

TECHNICAL SPECIFICATION

ekey net 4.0

The document has been created using the following tools:

MS Office – Word, Version 2007

Document properties

VERSION	3.0
CONFIDENTIALITY	PUBLIC
STATUS	RELEASED
AUTHOR	PICG
REVISION	
MAILING LIST	
FILING	

Document History

VERSION	DATE	PERSON IN CHARGE	MODIFICATIONS
1.0	22.04.10	picg	Update to ekey net 4.0
1.1	06.05.10	picg	Update of several pictures
1.2	02.11.10	brum	RFID – ISO14443 removed
1.3	23.11.11	reit	LICENSE MODELS updated
1.4	01.05.12	reit	New finger scanner hardware
2.0	05.11.12	reit	New featurelist business/light/com
3.0	08.08.13	pehg	Data sheets of ekey net products deleted; Inserted reference to the homepage;

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1 Introduction

1.1 Purpose of the document

The purpose of this document is the complete technical description of the product ekey net 4.0. The document is to present all typical parameters as well as the limit values and thresholds of the system.

1.2 Validity of the document

The specifications are deemed to be a technical description of *ekey net 4.0*. The function of hardware units required for the system and their technical limit values are not described in detail in this document, but only to the extent that these components define the scope of the complete system.

1.3 Definitions and Abbreviations

10 Base T: The specification IEEE 802.3i for Ethernet with 10 MBit/s basic band transfer through symmetric four-ply cable with 100 ohm.

100 Base TX: The specification IEEE for an Ethernet cabling enabling a transfer rate of 100 MBit/s using paired UTP and STP cables of category 5.

ASCII: American Standard Code for Information Interchange (ASCII, alternatively US-ASCII, pronounced [æski]) is a 7 bit character encoding representing the US equivalent for ISO 646as well as subsequent multi-bit character encodings.

CSV: The file format CSV describes the structure of a text file when saving or exchanging data in a simple and time efficient, structured way. CSV is an abbreviation for comma separated values (less frequently also character separated values or colon separated values).
A universal standard for the file format CSV does not exist. However, a basic description of the CSV format can be found in RFC 4180.
The character encoding which is to be used has not been specified either; the 7 bit ASCII is acknowledged to be the smallest common denominator.

DSN: The Data Source Name (DSN) is a data structure (similar to a URL or a file path), describing the access data when using a database abstraction framework (data base abstraction layer) like ODBC (Open Database Connectivity), JDBC or ADOdb, which in turn require a driver in order to connect to a certain database on the basis of a specific RDBMSs.

ekey net Master server

Software product of ekey biometric systems, part of ekey net 4.0

ekey net Terminal server

Software product of ekey biometric systems, part of ekey net 4.0

ekey Communication server

Software product of ekey biometric systems, part of ekey net 4.0

ekey ModuleUpdate

Software product of ekey biometric systems, part of ekey net 4.0

ekey net CV LAN config

Software product of ekey biometric systems, part of ekey net 4.0

ekey net FS (finger scanner)

Hardware product of ekey biometric systems to capture fingerprints, part of ekey net 4.0

ekey net CP (control panel)

Hardware product of ekey biometric systems to control actuators (door locks, etc.), part of ekey net 4.0

ekey net CV LAN (LAN converter)

Hardware product of ekey biometric systems to implement Ethernet – RS485, part of ekey net 4.0

Ethernet

Collective term for a row of basic band networks of various topologies, all working with CSMA/CD access method. Today, it is the most common LAN technology.

Also see: 10Base-T, 100Base-TX

Full Duplex

Process of message transfer, simultaneous bidirectional communication

Half Duplex

Process of message transfer, alternating bidirectional communication

Hardware

Is the generic term for technological machine equipment of a system, e.g. a computer system

LED

light **e**mitting **d**iode

Mbps

Mega bits per second = unit for data transfer rate

ODBC

Open **D**atabase **C**onnectivity is a standardized interface for databases using SQL as database language. ODBC provides a standard software API (application programming interface) method for using database management systems (DBMS). The designers of ODBC aim to make it independent of programming languages, database systems, and operating systems

Software Is a general term used to describe the role that computer programs, procedures and documentation play in a computer system.

TCP/IP Transport control protocol / internet protocol = transfer protocol in the internet

Unicode: Unicode is a computing industry standard allowing computers to represent and manipulate text expressed in most of the world's writing systems consistently. Its objective is to normalize coding text across different countries and cultures.

VPN **V**irtual **p**rivate **n**etwork is a computer network using a public network to transport private data (e.g. the internet). It therefore enables a secure transfer using an unsecured network.

1.4 Correlation with other documents

Additional information regarding ekey net 4.0 can be found in the ekey net manual.

1.5 Notes regarding the notation

This specification is components-based.

Product name *italic, underlined*

1.6 Symbol description



ATTENTION
kept in

This symbol highlights a special note which has to be kept in mind for the described function.



INFORMATION

Provides additional/supplementary information for this function / parameter.



STOP

This symbol stipulates that a certain function should not be executed. Frequently, you will have to define certain settings first.











2 ekey net 4.0 software

2.1 ekey net 4.0 software components

ekey net FEATURES	LICENSE MODELS		
	BUSINESS	LIGHT	COM*
Fingerscanner hardware shapes wall-mounted (WM), outlet-mounted (OM), flush-mounted (IN) and door handle (FSB)	WM, OM, IN, FSB	WM, OM, IN, FSB	WM, OM, IN
Finger scanner sizes (S = 40, M = 200, L = 2.000 fingerprints)	S, M, L	S, M	S, M, L
Number of time zones	UNLIMITED	3	1
User groups	UNLIMITED	1	UNLIMITED
Terminal groups	UNLIMITED	1	UNLIMITED
Max. number of sites per each VPN		10	
Max. number of terminal		10	
Amount of finger scanners administrable within an installation		80	
Max. number of users administrable within an installation		4.000	
Access	YES	YES	NO
Number of time slots per time zone	31	12	1
Attendance list	YES	NO	NO
Calendar	UNLIMITED	1	NON
Easy-Mode	YES	YES	YES
Enrollment via terminal or USB	YES	YES	YES
Concierge mode	YES	NO	NO
RFID	YES	YES	YES
WIEGAND	YES	NO	YES
Basic settings adjustable	YES	NO (predefined)	YES (limited)
Customer-specified actions and events	YES	NO	NO
E-Mail Notification	YES	NO	NO
CSV Logging	YES	Only positive	YES
ekey-Reporting	YES	NO	NO
ODBC(SQL) Logging	YES	NO	YES
HTML Logging	YES	NO	YES
UDP Logging	YES	YES	YES
Time-controlled operations	YES	NO	NO
Time-controlled anti-	YES	YES	NO

pass back (min)				
Max. number of relays to be activated with 1 finger swipe		2	2	0
Mobile phone opening via onetime PIN for increased security		YES	YES	NO
Offline capability		YES	YES	YES
Number of relays 1 - 28		YES	NO	NO
Daytime operation with or without first entry		YES	YES	NO
Area limit(s)		YES	YES	NO
Multi-lingual software		YES	YES	YES
Holiday calendar		YES	YES	YES
* for time attendance only				

The ekey net 4.0 system consists of the following software units, which are described in detail in the following chapters:












-  ekey net Master server
-  ekey net Terminal server
-  ekey Communication server
-  ekey net Admin
-  ekey net CV LAN config
-  ekey ModuleUpdate
-  ekey net FS (finger scanner)
-  ekey net CP (control panel)
-  ekey net CV LAN (converter)
-  ekey net CV WIEG



Detailed information as to the software configuration of ekey net 4.0 and its functionality can be found in the **ekey net 4.0 User Guide**.

2.2 Operating System

ekey net 4.0 is compatible with the following operating systems:

-  Microsoft Windows XP Professional SP3
-  Microsoft Windows Server 2003 SP1 (and SBS 2003)
-  Microsoft Windows Server 2008
-  Microsoft Windows Server 2008 R2
-  Microsoft Windows VistaHome Premium SP1
-  Microsoft Windows Vista Business SP1
-  Microsoft Windows Vista Enterprise SP1
-  Microsoft Windows Vista Ultimate SP1
-  Microsoft Windows 7 home/premium, enterprise, professional, ultimate – 32 and 64bit all versions
-  Microsoft Windows 8 Pro (minimum version ekey net 4.1.8)
-  Microsoft Windows Server 2012 (minimum version ekey net 4.1.8)



The operation of ekey net on virtual machines (e.g. VM-Ware) is not possible due to the required availability of this access control system!

2.3 Communication

ekey net communicates via Ethernet/ UDP (User Datagram Protocol). UDP is one of the core members of the Internet Protocol Suite (IP). This way, messages can be sent without requiring prior communications to set up special transmission channels or data paths. The communication is managed via MSMQ (Microsoft Message Queuing). UDP uses a simple transmission model **without** implicit hand-shaking dialogues between the server services and ekey net CV LAN for guaranteeing reliability, ordering, or data integrity.

It must be possible to communicate through the following ports unhindered: They must be accepted by firewalls, layer 4 switches, etc., so that an unhindered communication between ekey net components is possible.

Message Queuing	MSMQ	UDP1801
Message Queuing	MSMQ-DCs	TCP2101
Message Queuing	MSMQ-Ping	UDP3527
Message Queuing	MSMQ-Mgmt	TCP2107
Message Queuing	MSMQ-RPC	TCP2103
Message Queuing	MSMQ-RPC	TCP2105
Message Queuing	RPC	TCP135
Message Queuing	MSMQ	TCP1801
Free UDP ports		58000-58016

All the servers and PCs on which ekey net has been installed must be reachable via "hostname".



The ports are so-called RPC (remote procedure call) ports, meaning that if this port is occupied by another software, the next available port – in steps of 10 upward – will be used. e.g.: UDP1801 will become UDP1811. In the event that the following ports are not available, a range of ports – e.g. UDP1801 - UDP1851 must be enabled.

For ekey net CV LAN
NTP (Network Time Protocol) UDP UDP123



All the ekey net CV LANs are supplied with a default IP address (**192.168.1.250**). If you have implemented several converters, be careful to connect them one after the other and change the IP address immediately, so that you do not face any network or IP conflicts.

If some of the ekey net CV LANs are missing on the list, then it could be that the „BROADCASTING“ of MAC addresses in the network is disabled or blocked. Assign an adequate IP address to the converter in an adequate 192.168.1.xxx network.

Network Address Translation(NAT)

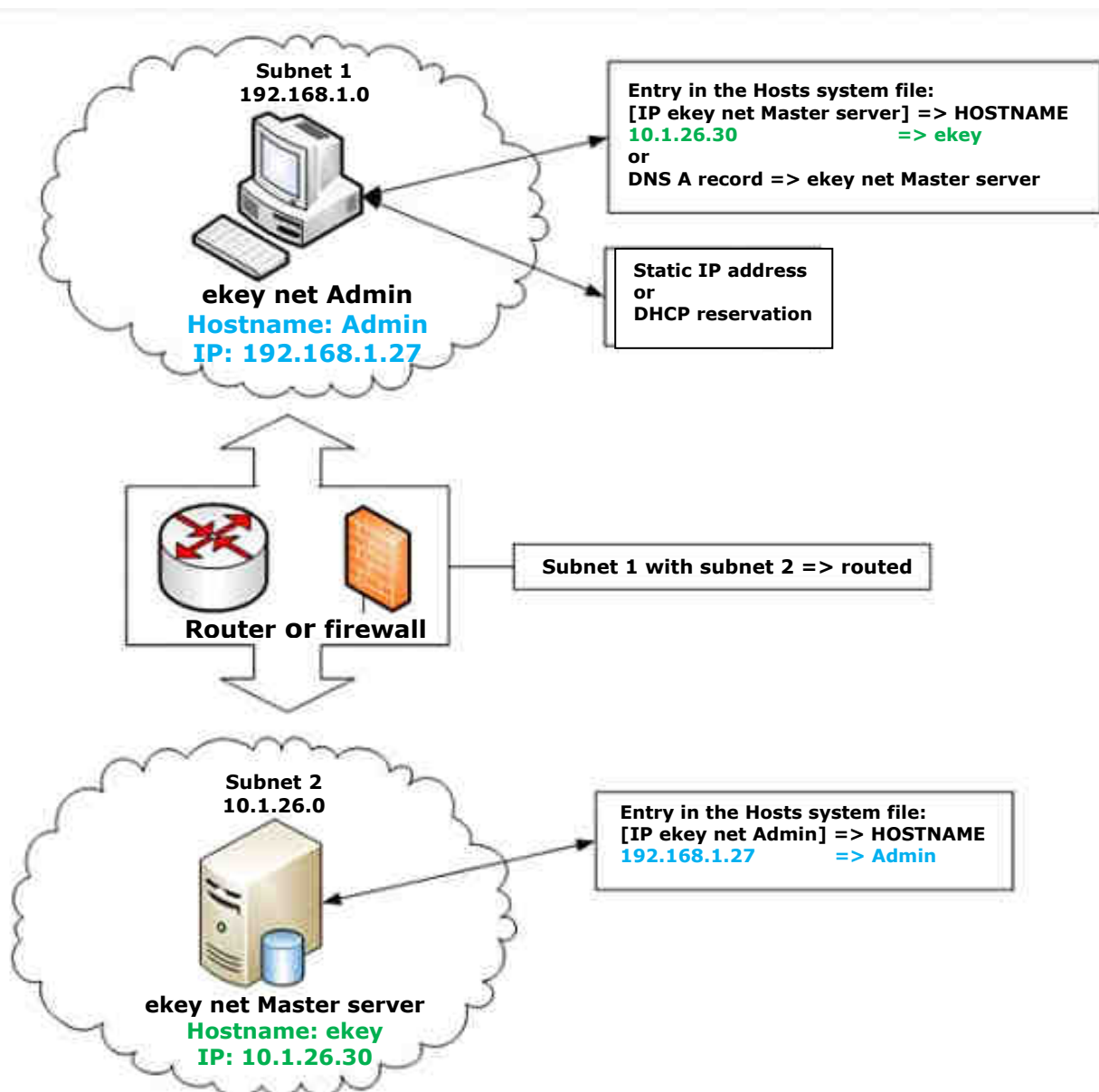
As of using Client NAT or Server NAT together with Microsoft MSMQ is not supported, ekey net does not work in systems with such network configurations!

Communication beyond the network limits

This network configuration is required for access by the ekey net Admin software to the ekey net Master server when:

- ekey net Admin and ekey net Master server are not members of the same MS Active Directory domain
- no WINS server has been configured

In the scheme below you may find the corresponding settings.



2.4 Setup

Start setup.exe

Select the language after executing setup.exe. The window below will appear, offering different options. Select the respective language from the combo box and confirm your entry by clicking OK.

Setup.exe allows to make either a complete or a customized installation of *ekey net*.



The ekey net install shield wizard will start automatically.



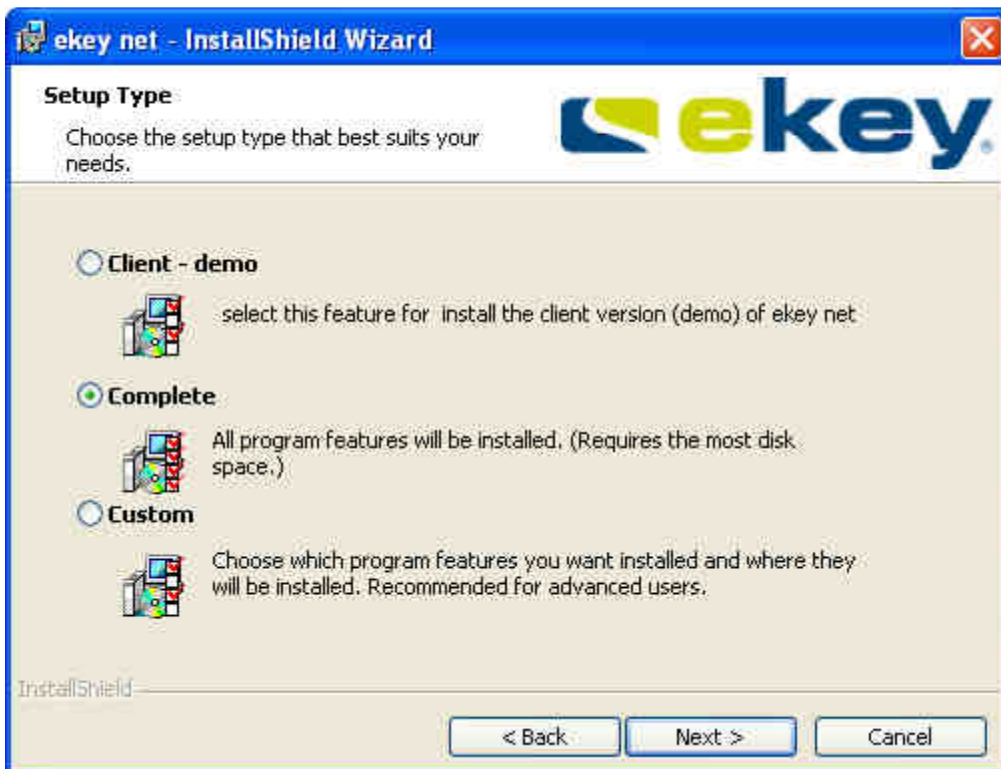
Click  to continue.

Next, the license agreement will be opened. Please read this information carefully and continue the installation by ticking the field

I accept the terms in the license agreement

Click

Next >



You will now have to enter the license key. If you have previously activated any licenses, the window below will not be displayed!



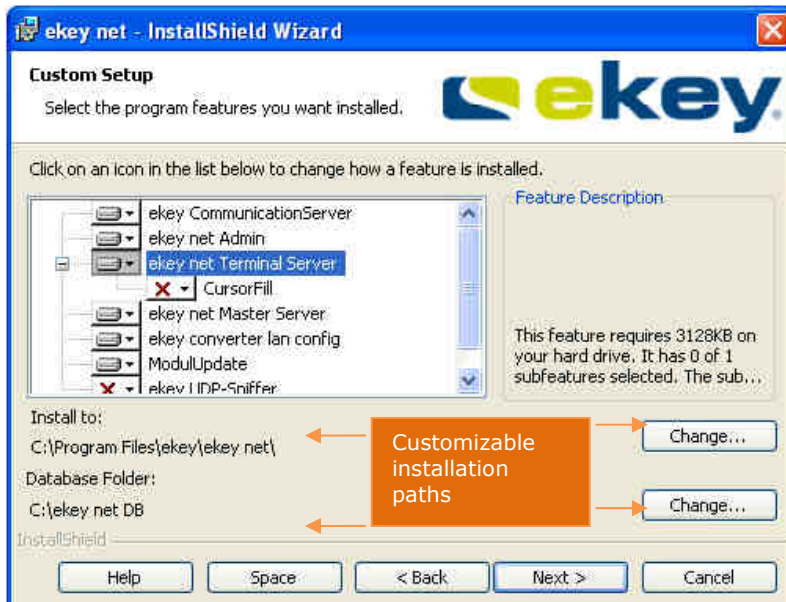
Defining the installation paths

The installation paths can be defined during installation.

Default installation paths (factory setting):

ekey net applications: C:\Program Files\ekey\ekey net




ekey netdata file: C:\ekey net DB



When installing the database, do not use any UNC – paths or network drives to avoid problems with the authorization. The service account for the ekey net Master server service has to have full access rights to this folder!

Selection of the ekey net components to be installed

The following components must be installed so that ekey net can function properly.

- ekey Communication server
Function: ekey Communication server administers the ekey net communication in the network based on MSMQ (Microsoft Message Queuing). This service must be installed on every computer in the ekey net system. This applies, in particular, to the ekey net Master server and ekey net Terminal server server services, as well as to the ekey net Admin.
- ekey net Admin
Function: This program can be installed on any desired number of computers and serves for ekey net administrators to administer ekey net. This software application is also used for the doorman mode.
- ekey net Master server
Function: Database administration. All system data (personal data, terminal data, access data, etc.) is stored here centrally. Only **one** ekey net Master server may be active for each ekey net installation.
- ekey net Terminal server
Takes care of the allocation of access data from the ekey net Master server to the devices and back, monitors the devices, etc. Any desired number of ekey net Terminal servers can be active for each installation (take note that there may be limitations due to the OS).
- ekey converter LAN config
Lists existing ekey net CV LANs found in the local network and enables network configuration and firmware update of individual ekey net CV LANs.
- ekey ModuleUpdate
A software to update the firmware of the devices (ekey net CP, ekey net CV WIEG and ekey net FS).
- ekey Service Guard
This service will be installed automatically to monitor the individual ekey net services:
 -  ekey net Communication server
 -  ekey net Master server
 -  ekey net Terminal server
 If it is necessary, the services will be restarted automatically!



*Should you plan to stop the ekey net system services for maintenance, you will **have to stop the ekey Service Guard first!***

Below listed software components can be installed optionally:

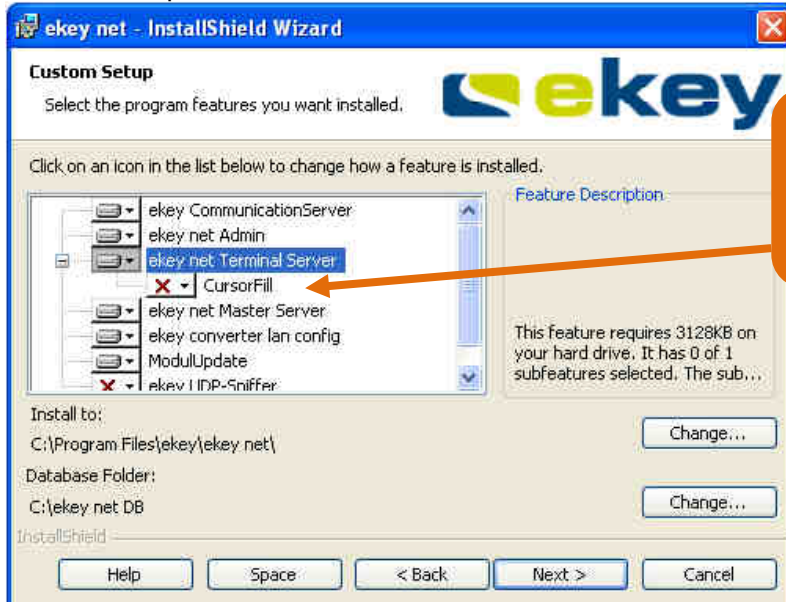
- *ekeyCursorFill*

The most simple interface to third-party software e.g. time recording or similar. CursorFill has to be installed on the same computer as the *ekey net Terminal server* works. In the event of access activity, the configured user ID is inserted into the cursor field on the desktop. This function is comparable with a barcode scanner that inserts the number into the cursor field after reading the barcode. Cursorfill does not need to be installed if this function is not required.

Software components	Type	Dependency on services / drivers / groups
ekeynetadmin.exe	Application	<ul style="list-style-type: none"> • ekey net Master server • ekey net Terminal server • ekey Communication server
ekey net Admin Hilfe (Help)	PDF	<ul style="list-style-type: none"> • ekey_net_Handbuch (User Guide)
ekeyres_DEU.dll	Program library	<ul style="list-style-type: none"> • German DLL for ekey net Admin
ekeySvcGuard.exe	Service	<ul style="list-style-type: none"> • Monitors the ekey net Server services
ekeynetterminalserver.exe	Service	<ul style="list-style-type: none"> • ekey Service Guard • ekey Communication server
ekeynetmasterserver.exe	Service	<ul style="list-style-type: none"> • ekey Service Guard • ekey Communication server
ekeyCommunicationServer.exe	Service	<ul style="list-style-type: none"> • MSMQ
ekeynetcursorfill.exe	Application	<ul style="list-style-type: none"> • ekey net Terminal server
ConfigConverter.exe	Application	<ul style="list-style-type: none"> • ekey net Terminal server and ekey Service Guard have to be stopped
ModuleUpdate.exe	Application	<ul style="list-style-type: none"> • ekey Communication server • ekey net Terminal server and ekey Service Guard have to be stopped

Whether or not the individual components should be installed on the respective computer (server) can be defined in the **ekey net InstallShield wizard**.

- component will be installed
- component will **not** be installed

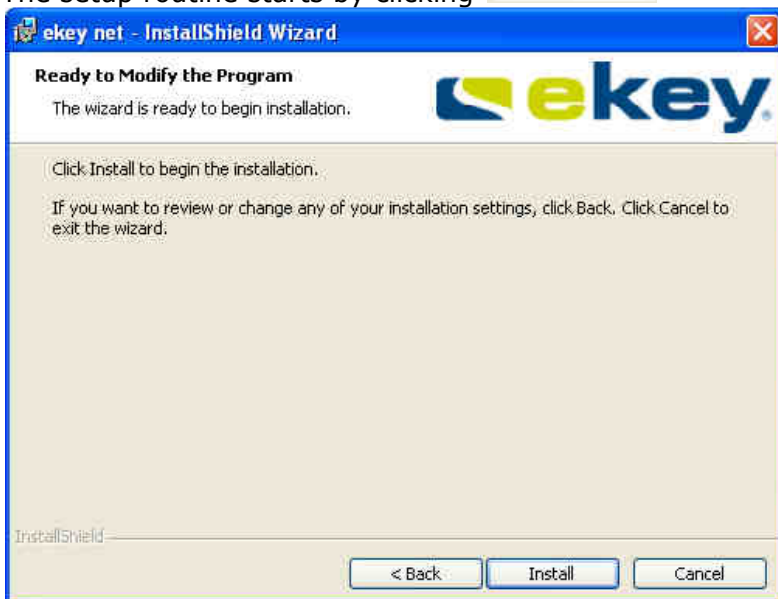


Click here to select/deselect the respective component. Choose "Install" or "Not install".

Confirm your settings by clicking

Install *ekey CONVERTER LAN config* as well as *ModulUpdate* along with each ekey net Terminal server. Both applications are necessary later on for the device configuration.

The setup routine starts by clicking



The setup routine may take a few minutes. If you decided to install an ekey net Terminal server on your computer, below displayed window would appear towards the end of the installation:



To enable proper communication between the ekey net Terminal server and the corresponding ekey net Master server, it has to be assigned correctly. For this purpose, enter the name of the computer (HOSTNAME) – on which the ekey net Master server has been installed – into the text field.



Under certain circumstances, entering an IP address or "localhost" could lead to system failures.

Next, click **Install** to finish the installation of the ekey net Terminal server. The setup for this computer has now been completed.



Repeat the installation process for additional computers (servers) along with all necessary ekey net software components.



*Please pay attention to install only **one ekey net Master server** within every system! Otherwise, ekey net will not work according to its specifications.*

2.5 Data filing

Data filing is performed in the **ekey net.netdata.**

data file, according to the path defined during installation.

The file is backed up after each modification.

Data file size at

- 0 users = 9-10 kB
- 1000 users = approx. 1 MB
- 2000 users = approx. 2 MB
- 10 000 users = approx. 10 MB

The size can vary depending on the user photos.

Generally speaking, the quantity of

- Clients
- User groups
- Users

is unlimited, however, it influences the respective system performance.

2.6 Data communication

The data tables shown in the following chapter display the data transfer in the net system for various operating conditions. The following abbreviations are used in the tables.

MS ... ekey net Master server

TS..... ekey net Terminal server

CNV... ekey net CV LAN

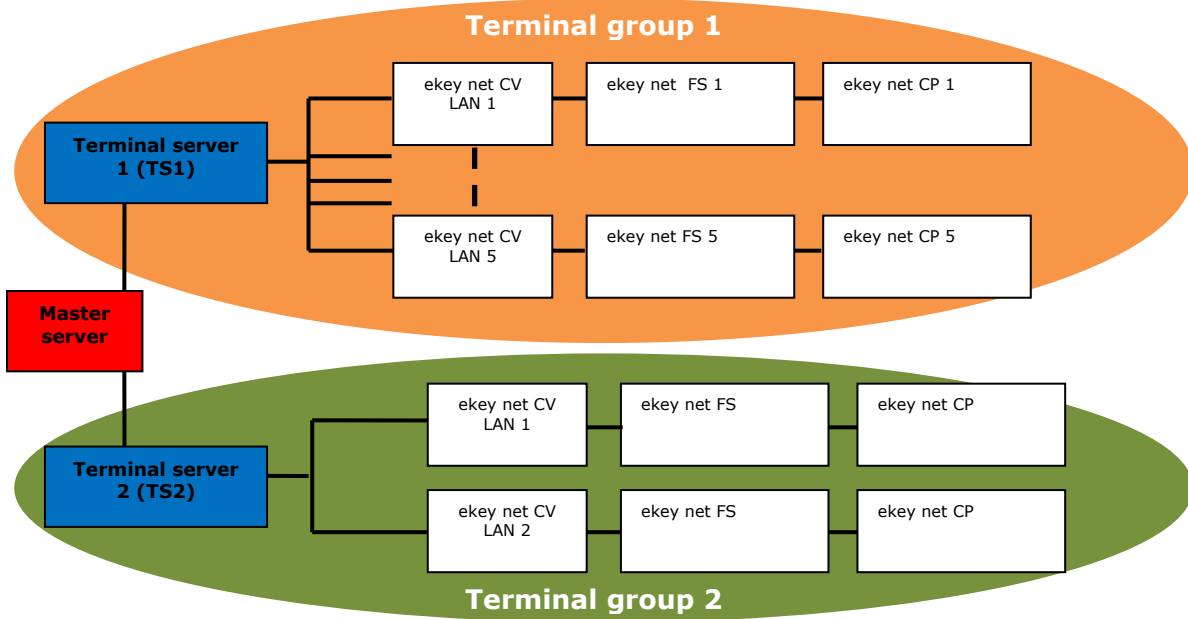
2.6.1 Download of 2 modifications

Two changes were made in ekey net Admin and these changes were sent to the terminals. The subsequent table shows the occurring amount of data between the different services.

	Small 9 modules			Medium 18 modules			Large (Moxa) 28 modules			ekey net L 20 modules		
	MS	TS	CNV	MS	TS	CNV	MS	TS	CNV	MS	TS	CNV
Rec.	2.214 KB			2.200 KB			1.890 KB			2.692 KB		
Sent	1.351 KB			1.400 KB			1.203 KB			1.334 KB		
Rec.		2.213 KB			2.846 KB			3.106 KB				
Sent		1.335 KB			1.381 KB			1.564 KB				

2.6.2 Update

Amount of data during a complete update routine for the configuration below:



Amount of data to service	[MB] in megabytes	COM Server	MQVSC	Master server
Terminal group 1	Received	0,04	69,4	59,7
	5 ekey net sets + 1 ekey net Terminal server	Sent	0,03	4,7
Terminal group 2	Received	0,6	65,2	59,7
	5 ekey net sets + 1 ekey net Terminal server	Sent	1,2	1,5

The size of the **Setup.exe** file is 59,7MB.

2.6.3 Standby Operation (without swiping a finger)

This measurement shows the amount of data per hour at the described configuration, while no input is made.

Configuration:

- 1 Master server
- 1 Terminal server 1: 8 ekey net CV LAN with 8 terminals
(6x *ekey net M FS*,
2x *ekey net M IN (integra)*)
- 1 Terminal server 2: 4 MOXA with 10 terminals
(1x *ekey net S FS*, 8x *ekey net M FS*, 1x *ekey net L FS*)

	received (kB / h)	sent (kB/h)
MS	2.549,88	2.092,06
TS1	2.893,66	1.486,65
TS2	2.067,24	1.421,77

2.6.4 Duration of data update at finger scanner

In this test, the maximum quantity of fingerprints will be sent to the finger scanner variants S, M, L and the duration of the update will be measured.

1 pc. *ekey net S FS* (40 fingerprints)

~ 5 sec. for "simple update"

~ 15 sec. for "complete update" (Ctrl + Shift)

1pc. *ekey net M FS* (200 fingerprints)

~ 8 sec. for "simple update"

~ 60 sec. for "complete update"

1 pc. *ekey net L FS* (2000 fingerprints)

~ 8 sec. for "simple update"

~ 60 sec. for "complete update"

2.7 Recording log files

2.7.1 Data logging in ONLINE mode

The data logging possibilities are not relevant for this technical specification and are described in details in **Chapter 15** of the **ekey net 4.0 User Guide**.

2.7.2 Data logging in OFFLINE mode

During offline mode, there is no connection between the ekey net FS and the ekey net Terminal server. So records are stored on the finger scanner until the connection is re-established.

ekey net FS	max. amount of fingers	max. amount of log records
S	40	8192
M	200	8192
L	2000	8192
S integra	40	8192
M integra	200	8192
L integra	2000	8192

Four 64k blocks are dedicated in the Flash for log data. One log record consists of 32 bytes. This way, up to 8192 log records can be saved. After the 8193rd log record, the oldest 64k block is deleted (Flash – organization in 64k blocks).

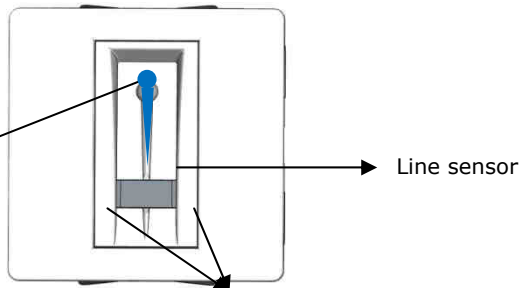
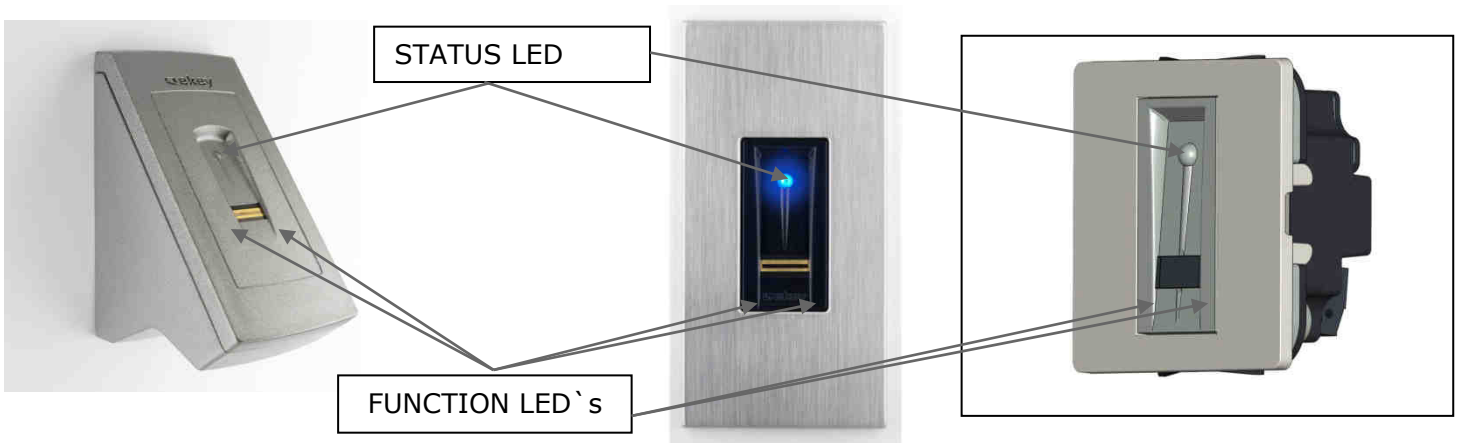
3 User Interfaces






There are several user interfaces in the ekey net system.





- ekey net FS: LED signaling of the operating status and of the ekey net FS.
- ekey net CP: seven segment display and 4 keys to signal the operating status and intervention when linking ekey net FS and ekey net CP
- ekey net CV LAN: LED signaling of the operation status
- ekey net Admin: application program – configuration of the ekey net system
- ekey net Terminal server: application – master server allocation
- ekeyModuleUpdate: application program for firmware update of devices
- ekey CV LAN config: Application program for the identification and configuration of ekey net CV LAN

3.1 ekey net FS

The sensor which reads the fingerprint is, of course, installed as a data entry unit on the finger scanner. However, LEDs are implemented for system status signaling. Their functions are described in the table below.



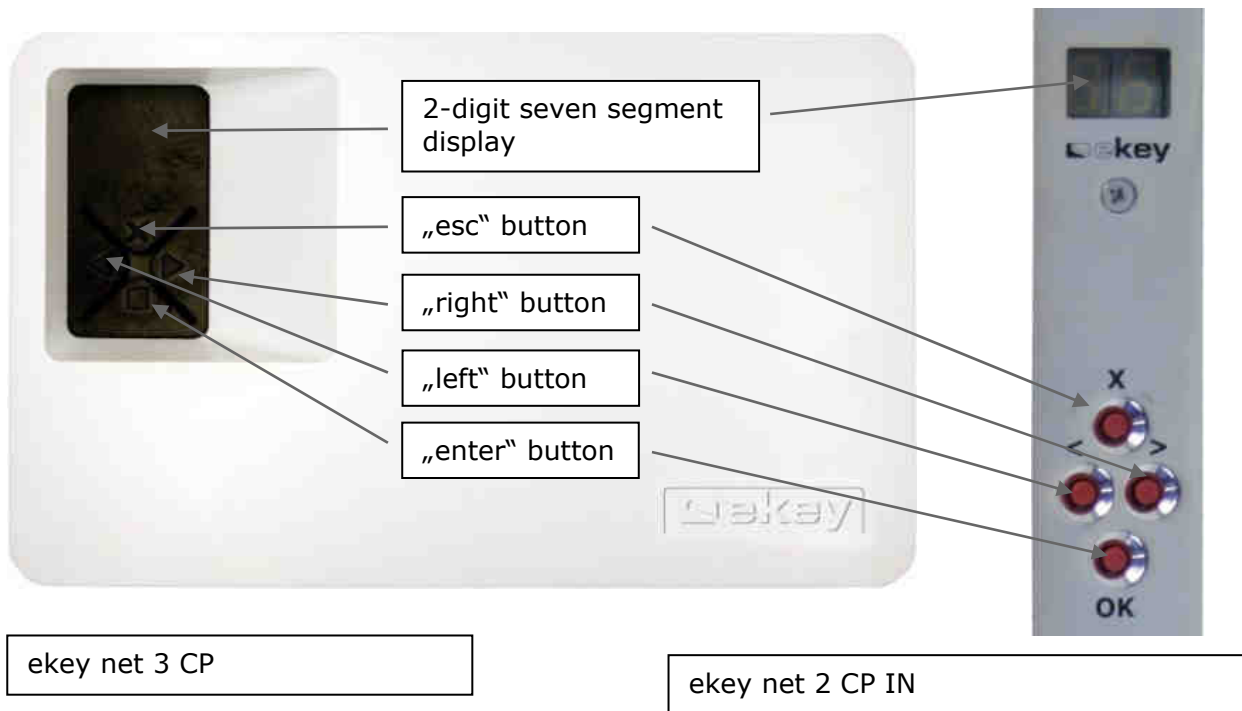
Display	Function LED	Signification of the indication
	Blue	The device is ready to read a finger. A finger may be swiped over the sensor.
	Blinking orange	The analysis and identification of an enrolled finger image is currently being done.
	Green	The finger has been identified and has access rights.
	Red	The finger has been denied access (reason: unknown finger or for instance due to a time-restricted access).
	Blinking red	Finger scanner data is currently being updated (finger templates, rights).

Display	Status LED	Signification of the indication
	right : off left : off	The finger scanner is ONLINE: there is an active data connection to the ekey converter LAN and to the ekey net terminal server (normal status).
	left: blue right: off	The finger scanner is HALF-OFFLINE: there is no data connection to the ekey net terminal server.
	right: on left: on	The finger scanner is OFFLINE: there is no connection neither to the ekey CV LAN nor to the ekey net terminal server.
	Right blinking left alternately	A software update is being done on the finger scanner.










3.2 ekey net CP 3 / ekey net CP IN 2 (integra)

The ekey net CP is equipped with a 2-digit seven segment display to signal the operating status and 4 keys for corresponding system entries.

However, system entries are required only if the terminal is new or has not yet been initialized (e.g. also after an update).










The meaning of the information shown on the seven segment display of the ekey net CP as well as required entries using the keys are displayed in the following table.

Display	Info	Description
	Both points are lit up	The terminal is new and has not yet been initialized. This state can be forced by pressing the left and right buttons.
	The "r" in the right segment and points are blinking alternately	This terminal has been initialized in another ekey net system. It has to be reset by pressing first the left and then the right button.
	There is an "o" in the right segment	There is no connection with an <i>ekey net CV LAN</i> and the <i>ekey net Terminal server</i> is in - "offline - state". Please check the connections.
	The left point is flashing	The <i>ekey net CV LAN</i> is online, but the <i>ekey net Terminal server</i> cannot be contacted. Check the network connections and the <i>ekey net Terminal server</i> service.
	The points are blinking alternately	The system is online - all components are communicating correctly.
	The lower line in the left segment and the points are flashing alternately	Port 1 (relay 1) is switched on
	The middle line in the left segment and the points are flashing alternately	Port 2 (relay 2) is switched on.
	The upper line in the left segment and the points are flashing alternately	Port 3 (relay 3) is switched on
	"Nu" - Need Update	This terminal requires a firmware update. This display also appears during an update.

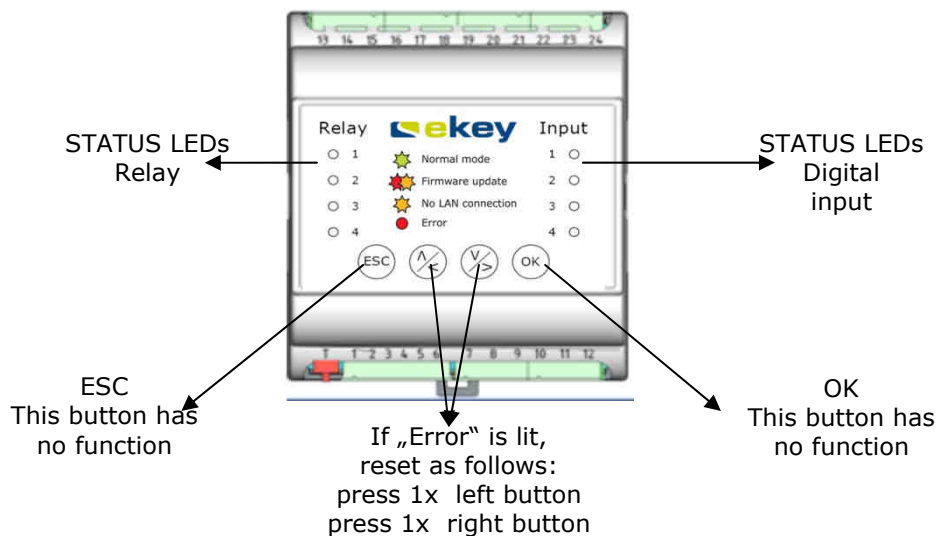
3.3 ekey net CP mini

The ekey net CP mini is equipped with a 2-colour LED on the front side, which is visible through the housing. The signaling represents the following operation modes:

Display	Info	Description
	Flashing green	Normal operation
	Green light illuminated	Relay is switched on
	Orange/ red flashing alternately	Firmware update
	Flashing orange	There is no connection with the ekey net CV LAN
	Red light illuminated	Error: e.g. NU
	Orange light illuminated	I/O door status has been closed
	Green orange flashing alternately	I/O is active and relay is switched on.






3.4 ekey net CP DRM

The ekey net CP DRM has 4 Status-LED for the Relay-Outputs and 4 Status-LED for the Relay-Inputs. 4 more LED show the operating status of the control panel. The two middle Buttons can be used for a Reset if an Error is lit.

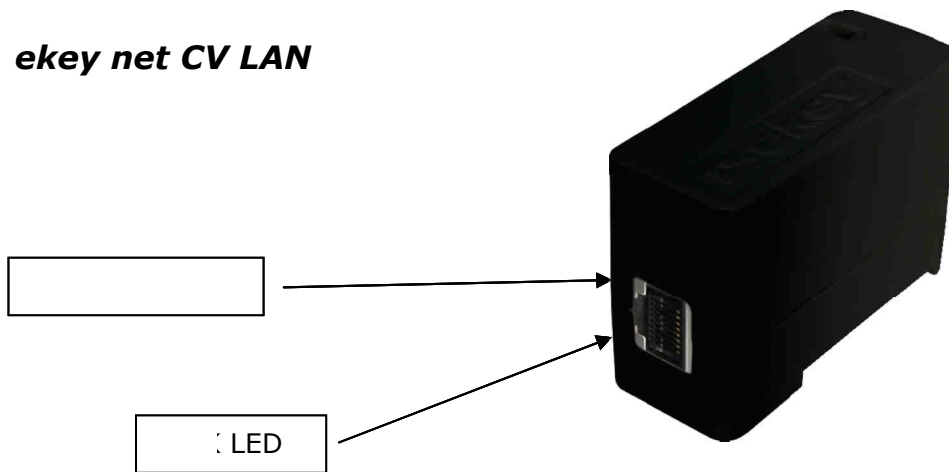


3.5 ekey net CV WIEG

The ekey net CV WIEG is equipped with a 2-colour LED on the front side, which is visible through the housing. The signaling represents the following operation modes:

Display	Info	Description
	Flashing green	Normal operation
	Green light illuminated	Data is being sent
	Orange/ red flashing alternately	Firmware update
	Flashing orange	There is no connection with the ekey net CV LAN
	Red light illuminated	Error: e.g. NU

3.6 ekey net CV LAN



ekey net CV LAN has 2 status displays (LEDs) for signaling

LINK LED: left, bicolor
 ACTIVITY LED: right, bicolor:

LINK LED	
Color	Status
Off	No connection
Amber	10Mbps
Green	100Mbps

ACTIVITY LED	
Color	Status
Off	No activity
Amber	Half Duplex
Green	Full Duplex

In order to configure an ekey net CV LAN, the program ekey CV LAN config must be used. (also see Chapter 5.2.3 in the ekey net 4.0 manual).

4 Hardware

4.1 Computer specification for the operation of the ekey net 4.0 software

- 1,0 GHz 32-Bit (x86)- or 64-Bit (x64) processor (Intel Celeron)
- 256MB RAM (system may not swap constantly to pagefile.sys)
- 40GB hard drive with at least 100 MB free memory
- Ethernet, at least 10BaseT (10Mbit / s)

The computer performance above is the least you need, as defined by ekey biometric systems. System requirements for the operating system or reduced computer performance based on third party applications which possibly run on that respective computer, are not taken into consideration.

Generally speaking, ekey recommends operating the ekey net application including all its terminal services on dedicated PCs!

This is due to the fact that ekey net has high availability requirements (availability >90%). External applications can strongly reduce this availability (server services fail, necessary network and computer capacities are busy, system crashes etc.).

4.2 Data sheet ekey net products

The data sheets for the individual ekey net products can be found on the ekey website under Downloads/Data sheets

<http://www.ekey.net/downloads-en/cat/Datenblatt>

4.3 CONVERTER MOXA NPORT 5232

This hardware is NO LONGER supported by ekey net 4.0!

4.4 Hardware interfaces/ wiring



4.4.1 Ethernet 10Base-T

Data transfer rates:	Max. 10Mbit/s
Wiring type:	Minimum requirement is CAT-5
Cable length:	When using Twisted Pair (TP) cables 10BaseT = 100m per segment

4.4.2 Ethernet 100 Base TX

Data transfer rates:	max. 100Mbit/s
Wiring type:	Minimum requirement is CAT-5 When using Twisted Pair (TP) cables 10BaseT = 100m per segment

4.4.3 RS485

Data transfer rate:	230kBit / s
Transfer type:	two core, half duplex
RS485 – driver:	ADM4852A from Analog Device
Receive level:	A-B < -0.3V = MARK = OFF = logical 0 A-B > +0,3V = SPACE = ON = logical 1
Protocol:	ekey net 3.0
Maximum amount of devices on each bus segment:	9 Bus segment means starting from the ekey net CV LAN. This way, it is possible to operate e.g. 1 ekey net CV LAN 4 ekey net FS (if u use "L" Fingerscanners or the setting "Servermatching" only 1 Fingerscanner 4 ekey net CP within one bus segment.
Protective circuit:	The RS485 driver stages of the ekey devices are equipped with <ul style="list-style-type: none">  ESD protection up to +-15kV  electric current limit and a thermal control against overcharge
Galvanic separation:	There is no galvanic separation between the RS485 components and the remaining circuit. For longer wiring distances, it is recommended to use separate power supplies for the sender and the receiver.
Cable types:	Refer to chapter 4.5
Cable lengths:	Maximum 500m; Resistor/termination according to the characteristic wave impedance of the cable (120E, 150E, 510E). Termination for cable lengths above 50m.

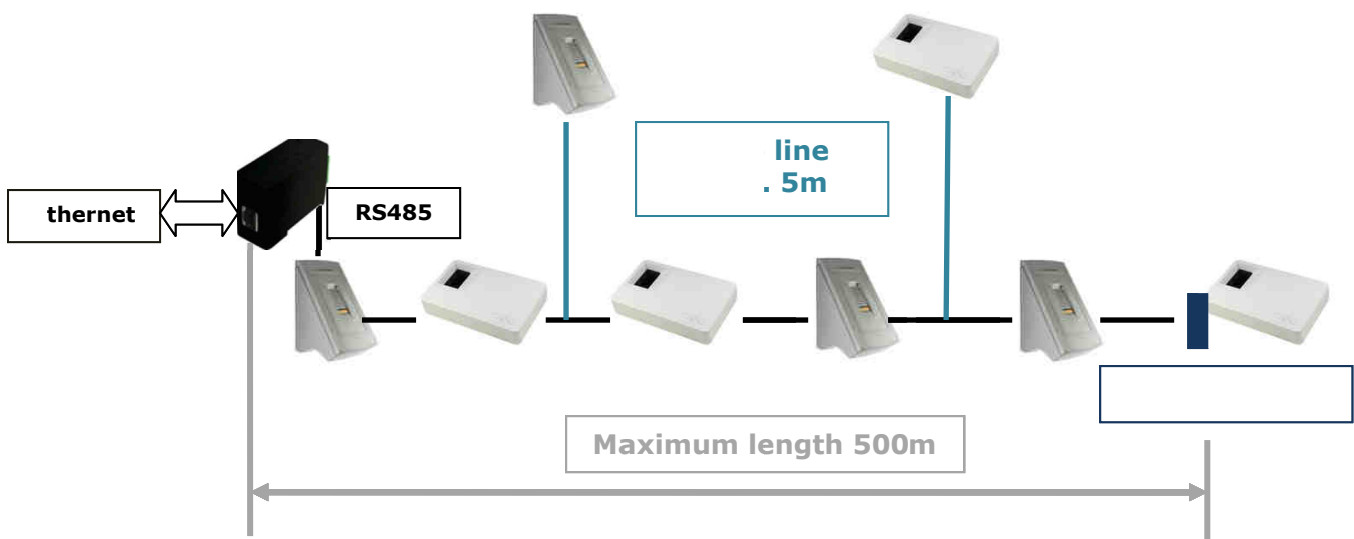
It is not possible to operate both Atmel finger scanners
(ekey net FS WM, ekey net FS IN)
and Authentec finger scanners
(ekey net FS OM, ekey net FS IN 2.0 and ekey net FS WM 2.0)
on the same BUS.

You can operate a maximum of 20 ekey CV LAN per "Terminalserver"

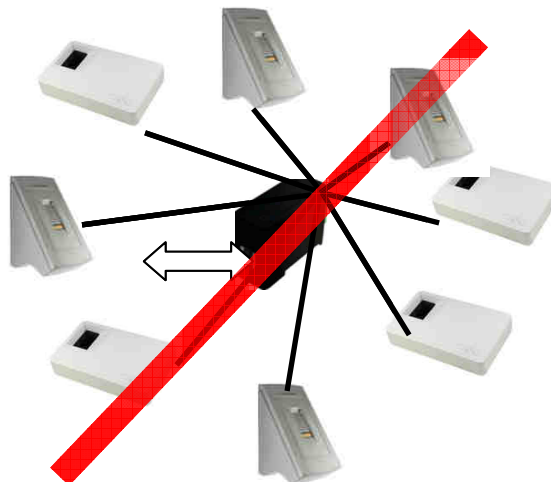
When using the server-matching operation mode of finger scanners, a dedicated CV LAN must be used for each finger scanner type M or L.

Topology:

- It is recommended to use a daisy chain bus connection.
- Within one ring at most 8 devices are to be connected to an ekey net CV LAN. The maximum wiring distance must not exceed 500m.
- Stub lines in daisy chain networks may not exceed a length of 5m.



A star-shaped bus may not be used.



<h2 style="text-align: center;">Planning aid for ekey net</h2> <p>The planning of the ekey net system must take the number of users and the required features into account.</p>			
<h3 style="text-align: center;">Finger scanner matching</h3> <p>The finger verification takes place in the finger scanner itself.</p> <p style="text-align: center;">To be selected</p> <p style="text-align: center;">for < 200 fingers in the system</p> <p style="text-align: center;">and when no time recording* is to be carried out.</p>	<p style="text-align: center;">CV LAN</p> <p style="text-align: center;">max. 20 CV LAN per terminal server PC</p>	<p style="text-align: center;">Control panels</p> <p style="text-align: center;">max. 4 control panels per CV LAN</p> <p>except for special solutions such as the Composite control panel (max. 7 control panels in this case)</p>	<p style="text-align: center;">Finger scanners</p> <p style="text-align: center;">max. 4 finger scanners</p> <p style="text-align: center;">SMALL/MEDIUM/LARGE</p> <p style="text-align: center;">per ekey CV LAN</p> <p style="text-align: center;">A mixed operation of „ATMEL“ and „AUTHENTEC“* finger scanners on the same ekey CV LAN is NOT possible.</p>
<h3 style="text-align: center;">Server matching</h3> <p>The finger verification takes place in the server.</p> <p style="text-align: center;">To be selected</p> <p style="text-align: center;">for > 200 fingers in the system</p> <p style="text-align: center;">and also for < 200 fingers if time recording* is to be carried out.</p>	<p style="text-align: center;">CV LAN</p> <p style="text-align: center;">max. 20 CV LAN per terminal server PC</p>	<p style="text-align: center;">Control panels</p> <p style="text-align: center;">max. 4 control panels per CV LAN</p> <p>except for special solutions such as the ekey Composite control panel (max. 7 control panels in this case)</p>	<p style="text-align: center;">Finger scanners</p> <p style="text-align: center;">max. 1 finger scanner</p> <p style="text-align: center;">MEDIUM/LARGE</p> <p style="text-align: center;">per ekey CV LAN</p> <p style="text-align: center;">A mixed operation of „ATMEL“ and „AUTHENTEC“* finger scanners on the same ekey CV LAN is NOT possible.</p>
<p>Definitions:</p> <p>Finger scanner matching and server matching are 2 different settings available in the ekey net software. Finger verifications should be carried out on the scanner when few users are registered in the system. When a lot of users are registered in the system, and also if other external recording methods are carried out, then the verification should take place in the server. All the entry records are saved in ekey net, no matter if finger scanner matching or server matching has been selected.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>*,„ATMEL“ finger scanners:</p> </div> <div style="text-align: center;"> <p>„AUTHENTEC“ finger scanners:</p> </div> </div>			

4.5 Recommended cable types for wiring ekey net components (RS485 bus)

4.5.1 Introduction

The cable recommendation applies to the connections between the ekey net FS, the ekey net CP and the ekey net CV LAN (RS485 bus and power supply).

It is recommended to use a 8-core, twisted pair stranded cable. Since it requires only 4 cores to wire the devices, two pairs will be left spare. It can later be used if a wire broke or for powering the devices over a greater distance.



Below listed cable types (J-Y(ST)Y and Unitronic J-2Y(ST)Y) can be placed together with all NI2XY, NYY, NYM types. If there is a risk to damage the bus line mechanically, it is strongly recommended to use protective cable pipes (electrical conduits).

4.5.2 Wiring ekey devices

There are 4 connector clamps, namely

- 1 RS485
- 2 RS485
- 3 9VAC
- 4 9VAC,

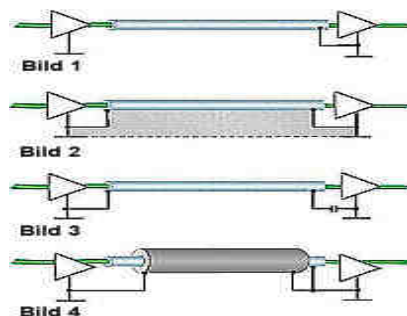
on ekey devices. When using below listed cables, it is important to wire the pins 1 and 2, as well as 3 and 4 via a core pair, i.e. for example

Core pair 1 ->	Core A ->	PIN 1 ->	RS485
	Core B ->	PIN 2 ->	RS485
Core pair 2 ->	Core A ->	PIN 3 ->	9VAC
	Core B ->	PIN 4 ->	9VAC

4.5.3 Shielding

The type of shielding depends primarily on the expected distortion. Based on the individual circumstances on the place of installation, the shielding has to be selected:

- No shielding on ground: in situations with little distortion and short cable lengths (<10m). e.g. residential homes.
- It will be necessary to use a single-sided grounding (picture 1) in order to suppress electrical fields.
- Distortions based on a magnetic field can only be suppressed via a double-sided shielding (picture 2). Negative influences caused by ground loops are to be avoided!



4.5.4 Core color coding

The color coding is in accordance with VDE0815, whereas the different LiY types (type A, B, C = cables used for the **ekey integra products**) are in accordance with DIN47000.



Since the color coding shown in the operation and installation manual is not in accordance with VDE0815, this has to be kept in mind when connecting the devices.

Color coding for J-Y(ST)Y ... LG internal cables

(pairs stranded in layers, to be counted outside in.)

a-core: 1. pair in each layer red,

Exception: The two-core installation cable is twisted-quad

all other pairs are white

b-core: blue, yellow, green, brown, black
in continuous repetition

Star 1 (pair 1): a-core red b-core black

Star 2 (pair 2): a-core white b-core yellow

4.5.5 Recommendation 1: for distances below 100m

Recommended cable type

J-Y(ST)Y 4 x 2 x 0,8mm LG internal cable

Installation cable compliant with VDE 0815



Manufacturer's recommended applications for this cable

Telephone internal cables transmit analog or digital signals and are designed for fixed installations. For example, the following connections can be realized in telecommunication engineering: telephone, fax, telex, all standard modems, intrusion detection systems, fire alarm system, entrance panels, access control systems, time attendance, plant information management systems.

Note



- For higher transmission frequencies, it is recommended to use UNITRONIC® J-2Y(ST)Y...ST III BD.



- Cable length of up to 100m (use a core pair for power supply above 50 meters).

Layout

Similar to J-YY...BD. However, (1) the wires are twisted into pairs, (2) there is a foil taping above the cable core as well as an aluminum-foil-laminated static shield including copper drain wire, (3) PVC cable coating, flame resistant according to DIN VDE 0472 part 804 test method B (IEC 60332.1), light grey (RAL7032).

The two-core versions are twisted quad!

Technical data

Minimum bending radius
10 x cable diameter

Temperature range:
Fixed wiring -30°C up to +70°C

Insulation resistance:
> 100MΩm x km
> 100MΩm x km

Loop resistance:
Copper conductor 0,6 mm:
max. 130 Ωm/km
Copper conductor 0,8 mm:
max. 73,2 Ωm/km

Operating capacity:
Copper conductor 0,6 mm:
max. 100 nF/km
Copper conductor 0,8 mm:
max. 100 nF/km

Coupling:
Copper conductor 0,6 mm:
(800 Hz): K1: 80% ≤ 300 pF/100m
Copper conductor 0,8 mm:
(800 Hz): K1: 80 % ≤ 300 pF / 100m

Peak operating voltage:
Copper conductor 0,6 mm:
(not suitable for high voltage):
300 V
Copper conductor 0,8 mm:
(not suitable for high voltage):
300 V

Test voltage:
A/A 800 V
A/S 800 V

Use/Application:
in dry or humid areas for fixed wiring, flush- or surface-mounted.

Line attenuation/Damping:
Copper conductor 0,6 mm:
1,7 dB/km
Copper conductor 0,8 mm:
1,1 dB/km

Cable diameter in mm²:
Copper conductor 0,6 mm:
0,28 mm²
Copper conductor 0,8 mm:
0,50 mm²

Lapp cables article list

Part number	Number of pairs	Number of twisted quads	Outer diameter in mm	Copper index kg/km	Weight kg/km
J-Y(ST)Y...LG copper conductor 0,6 mm					
1591 300	1	-	5,0	6,9	30
1591 301	2	1	5,5	13,0	40
1591 302	3	-	6,3	18,0	50
1591 303	4	-	6,8	24,0	60
1591 304	5	-	7,2	30,0	70
1591 305	6	-	7,5	35,0	80
1591 306	8	-	8,0	46,0	90
1591 307	10	-	9,0	58,0	110
1591 308	12	-	9,5	71,0	130
1591 309	14	-	10,0	82,0	145
1591 310	16	-	10,5	93,0	160
J-Y(ST)Y...LG copper conductor 0,8 mm					
1591 500	1	-	6,0	11,0	40
1591 501	2	1	7,0	21,0	60
1591 502	3	-	8,5	31,0	80
1591 503	4	-	9,0	41,0	100
1591 504	5	-	9,5	52,0	120
1591 505	6	-	10,5	62,0	140
1591 506	8	-	11,5	82,0	170
1591 507	10	-	13,0	102,0	220
1591 508	12	-	14,0	123,0	250
1591 509	14	-	14,5	144,0	280
1591 510	16	-	15,5	164,0	320

4.5.6 Recommendation 2: for distances above 100m

Recommended cable type

UNITRONIC® J-2Y(ST)Y 4 x 2 x 0,8 ST III BD

The polyethylene isolated installation cable – for fast data transmission



Manufacturer's recommended applications for this cable

UNITRONIC® J-2Y(ST)Y...ST III BD is a twisted quad installation cable used for data transfer rates of up to 16MBit/s due to the PE wire isolation. Typical application areas include connecting IT system units, air field light or ISDN substations. Also, they are used for access control systems, time attendance, industrial electronics or burglar alarm systems. Suitable for dry or humid areas for flush- or surface-mounted installation.

Note



The cable diameter will be too small, and the voltage drop will be subsequently too big! Therefore, a dedicated cable with a larger cable diameter has to be used for powering the device (clamp 3, 4). Respectively, the power supply must be secured directly at the unit.

Layout

Single wired, bare copper conductor (solid wire), core insulation polyethylene, core identification according to VDE color code VDE 0815 for indoor telephone cables, foil taping, aluminum-foil-laminated static shield including copper drain wire, PVC cable coating, flame resistant according to DIN VDE 0482, part 265-2-1/IEC 60332-1 (equivalent to DIN VDE 0472 part 804 test method B), light grey (RAL7032).

Three- and four-core version = layer-stranded.

Technical data

Minimum bending radius: Fixed wiring: 10 x cable diameter	Temperature range: Fixed wiring: -40 °C up to +70 °C	Insulation resistance: > 5 GOhm x km	Loop resistance: Max. 130 Ohm/km
Operating capacity: (800 Hz) max. 52 nF/km	Characteristic impedance: 100 Ohm +/- 15 %	Coupling: K1: 98 % < 400 pF/300 m K9-12: 98 % < 100 pF/300 m	Near crosstalk attenuation: 4-16 MHz: >2-core >= 45 dB 4-16 MHz: >2-core >= 20 dB
Peak operating voltage: (not suitable for high voltage): 300 V	Test voltage: A/A 800 V A/S 2000 V	In regards to : VDE regulation: VDE 0815/0816	Line attenuation/Damping: At 16 MHz < 8 dB/100m

LAPP cables article list

Part number	Number of pairs and cable diameter mm	Outer diameter in mm	Copper index kg/km	Weight kg/km
J-2Y(ST)Y...ST III BD				
0034 171	2 x 2 x 0,6	5,5	13,0	40
0034 172	3 x 2 x 0,6	6,5	18,0	50
0034 173	4 x 2 x 0,6	7,5	24,0	60
0034 175	8 x 2 x 0,6	8,5	46,0	90
0034 176	10 x 2 x 0,6	9,5	58,0	148
0034 178	20 x 2 x 0,6	13,5	116,0	190
3001 7810	50 x 2 x 0,6	18,0	288,0	190
0034 181	80 x 2 x 0,6	22,5	455,0	640
3001 7811	100 x 2 x 0,6	25,8	570,0	640