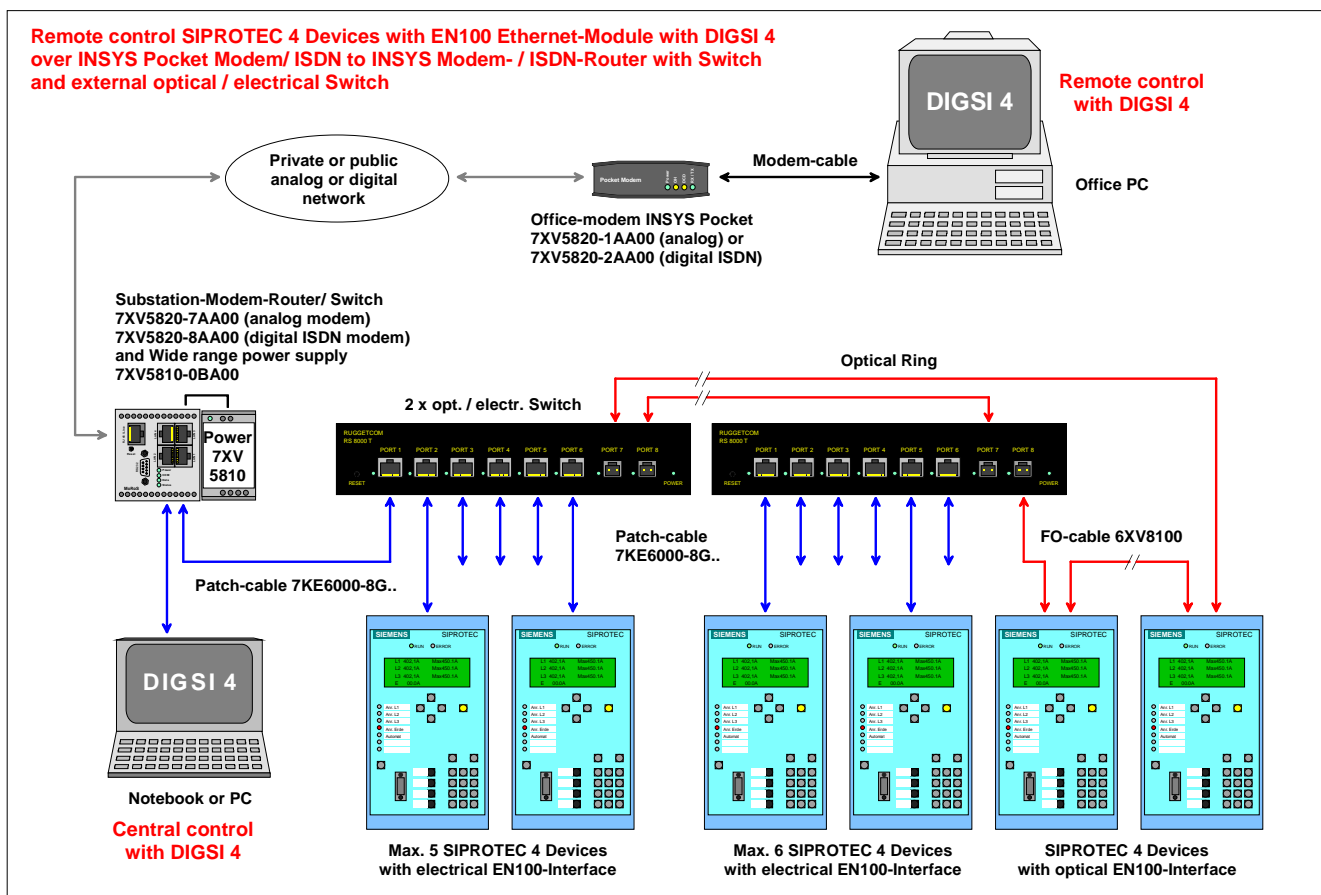


Figure: Application 3

Application 4

“Remote operation of SIPROTEC 4 devices with serial interfaces via Modem-Router“

This application example shows the remote operation of SIPROTEC 4 protection devices with a serial interface, using an analog or digital ISDN office modem (7XV5820-1 or -2), to a modem or digital ISDN router (7XV5820-7 and -8). This router with integrated 4 way switch makes up a „local subnet“. The serial hub connected between the router and the device converts the data, transmitted as TCP packages into serial DIGSI protocols. The connection to the protection and RTU devices with optical interface is done via a cascadable star coupler. Devices with RS 485 interface are connected via an FO-RS 485 converter and the RS 485 bus system 7XV5103.

To ensure secure lightning protection, there should always be a galvanic separation between the substation modem and the protection devices by means of an optical barrier. The modem-router with the serial hub should preferably be located in a communication or control room, while the star coupler 7XV5450 or FO-RS485 converter 7XV5650/51 is located in the first protection cubicle

The remote connection from the office to the substation is established via a password protected DUN connection under Windows. Subsequently, the connection is „transparent“, and the protection devices may be operated with DIGSI 4 via the virtual COM-Port of the serial hub and the device address.

If the protection devices are to be conveniently centrally controlled with a note book in the substation, the notebook with Ethernet interface may be logged into the local subnet with a patch cable. Secure communication via modems is done at 57,6 kB, the standard data format 8N1 with data compression and error correction.

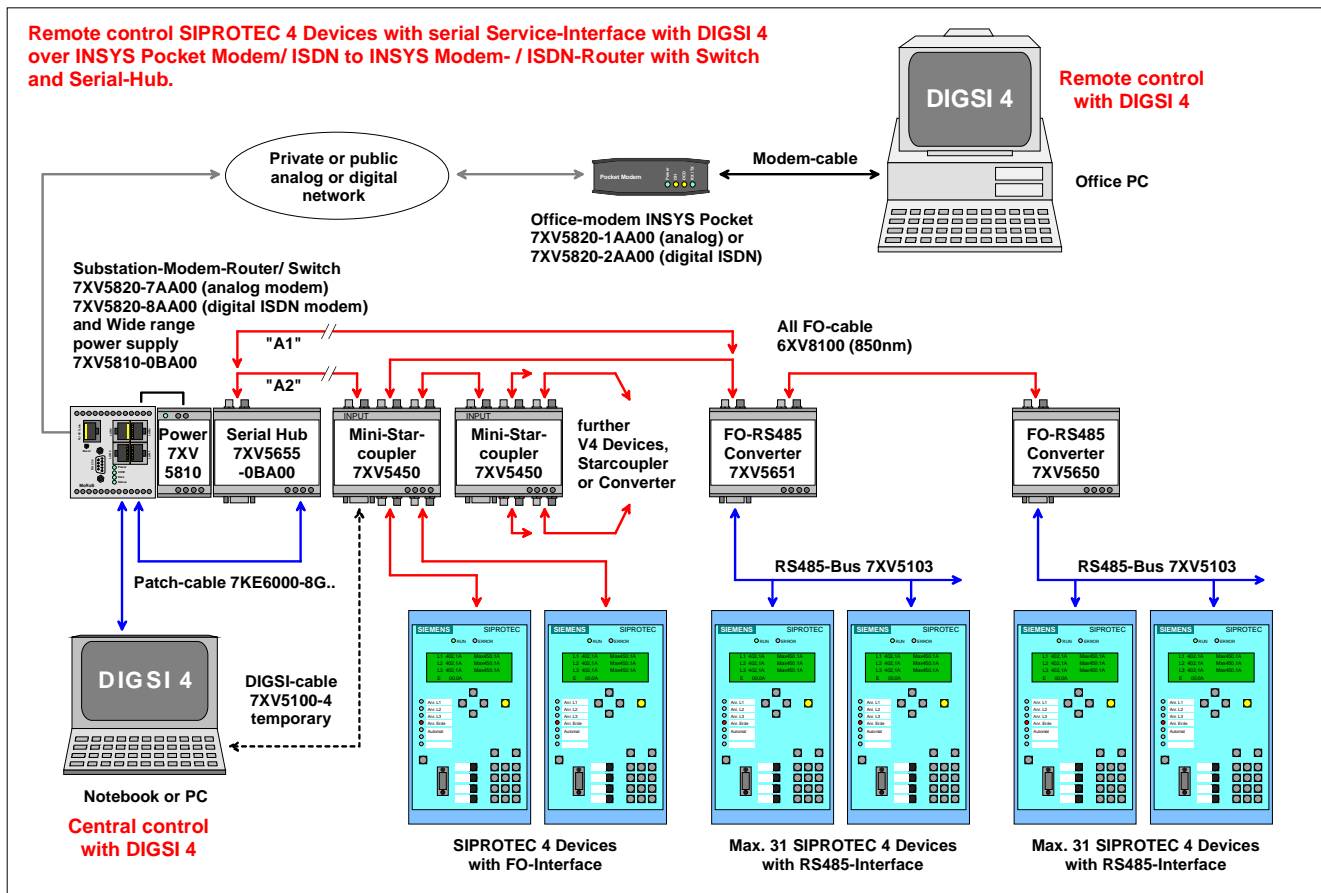


Figure: Application 4

7XV5820-1AA00 INSYS Pocket Modem 56k

Data communication in the private, commercial and industrial field gains larger importance.

INSYS Pocket Modem fascinates by its sophisticated engineering and the shapely compact metal housing.

The devices are well suited as remote stations for our DIN rail series.



Technical Data

Network interface, line requirement	analog telephone network
Data transmission rate	up to 56 kbps
Software update	flash
Approvals	R&TTE, CTR21
Application	for international use
Standards	developed according to CE directives, manufactured according to ISO 9002

Features

Configuration	remote configuration, AT commands
Connection	auto answer mode, hardware-handshake, speed adjustable, sleep mode, auto-bauding, display caller ID
Data format	10 and 11 bit: 7E1, 7O1, 7N2, 7E2, 7O2, 8N1, 8E1, 8O1, 8N2
Protocols	V.92, V.90, V.34+, V.34, V.32bis, V.32, V.23, V.22bis, V.22, V.21, Bell Norm 103/212, Fax Class 1/2
Compression	MNP5, V.42bis, MNP 10, 10 EC, V.44
Error correction	MNP 2/3/4 and V.42
Security functions	security call-back, alarm transmission, SMS to fixed network or as fax over AT command, selective call answer, line-in-use detection, selectable key-abort

Electrical features

Power supply	9 - 10 VDC (with plug power supply 230 V AC)
Consumption	approx. 140 mA DC
Interface to application	RS232, 9 pin SUB-D-jack
Interface to network	RJ-12 (Western)

Physical features

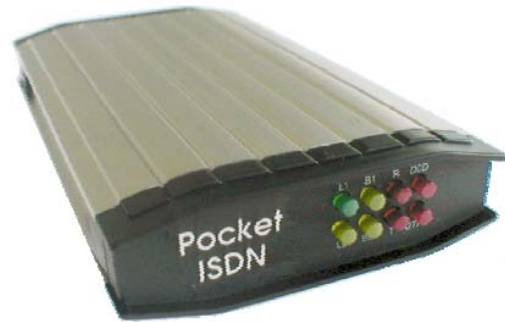
Size in mm (w x d x h)	71x128x22
Temperature range	0 - 55 °C
Humidity	0 - 95% (non condensing)

7XV5820-2AA00 INSYS Pocket ISDN TA Profi

Data communication in the private, commercial and industrial field gains larger importance.

INSYS Pocket ISDN TA fascinates through its sophisticated engineering and the shapely compact metal housing.

The devices are well suited as remote stations for our DIN rail series.



Technical Data

Network interface, line requirement	ISDN net, S0/I.430 Euro ISDN DSS1
Data transmission rate	64.000 bps
Software update	flash
Approvals	R&TTE, CTR3
Application	Europe
Standards	developed according to CE directives, manufactured according to ISO 9002

Features

Configuration	local, via PC terminal, remote via ISDN
Connection	auto answer mode with optional phone number verification
Data format	B-Kanal: V.110, X.75, V.120, X.25/X.31, HDLC (PPP), T70NL, T90NL
Pocket ISDN-TA Profi	D-Kanal: 1TR6 DSS1, VNx
Security functions	access protection via approved phone number (accessible), password protection of remote configuration

Electrical features

Power supply	5 V DC (with plug power supply 100-230 V AC)
Consumption	max. 100mA at 5V/500 mW
Interface to application	RS232, 9 pin SUB-D jack
Interface to network	RJ-45 connector

Physical features

Size in mm (w x d x h)	71x128x22
Temperature range	0 – 55°C
Humidity	0 – 95 % (non condensing)

7XV5820-5AA00 INSYS Modem 56k Profi

With the INSYS Modem 56k any application can be connected to the world wide available analog telephone network.

The INSYS Modem 56k enhances the pure data communication by alarming and security functions: alarms with a user defined text as an SMS, Fax or E-Mail are triggered by digital inputs. Data connections and remote configuration are protected by passwords. If Security Call-back is activated the modem establishes only a connection to a predefined number upon an incoming call. Selective call answer allows only data calls from specified numbers.

Two digital outputs can be controlled remotely by a data connection as well as by DTMF tones from a tone dial phone.



Technical specifications

Network interface	2-wire leased line or dial-up line
Data transmission	rate up to 56.000 bps
Digital in-/output	2 alarm inputs, 2 control outputs

Features

Configuration	AT commands via serial line, remote configuration
Connection *)	auto answer mode, idle connection control , number storage, international settings, caller ID presentation, SMS to fixed network, hardware / software handshake, auto bauding, fixed serial speed, sleep mode
Alarm functions *)	triggered by alarm input or AT command: send SMS, send fax, establish data connection, transmit message over data connection, collective fax message
Output control *)	AT command (local and remote), DTMF
Security functions *)	password protection for connection, security call-back and remote control; selective call answer, watchdog
Data formats	10 and 11 bit: 7E1, 701, 7N2, 7E2, 702, 8N1, 8E1, 801, 8N2 and bit transparent
Protocols, error correction, compression	V.32bis, V.32, V.23, V.22, V22 bis, V21, V.34+, V.34, V.90, V.92 Bell Norm 103/212, Fax Class 1/2, MNP 2/3/4, V.42, MNP 10, MNP 10 EC, MNP 5, V.42 bis

Electrical Features

Supply voltage	10V DC...60 V DC
Current consumption	transmission: 200 mA (with 12V), standby: 160 mA (with 12V)
Inputs / outputs	SPDT (single pole double throw) switches by galvanic insulated relays max. voltage: 30V DC / 42V AC, max. current: 1A DC / 0.5A AC
Serial line speed	300 – 115.200 bps

Physical Features

Size in mm (w x d x h)	55x110x75 mm
Environmental temperature	0 - 55°C
Humidity	0 - 95% (non condensing)

*) device-dependent

7XV5820-6AA00 INSYS ISDN TA Profi

The INSYS ISDN 4.0 can easily be connected to the digital ISDN network.

The INSYS ISDN 4.0 enhances pure data communication by alarming and security functions: alarms with a user defined text as an SMS, Fax or Mail are triggered by digital inputs. Remote control is protected by password.

Selective call answer allows only data calls from specified numbers.

The digital outputs can be controlled remotely. They can be configured to display the connection status as well.



Technical specifications

Network interface	ISDN network, DSS1
Maximum data rate	64.000 bps (channel bundling 128.000 bps)
Digital inputs/outputs	2 alarm inputs, 2 control outputs
Watchdog	yes

Features

Configuration	AT commands, configurator over serial line, remote configuration, CAPI
Connection	auto answer mode, hardware and software handshake, auto bauding, idle connection control, number storage
Alarm functions	triggered by alarm input or AT command: send SMS, establish data connection, transmit message over data connection output control AT command, configurator, connection status
Security functions	password protection for remote control, number identification (CLIP) for connection and Security Call-back
Data formats	10 and 11 bit: 7E1, 7O1, 7N2, 7E2, 7O2, 8N1, 8E1, 8O1, 8N2
Protocols	B channel: X.75, X.25/X.31, HDLC/PPP, V.110, V.120 asynchronous D channel: X.31

Electrical Features

Supply voltage	10V DC ... 60V DC
Current consumption	40 mA
Input / output	SPDT (single pole double throw) switches by galvanic insulated relays max. voltage: 30V DC / 42 V AC, max. current: 1A DC / 0.5 A AC
Serial line speed	1.200 – 230.400 bps

Physical Features

Size	55x110x75 mm
Environmental temperature	0 - 70°C
Humidity	0-90% (non condensing)

7XV5820-7 / 8AA00 Modem Router Switch „MoRoS“

Modem-Router-Switch by INSYS combines a modem, a router and a 4-port switch. The dial-in and dial-out functionality enables the remote maintenance and operation of devices in an Ethernet network.

The *MoRoS* device is available with an integrated analog modem or with ISDN-TA. The integrated 4-port switch allows for direct connection of up to four network devices. The *MoRoS* device has an international 56k modem for global application. The configuration of the *MoRoS* device is easy and fast via a web interface.

MoRoS by INSYS is a device which combines modem, router and switch functions for the remote maintenance of Ethernet-enabled products, e.g. PLC, HMI, etc



- Integrated communication module (analogue modem or ISDN TA)
- Dial-in
- Dial-out (Dial-on-Demand)
- 4-port switch with 10/100 MBit/s
- DHCP server and client
- Integrated configuration interface with help function
- Authentication for up to 10 users (dial-in)
- Dialling filter for dial-out
- Authentication via PAP, CHAP, MS-CHAP, MS-CHAP 2
- Easy configuration
- Local or remote configuration
- Firmware update (local and remote)
- 2 digital inputs and outputs
- Buffered RTC (real time clock)
- Full NAT
- DNS-Relay

- Serial Ethernet-Server *)
- VPN *)
- Firewall *)

*) only version MoRoS PRO

Technical Data „MoRoS“

Modem

Certifications	R&TTE, CTR21 (dial-up line), CTR3 (ISDN), CE
Dial-up line	Transmission rate 56 kBits/s
ISDN	Transmission rate 64 kBits/s
Configuration	Web interface, AT command (via web interface), local and remote

Router

Function	Dial-in, dial-out
Authentication	10 users for dial-in, authentication via PAP, CHAP, MS-CHAP, MS-CHAP 2
Dialing filter (dial-out)	Filtering of IP addresses and/or ports
Configuration	Web interface, AT command (via web interface), local and remote
DHCP server and client	
Watchdog (ext. hardware watchdog)	
RTC (buffered real time clock)	
Full NAT	
VPN*	
Firewall*	
Serial Ethernet-Server*	

Switch

Ports	4
Operating mode	10 / 100 MBit/s for full and half duplex operation
Auto detect	automatically recognizes patch and cross over cables; automatic speed adjustment

Configuration

Web interface	Local/remote
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Additional features

Digital inputs and outputs, firmware update local/remote

Supply

Voltage	10V DC...60V DC
Power input	Approx. 2.5 W (during connection)

Physical Features

Dimensions	70 x 110 x 75 mm
Operating temperature	0...+ 55°C
Humidity	0...95% (non-condensing)
Weight	10.58 oz

*only version MoRoS PRO

Subject to correction and technical changes

Selection- and ordering data

Product name	Order Nr.:
Modem / Modem-Router	7 X V 5 8 2 0 - [] A A 0 0
Analog Pocket Modem 56k Desktop device with plug power supply 230 V AC	1
Digital Pocket Modem ISDN 64k Desktop device with plug power supply 100 - 230 V AC	2
Analog Modem 56k for DIN-rail mounting Power supply 10 - 60 V DC	5
Digital Modem ISDN 64k for DIN-rail mounting Power supply 10 - 60 V DC	6
Analog Modem-Router with 4-times switch for DIN-rail mounting, Power supply 10 - 60 V DC	7
Digital ISDN-Router with 4-times switch for rail mounting 10-60 V DC	8

Product name	Order Nr.:
Modem / Modem-Router Accessories	7 X V 5 8 2 0 - 0 A A 1 0
Data cable from Modem to 7XV5300, 7XV5450, 7XV5550, 7XV5652 2x Sub-D jack, 9-pin female, Length 2 m	

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