

KABA®



B-Net® 91 04

Manual

12/2008

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Kaba GmbH

Albertstraße 3

D-78056 Villingen-Schwenningen

Phone +49 7720/603-0

Fax +49 7720/603-102

info@kbs.kaba.com

www.kaba.com/workforce-management

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Order no. 04038521

1	About this Manual	5
2	Safety Regulations	6
2.1	Use as directed.....	6
2.2	General Remarks.....	6
2.3	Installation Instructions	6
2.4	ESD (Electro Static Discharge) Protective Measures	7
3	Product Description	8
3.1	Technical data	9
3.2	Conformity	10
3.3	Labeling	10
4	Design and Function	11
4.1	Models / Delivery volume.....	11
4.2	Input possibilities	12
4.3	Hardware equipment	12
4.3.1	LED.....	12
4.3.2	Acoustic signal generator	12
4.3.3	Digital outputs.....	12
4.4	Operating Modes	13
4.4.1	Online mode.....	13
4.4.2	Stand-alone operation	13
5	Mounting and Installation	14
5.1	Installation Conditions.....	14
5.2	Installation Diagram	16
5.3	Installation Lines	18
5.4	Mounting	19
5.5	Installation of devices with connecting cable.....	20
5.6	Installation of devices with connecting panel.....	20
5.7	Pin assignment	21
5.8	Description of connections.....	22
5.8.1	Power Supply	22
5.8.2	Relay output	22
5.8.3	Data interface to access control unit (subpartyline)	22
5.9	DIP-Switch	23
5.9.1	Required DIP switch settings in different operating modes	24
5.10	Final assembly.....	25
6	Start-Up	26
6.1	Online mode	27
6.1	Stand-alone operation	28
6.2	Cold start.....	29
6.3	Status LED.....	29
6.4	Adjusting the reader.....	30
7	System mode	31
7.1	Commands	32
7.1.1	SETHWC.....	33
7.1.2	GETHWC	36
7.1.3	GETPRG	37
7.1.4	LOWPAR.....	38

7.1.5	RUN.....	40
7.1.6	ORIGIN.....	40
7.1.7	GETDGN.....	41
7.1.8	RSTDGN.....	41
8	Description of the Subpartyline.....	42
8.1	BPA Subset.....	42
8.2	Addressing.....	42
8.3	Control Characters and Control Sequences.....	43
8.4	Data Records.....	43
8.5	Data from Subterminal to Control Unit.....	44
8.6	Data from the Control Unit to the Subterminal.....	45
8.7	Escape sequences.....	46
8.7.1	Controlling LED, relay and beeper.....	46
8.7.2	Reset.....	46
8.7.3	Device configuration.....	47
8.7.4	Program number.....	47
8.7.5	Recorded data.....	48
8.7.6	Hex Representation of the Recorded Data.....	48
8.7.7	Acoustic acknowledgement for reading.....	48
8.7.8	Customer number list.....	49
8.7.9	Control stand-alone operation.....	51
8.8	ASCII Table.....	52
9	Packaging / Returns.....	53
9.1	Complete Devices.....	53
9.2	Electronic Assemblies.....	53
9.3	Labeling.....	54
10	Disposal.....	55
11	Index.....	56

1 About this Manual

Validity	This manual describes the Kaba B-Net 91 04 subterminal as of Serial number: 072114- 000100 Creation date: November 2008
Addressees	The manual addresses specialists for mounting, installation, set-up, service, and maintenance of the device. The descriptions in this manual are intended for trained personnel. The information in this manual cannot substitute a product training.
Contents and purpose	The contents are limited to the assembly, installation, set-up, and basic operation of the hardware.
Orientation in the manual	This manual contains the following orientation guide to find specific topics more easily: <ul style="list-style-type: none">• The table of contents at the beginning of the manual gives an overview of all topics.• The header always contains the respective main chapter.• An index in alphabetical order is at the end of the manual.
Remarks with symbols	Please pay special attention to the remarks that are marked with symbols. The symbols used in this manual have the following meaning:
	NOTICE! Important information for a proper handling of the product. Ignoring this information can cause device malfunction.
	Remark Tips and useful information. This information will help you to best use the product and its functionality.

2 Safety Regulations

2.1 Use as directed

The device or system is only intended for usage as described in chapter "Product Description".

Any use beyond the designated use is not according to rules. The manufacturer is not responsible for damages resulting from improper use. The user/operator is responsible for any risks associated with non-duly use.

2.2 General Remarks

Removal of malfunctions and maintenance may only be performed by skilled technical specialists.

Only specialists authorized by the manufacturer may carry out reconstruction and modification.

All reconstructions and modifications carried out by unauthorized personnel shall render void any liability.

2.3 Installation Instructions

Only trained personnel may carry out mounting and installation.

Kaba GmbH is not liable for damages resulting from improper handling or incorrect installation.



NOTICE!

The relay is designed for 30 V AC / DC and 1 A maximum.

For device safety reasons 120 / 230 V may not be switched with this relay.

Installation may only be carried out in places that fulfill climatic and technical conditions stated by the manufacturer.

2.4 ESD (Electro Static Discharge) Protective Measures



CAUTION

Danger for electronic components due to electrostatic discharge.

Improper handling of printed circuit boards or components can cause damages that lead to complete failures or sporadic errors.

During installation and repair of the device, the ESD protective measures must be considered.

Please consider the following guidelines before the installation or maintenance of the device:

- Always carry an ESD antistatic wristband when dealing with electronic components. Connect one part of the wristband with a discharge socket or an unvarnished grounded metal component. This way, static charges are discharged from your body securely and effectively.
- Only touch the printed circuit boards at the edges. Do not touch the printed circuit board itself or the connector.
- Place all dismantled components on an anti-static surface or in an anti-static container.
- Avoid contact between printed circuit boards and your clothing. The wristband only protects the printed circuit boards against electrostatic discharge from the body, but there is still a risk of damage through electrostatic discharge from your clothing.
- Only transport and dispatch dismantled modules in protective bags.

3 Product Description



Fig. 1: Subterminal B-Net 91 04, colors anthracite and grey aluminum

B-Net 91 04 is a subterminal to be used for access control. It is compatible with the terminal series Bedas / Bedanet 90 00.

The reader is in a sealed plastic housing and also designed for use under rough environmental conditions. Its compact design allows for installation on door frames or similar surfaces.

The following operating modes are possible:

- **Online mode**
The B-Net 91 04 is connected to a higher-level control system, for example an access manager or a terminal of the B-Net series, by means of the RS-485 sub-party line.
- **Stand-alone operation without control**

The B-Net 91 04 subterminal includes the LEGIC® contact-free identification medium. The reader is equipped with LEGIC® advant-RFID technology. LEGIC® data carriers can be read. Writing data on the LEGIC® medium also is possible.

B-Net 91 04 has a relay which can be used for door opening in secured areas.

The subterminal has a multi-color LED and a beeper for optical and acoustic user guidance.

3.1 Technical data

Power supply

- Operating voltage: 12 – 32 V DC / 16 – 27 V AC
- Current consumption: max. 150 mA at 24 V

Interface

- RS-485 2-wire subpartyline
Protocol: BPA9; transmission parameters: 9600/19200 baud, 7 data bits, parity even, 1 stop bit
Other settings via system mode are possible.

Output

- 1 relay output, contact load 30 V AC/DC, max. 1 A

Readers

- LEGIC® reader
Reading and writing of LEGIC® media.

Data retention in case of power failure

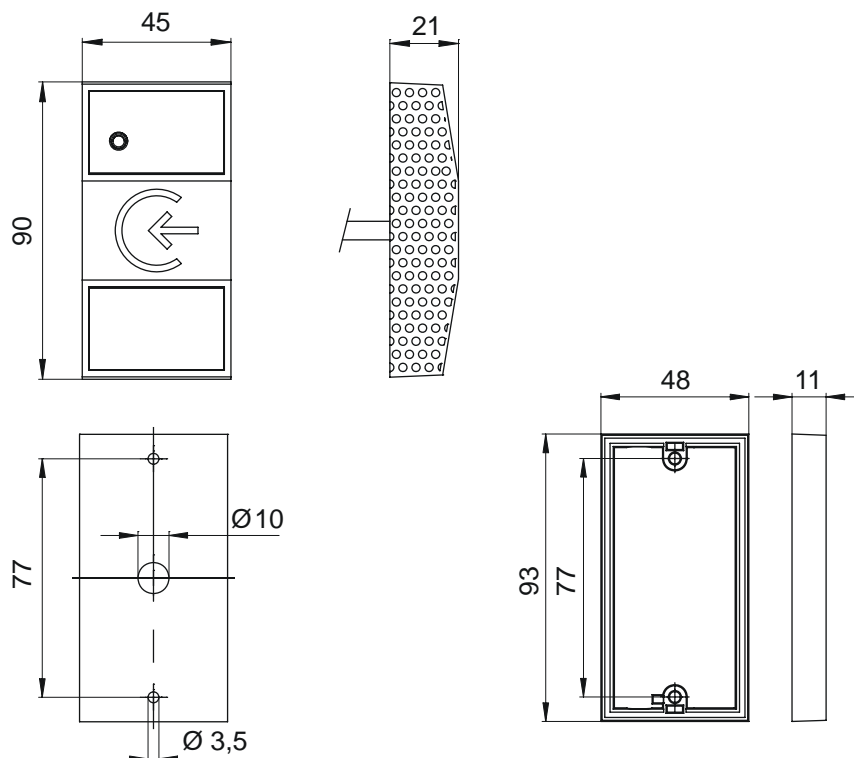
- Modified parameters, list of badges, etc. are stored in non-volatile memory (EEPROM) and are retained when a power failure occurs.

Environmental conditions

- Protection class according to IEC 60529: IP66 with connecting cable
IP54 with terminal board
- Environmental temperature: - 25° C - + 55° C
Environmental class: 4
- National Electrical Manufacturers Association (NEMA) 4

Dimensions

Dimensions in mm



3.2 Conformity



This device complies with the standards

EN 60950-1 2003

EN 301 489-3 V1.4.1

EN 300 330-2 V1.1.1

according to the regulations of the EU Directives

1999/5/EC R&TTE Directive



To the best of our knowledge, this device does not contain any substances in concentration or application, whose introduction in products is permitted according to the requirements of the **2002/95/EC** directive released by the European Union ("**RoHS**" = **R**estriction of **H**azardous **S**ubstances).

3.3 Labeling

The identification plate is located on the rear of the device.

Specified on the identification plate:

- Device name
- Product number
- Serial number
- Power data
- CE identification
- WEEE specification according to DIN EN 50419, please refer to chapter 10

4 Design and Function

4.1 Models / Delivery volume

The device can be delivered in two versions:

- With 3.5 mm connecting cable (standard)
- With terminal board without connecting cable (optional)

The connecting frame provides additional room for cable storage, if needed, and possesses a predefined location of rupture for cable outlet for surface mounting. The connecting frame is always part of the delivery.

In addition, the delivery comprises a bag with installation accessories, consisting of a 6 cm insulating tube and 9 butt connectors for extending the connecting cable.

Upper and lower front panel (cover) are attached unpacked.

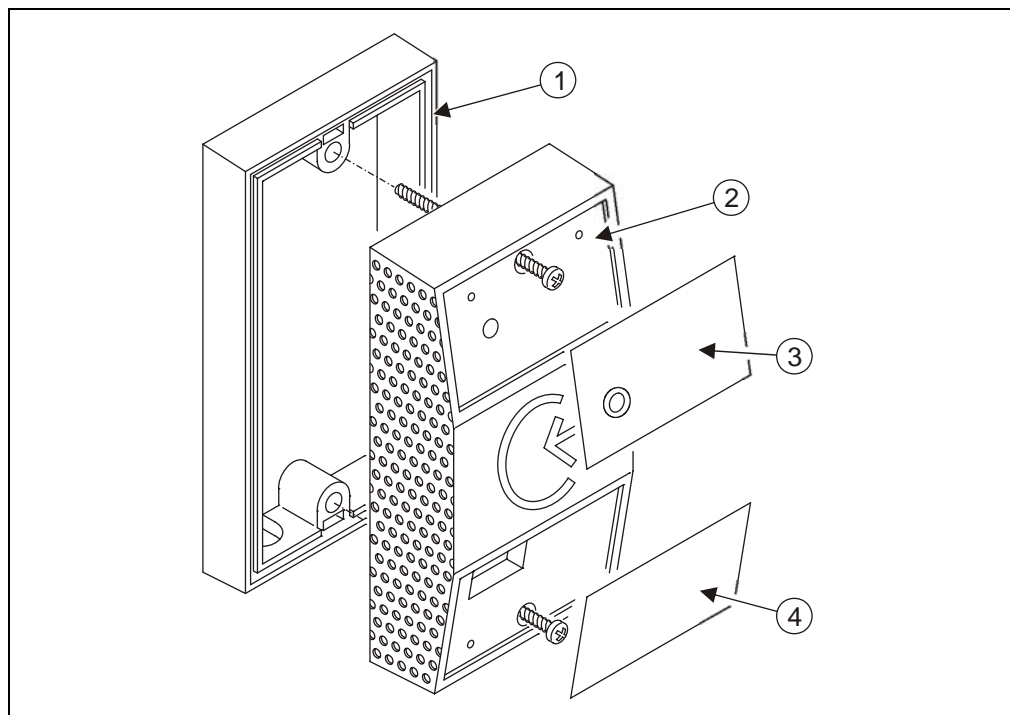


Fig. 2: Parts view

- | | |
|---|-------------------|
| 1 | Terminal frame |
| 2 | B-Net 91 04 |
| 3 | Upper front panel |
| 4 | Lower front panel |



NOTICE!

Please stick on front plates after setting into operation and test of function.

4.2 Input possibilities

LEGIC® media, such as badges, key tags, smartkeys, etc., can be read. The LEGIC® medium is positioned in front of the subterminal.

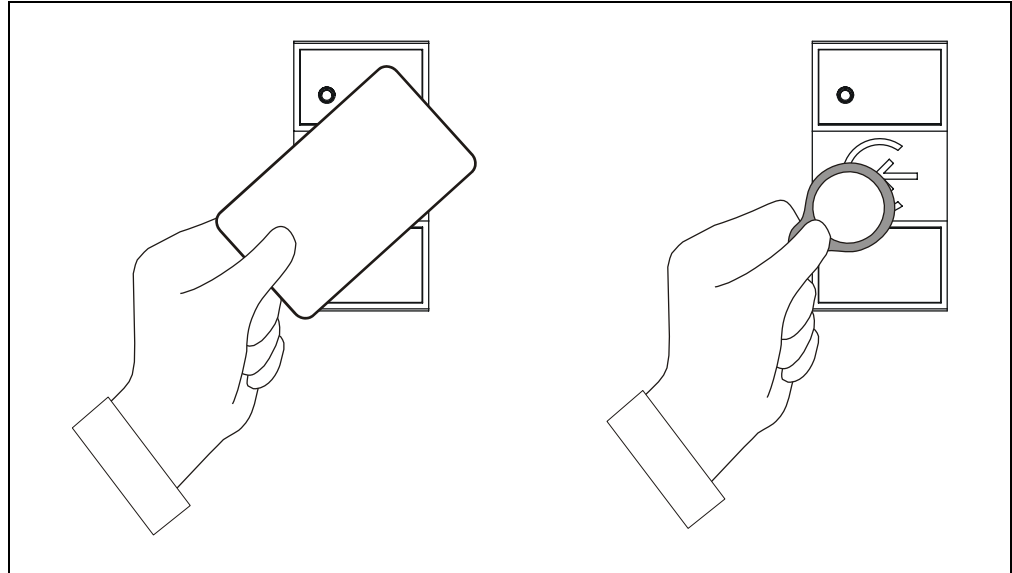


Fig. 3: Entry of LEGIC® media

The reading distance depends on the environmental conditions and the type of LEGIC®.

- The range of a LEGIC® badge is 5 cm.
- The range of a LEGIC® key tag is approx. 2.5 cm.

4.3 Hardware equipment

4.3.1 LED

For optical user guidance, the subterminal is equipped with a two-color LED (red and green).

The LED is directly activated by B-Net 91 04 depending on the operating mode or by corresponding commands from the control unit.

4.3.2 Acoustic signal generator

The subterminal has a beeper for acoustically signaling certain states. The beeper is directly activated by B-Net 91 04 depending on the operating mode or by corresponding commands from the control unit.

4.3.3 Digital outputs

The B-Net 91 04 has one relay. The name of the relay is R1.

In stand-alone mode, this relay is used for the door opener.

In online operation, the relay may be activated by the corresponding commands from the access control unit, e.g. door opening in secured areas.

4.4 Operating Modes

4.4.1 Online mode

In online operation, the device works as **subterminal** of an access control.

The device can be connected to access control units of the device families Bedas, Bedanet and B-Net, such as B-Net 92 50, Bedanet 92 90, or a time recording terminal of the B-Net series.

One or several subterminals are connected to the control unit by means of the RS-485 subpartyline. The subterminal is operated in the **polling mode**. The control unit polls the connected subterminals one after the other in order to send or receive data.

If a badge is presented, the badge data is sent to the control unit. The control unit decides whether a badge is authorized or not and sends the respective commands for LED, beeper and relay back to the subterminal. The internal relay should only be used in secure areas for opening a door. Therefore, the control unit generally controls and opens the door.



Remark

On delivery, online operation is preset in the subterminal.

4.4.2 Stand-alone operation



NOTICE!

Stand-alone operation may only be used together with LEGIC® prime media (media with existing data structure).

In stand-alone operation, the device works independently without connected control unit. A customer number list stored in the device allows for the verification check of every booking. LED, beeper and relay are activated accordingly.

A service PC and a parameter setting tool are required for set-up. The customer number list is transmitted via the RS-485 subpartyline. After activating the stand-alone operation, the service PC is removed again.

A customer number list can contain up to 5 entries. One individual entry may be a customer number or a complete badge number. If, for examples, the authorization is given to all employees of a company, the customer number must be stored. If the authorization is given to individual employees, the complete badge number (customer number + ID) must be stored.

The green LED is lighted during operation. When a badge is presented, the badge data is read and checked. If the verification is positive, the relay is activated for 3 seconds (default). A successful booking is confirmed by means of a 1-second acoustic signal. After an invalid booking, the red LED and the beeper are activated alternately for 3 seconds.

5 Mounting and Installation

5.1 Installation Conditions

General An accurate installation of all components is a basic requirement for proper functioning. The following installation instructions must be adhered to.

Installation site The device can be mounted either directly on the wall or on a door frame.

For cable outlet, a drilling of approx. 10 mm diameter is required. An edge which might be produced must be trimmed.

A screw guide is positioned in the middle of the housing's top and bottom. Use only the screws included in the delivery for fastening the device.

Connectors The following connectors must be prearranged at the installation site of the device.

- Power supply
- Data line for access control unit (online operation only)
- Cables to the door opener (if required)

Grounding The terminal must be grounded!

To guarantee the highest possible noise immunity according to EMC, the ground wire must be led to the terminal and connected.

Mounting height

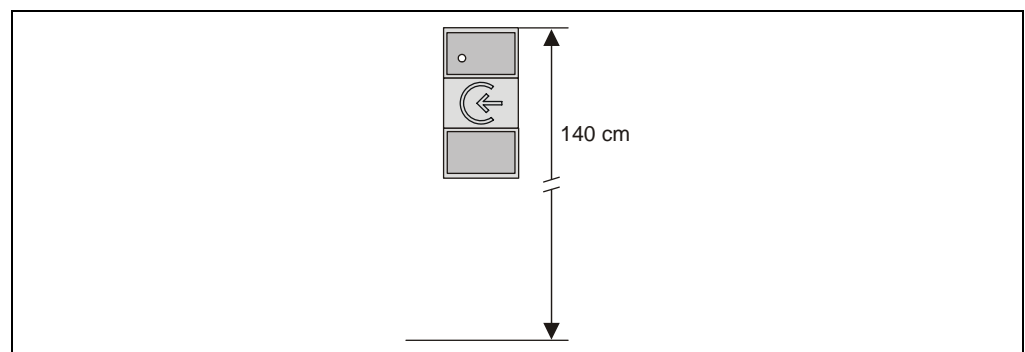


Fig. 4: Recommended mounting height 140 cm to top edge of terminal.

Electromagnetic fields The terminal must not be installed in the area of strong electromagnetic fields, caused by e.g. switching power supply, power lines, phase controllers, etc.!

Electromagnetic fields can affect the reading power or cause failures, in particular with contact-free readers (LEGIC, Mifare).

Clearances Between two B-Net 91 04 devices, a distance of 20 cm must be observed on all sides.

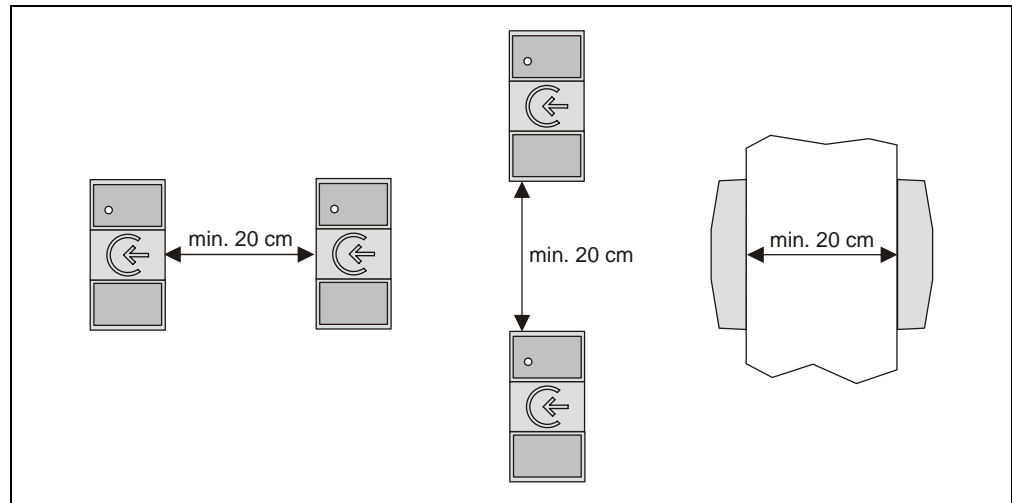


Fig. 5: Minimum distance between devices with LEGIC® readers.

To steel parts, a distance of 10 cm must be observed on all sides. If this distance is not observed, the reading quality is impaired. Then, the maximum reading distance is not achieved. Problems may appear with different LEGIC® media.

The terminals frame included in the delivery must be used for mounting the device on metal surfaces.

The terminal frame increases the distance between reader and metal surface thus reducing damping by the metal.

5.2 Installation Diagram

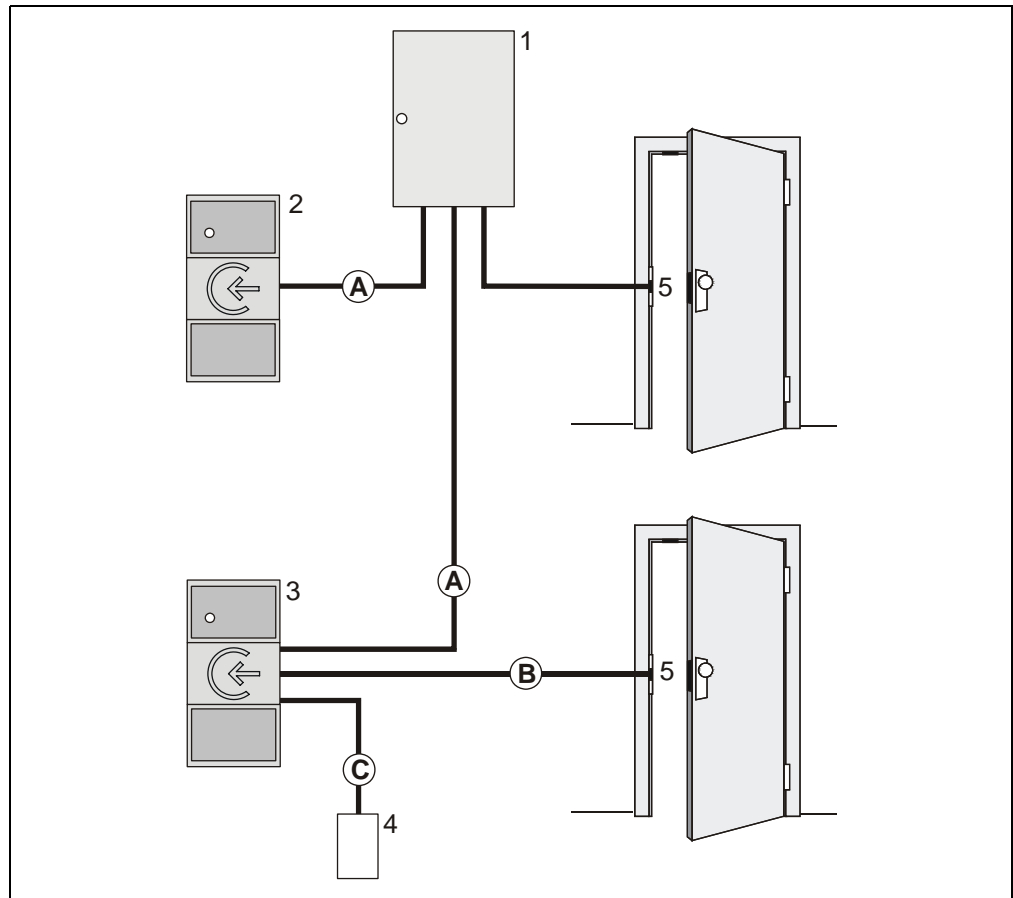


Fig. 6: B-Net 91 04 installation in online operation

1 Access Control Unit

2 B-Net 91 04

Power is supplied via the access control unit. The power supply is also led through the data line (A). This is permitted for cable lengths up to 20 m.

The door opener is led to the access control unit.

3 Subterminal B-Net 91 04 with separate power supply (4).

The door opener is connected to the subterminal. This is only recommended, however, in secure areas.

4 Power supply SV 100, SV 900 or SV 905 with supply for door opener

5 Door opener

Installation Lines

A Data line (subpartyline)

B Line to door opener

C Power supply and grounding

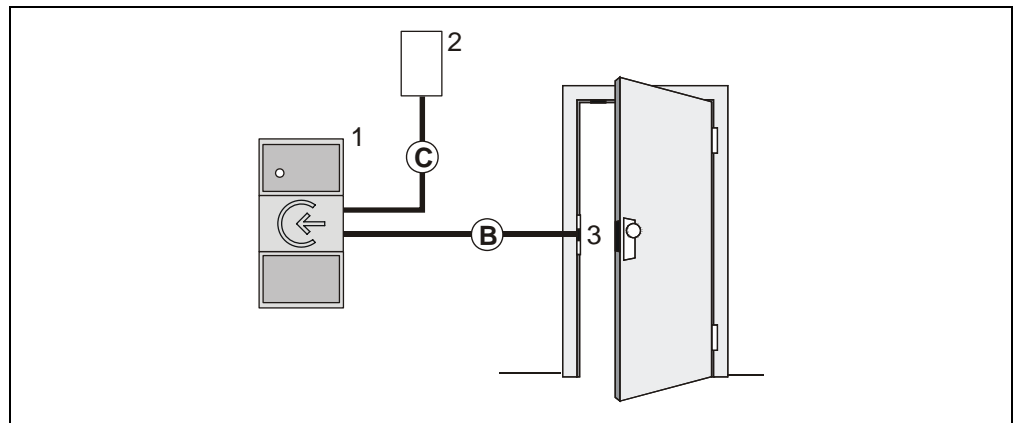


Fig. 7: B-Net 91 04 installation in stand-alone operation

- 1 Subterminal B-Net 91 04
- 2 Power supply SV 100, SV 900 or SV 905 with supply for door opener
- 3 Door opener

Installation Lines

- B Line to door opener
C Power supply and grounding

5.3 Installation Lines

(A) Data line to subterminal

The subterminals are connected to the control unit via a 2-wire subpartyline. It can be designed in star-shape or as partyline.



NOTICE!

The shielding of the data line is generally connected on both sides.

The complete bus connection (master lines and branch lines) may be up to 2,000 meters long. One branch line may not exceed 100 m.

For short distances (up to 20 meters max.), it is permitted to have the operating voltage for the subterminal and the data line in one single cable. In this case, the subterminal is grounded via the shield of the data line.

For line lengths over 20 m, a separate power supply cable (C) must be provided for the subterminal.

Line requirements:

Shielded line with twisted wire pairs,
cable diameter 0.4 mm to 0.6 mm
for instance standard telephone cable J-Y (St) Y 2 x 2 x 0.6 mm.

Recommended cable:

CAT.5 S-UTP 4 x 2 AWG 24 or AWG 22 (according to EIA/TIA568).

(B) Line to the door opener

Line requirements:

Cables with a cable diameter from 0.5 mm to 0.8 mm can be used.

Recommended cable:

CAT.5 S-UTP 4 x 2 AWG 24 or AWG 22 (according to EIA/TIA568) or higher.

(C) Power supply and grounding

In online operation, power is supplied by the superior control unit and can be tapped easily from there.

If the device is used without control unit or if power cannot be supplied by the control unit, a separate supply unit, e.g. SV 100, SV 900, SV 905, must be used.

In case of long lines, the voltage drop - caused by the line resistance - must be considered.

The ground wire must be led from the power supply to the terminal.

Cables with a cable diameter from 0.5 mm to 0.8 mm can be used.

Three wires are required for power supply + ground (SV 100 / SV 900).
If door-opener voltage is required, two further wires are needed (SV905).

5.4 Mounting

The device can be mounted either directly on the wall or on a door frame. The terminal frame included in the delivery must be used for mounting the device on metal surfaces.

For cable outlet, a drilling of approx. 10 mm diameter is required. A possible edge must be trimmed.

A screw guide is positioned in the middle of the housing's top and bottom.

In order to avoid danger of concealed or hidden cracks and tightness problems at the screw head, this device may only be mounted with the original screws included in delivery.

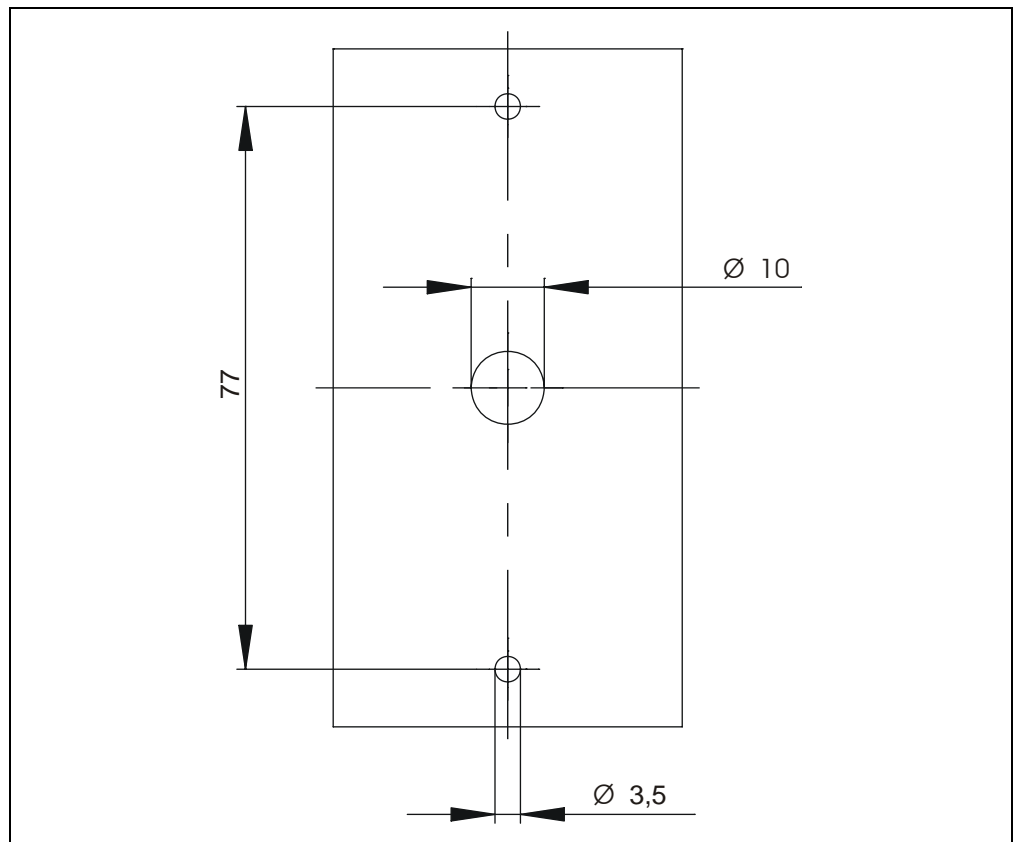


Fig. 8: Hole pattern for B-Net 91 04; dimensions in mm

5.5 Installation of devices with connecting cable

For the prolongation of the cable tail or for the link to an already mounted data cable, appropriate butt connectors are attached.

Possible wire and/or stranded wire dimensions are AWG 26-22 (D:0,4-0,65, A:0,13-0,36) The butt connectors must be fastened offset on the cable to allow introducing the connecting position into an empty tube or through a bore hole into the door frame. In case the butt connectors cannot be used, the attached connecting frame can be used as place for cable joint and/or cable storage room. The different stranded wires in the cable tail have different colors.

The butt connectors can be joined with the stranded wires with a standard crimping plier.

5.6 Installation of devices with connecting panel

As an option, the B-Net 91 04 terminal can be delivered with a connecting panel. The terminal board is located on the back side of the device.

The connecting clamps can be drawn from the connecting panel in order to render the connecting procedure easier.

The connecting panel is available as spare part. Owing to its double plug configuration, it can even be used if the subterminal was delivered with cable tail, for instance, if the cross section of the installed cable does not match with the butt connectors.

The connecting panel is labeled with the corresponding seizure of the clamps.

During discharge of tensile load, the shield can be directly laid up.

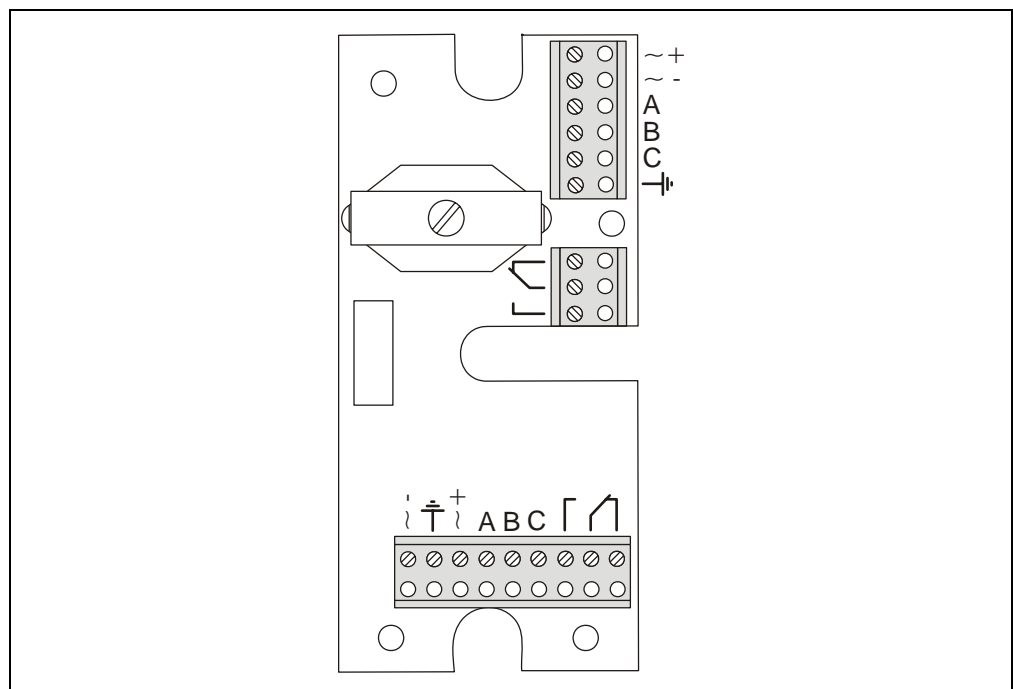


Fig. 9: Terminal board

5.7 Pin assignment

The following table shows designations and assignments of clamps with regard to wire colors.

Color	Description	Data
Power Supply		
red	AC/DC + or +	12-32 V DC or 16-27 V AC Power consumption max. 150 mA at 24 V
Gray	Ground \perp	
blue	AC/DC + or +	
Relay		
yellow	Opener (NC)	Contact loading capacity: 30 V AC/DC; 1 A max.
green	Center contact (COM)	
orange	Closer (NO)	
Subpartyline		
brown	A	
violet	B	
black	C	



NOTICE!

On principle, all connections have to be performed in off-circuit state.

5.8 Description of connections

5.8.1 Power Supply

The B-Net 91 04 subterminal can either be operated at 12 V DC or 24 V AC/DC. The current consumption with 24 V is 150 mA at maximum.

5.8.2 Relay output

The function of the R1 relay is defined by the access control unit in online mode. In stand-alone mode, the relay is used for the control of the door opener.

For door openers, which are supplied with direct current, a freewheeling diode must be connected in parallel to suppress interference (in reverse-bias direction). A varistor must be connected in parallel to AC door openers.

5.8.3 Data interface to access control unit (subpartyline)

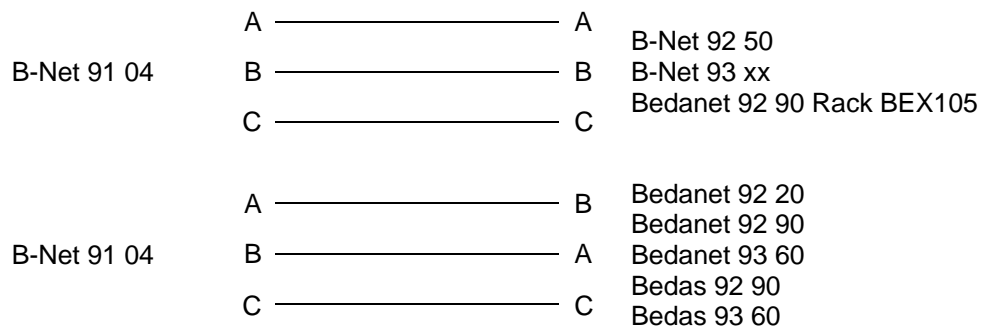
The access control unit is connected via a 2-wire subpartyline. The subpartyline is an RS485 bus operated in 2-wire technology.

The shielding of the data line is generally connected on both sides.



NOTICE!

Please pay attention to the correct pin assignment of the different control units.



5.9 DIP-Switch

The DIP switch row is located under the lower front panel. Therefore, the switches must be adjusted before fixing the front panel.



Remark

All switches are set to ON when delivered.

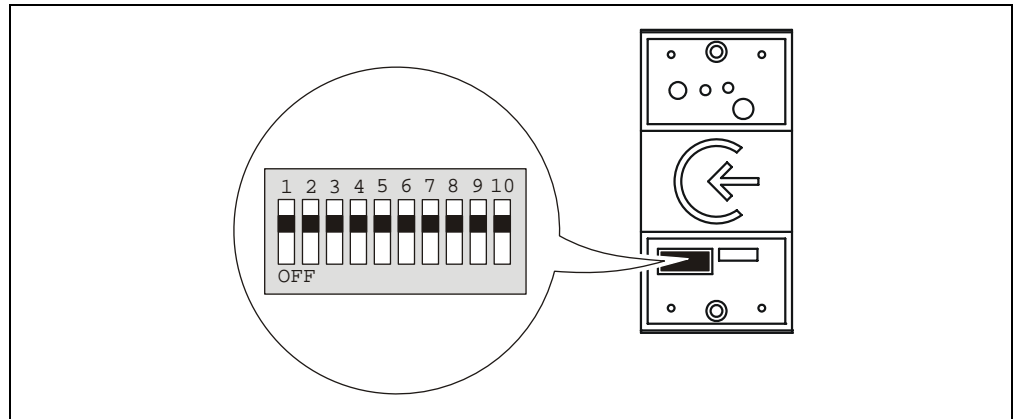


Fig. 10: DIP switch position

GID/DID

The group and device identifications (GID/DID) serve for addressing a subterminal via the RS-485 interface. This setting is required if the device is used as a subterminal in an access control unit.

Switch	1	2	3	4	Logical device address (DID)
	on	on	on	on	00
	off	on	on	on	01
	on	off	on	on	01
	off	off	on	on	03
	on	on	off	on	04
	off	on	off	on	05
	on	off	off	on	06
	off	off	off	on	07
	on	on	on	off	08
	off	on	on	off	09
	on	off	on	off	10
	off	off	on	off	11
	on	on	off	off	12
	off	on	off	off	13
	on	off	off	off	14
	off	off	off	off	15

Switch	5	6	7	Logical group address (GID)
	on	on	on	00
	off	on	on	01
	on	off	on	01
	off	off	on	03
	on	on	off	04
	off	on	off	05
	on	off	off	06
	off	off	off	07

Baud Rate The baud rate of the RS-485 subpartyline can be set by means of switch 8. The remaining transmission parameters are fix. 7 data bits, even parity, 1 stop bit, response control 3 seconds, operation monitoring 3.5 seconds

Switch	8	Baud Rate
	on	19200 (standard)
	off	9600

BPA/9 protocol The BPA/9 protocol can be switched off by means of switch 9.

Switch	9	BPA/9 protocol
	on	BPA/9 protocol (standard)
	off	no protocol

DIP switch All DIP switches can be deactivated by means of switch 10. The parameters are set in the system mode (see chapter 7) by means of the "LOWPAR" command.

Switch	10	DIP switch
	on	ON (standard)
	off	Off

5.9.1 Required DIP switch settings in different operating modes

Online mode:

Switch	1	2	3	4	5	6	7	8	9	10
	Device address				Group address			on	on	on

Stand-alone operation

Switch	1	2	3	4	5	6	7	8	9	10
	Device address				Group address			on	on	on

5.10 Final assembly



Fasten the front foils for finishing installation.

NOTICE!

Before fixing the front foils, the device must be put into service, see chapter 6.

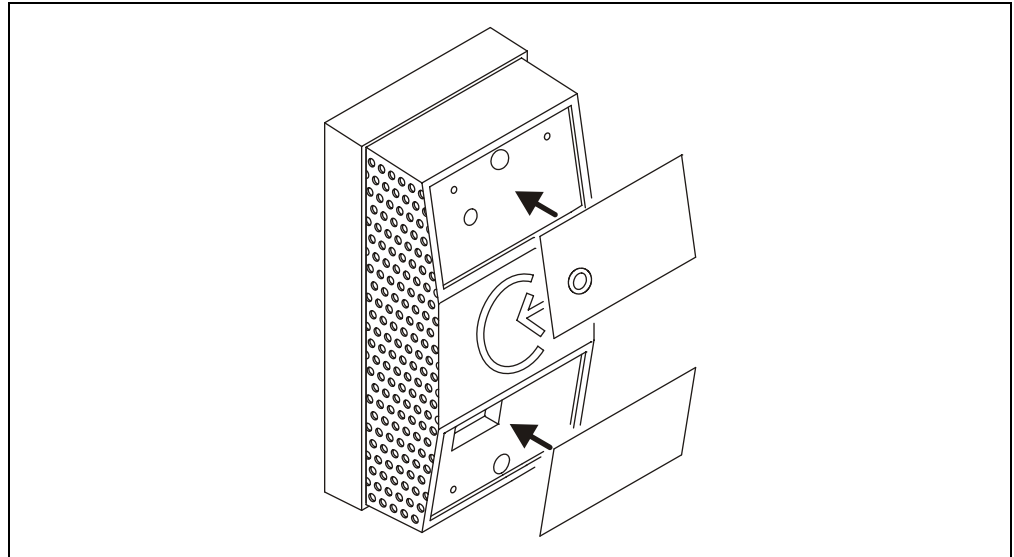


Fig. 11: Fixing the front foils



NOTICE!

Observe the following to avoid leaks:

- Use only new front foils with undamaged peel-off foil.
- The housing surfaces on which the foil is to be fixed must be dry, fat-free and clean. For cleaning purposes use solvents free of any oily or greasy substances such as n-Heptan or isopropyl alcohol.
- Press the foil down to fix it.
- The ambient temperature must be minimum +4°C.

The ambient temperature must be at least + 4°C. If the minimum processing temperature is not of + 4°C, or if you expect the temperature to drop below this value within the next 3 hours after bonding, do not mount the subterminal.

6 Start-Up



NOTICE!

The descriptions in chapter Set-up refer to devices with standard configuration preset in the factory.

By default, the driver "LEGIC® prime read-only" is active. This driver is compatible to the Bedas/Bedanet series, i.e. media with previous data structure can be read. The stand-alone mode is only possible with standard configuration.

Other drivers can be configured in system mode, see chapter 7. These include "LEGIC® prime read and write" or "LEGIC® advant read and write".

In this case, make sure that the access control unit supports these drivers in the online mode.



Remark

As a standard, only those badges are accepted which have a segment containing SSC 02 and a fixed structure of the badge data according to Kaba group header. Non-segmented badges may have an arbitrary SSC, but must also be coded according to Kaba group header.

It is also possible to allow badges having a different SSC and a different data field structure if defined so in the "Customer Number List".

The customer number list can be set by the control (see chapter 8.7.8) or a service PC with parameter setting tool (see chapter 6.1).

6.1 Online mode

Requirements

- A connection to the access control unit must exist.
- The DIP switches must have been set in accordance with the description in chapter 5.9.

Set-up procedure

1. Provide the subterminal with power.
2. Start up the subterminal at the control unit (see the Control Unit Manual).
3. Perform a functional test.

6.1 Stand-alone operation

Requirements

- The connections to power supply and door opener must exist.
- The DIP switches must have been set in accordance with the description in chapter 5.9.
- A service PC and the parameter setting tool, order number 04036126, must be available. In the service PC, the program "List Editor" (listedit.exe) must have been installed. This program is part of the parameter setting tool.

Set-up procedure

1. Connect the service PC via the parameter setting tool to the B-Net 91 04. Use the yellow connecting cable for connecting B-Net 91 04 to the parameter setting tool.

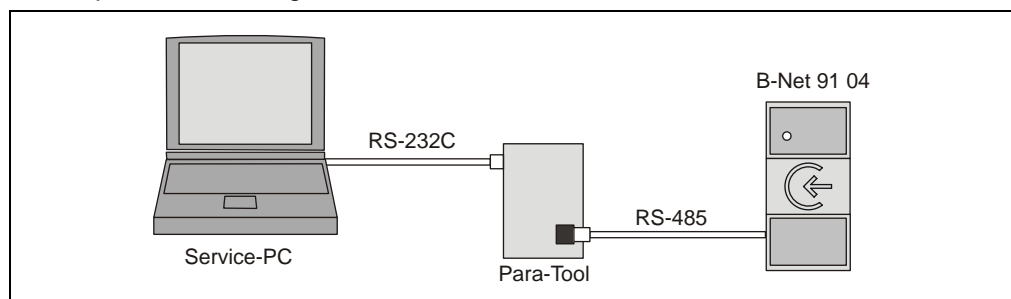


Fig. 12: Connecting the service PC to B-Net 91 04

2. Provide the parameter setting tool with power (B-Net 91 04 is also supplied with power).
3. Start the "List Editor" on the service PC.
In the Options menu, the COM port must have been selected and the device address used of the B-Net 91 04 must have been set.
4. Prepare the desired customer number list and load it to the subterminal.
If a list entry contains 14 digits of customer and badge number in accordance with the Kaba group header, a single badge will be authorized.
If a list entry contains, for example, only an 8-digit customer number in accordance with the Kaba group header, a badge group will be authorized.
5. Activate the stand-alone operation and enter the relay pull-in time (default 3 seconds).
6. Perform a functional test.
7. Service PC and parameter setting tool are no longer required and can be removed.



Remark

The operation of the List Editor is described in the manual of the parameter setting tool.

The description of the customer number list can be found in chapter 8.7.8.

6.2 Cold start

The device can be reset to default settings by means of a cold start.

How to perform a cold start:

- Turn off the device
- Push the cold start button and keep it pressed
- Turn the device on
- Release the cold start button after approx. 3 seconds

After a successful cold start, an acoustic signal can be heard, and the status LED flashes three times.

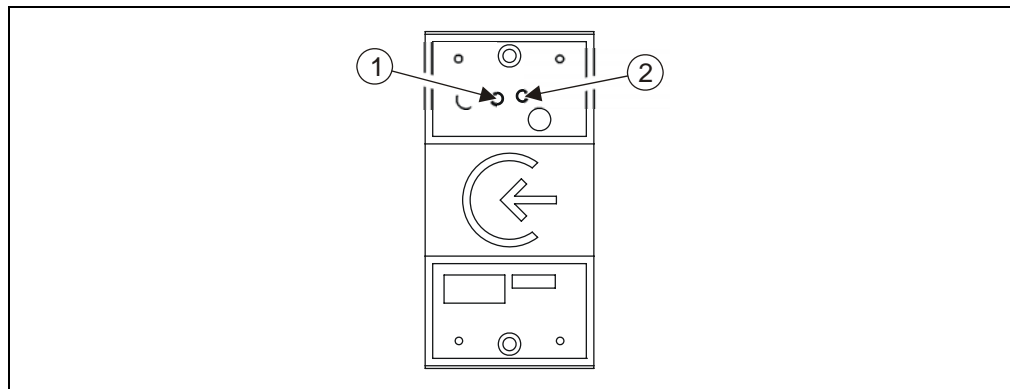


Fig. 13: Cold start button (1) and status LED (2).



Remark

The following applies to parameters being changed in the system mode:

Parameters adapted via LOWPAR are reset to default settings by means of the cold start.

Configuration parameters set by the SETHWC command and diagnostics data are maintained.

6.3 Status LED

The device has a red status LED (2) to signalize states or errors.

After switching on, the LED is lighted shortly and switched off immediately if operation is trouble-free.

The following states are possible:

LED is still lighted after reset	Program does not run
LED flashes 6 times after reset	First start (basic initialization)
LED flashes 3 times after reset	Cold start
LED flashes once	System mode becomes active
LED is switched off immediately after reset	Program runs error-free
LED flashes continuously	Program has detected an error

The error can be stored in the EEPROM memory and displayed directly or via a command, see system mode).

6.4 Adjusting the reader

The reader has been adjusted in the factory to an optimum range. Normally, it needs not to be readjusted.

The reader range is influenced by the damping of conducting material around the reading unit (e.g. housing, built-in units, conductive paint, reinforced concrete, etc.).

If used in critical environment (small distance to metal parts, etc.), the reading characteristics might be improved by an adjustment. The reader can thus be adapted to the installation environment to limited extent.

There is a small trimmer on the front of the device. This trimmer can be accessed after removing the housing frame.

The adjustment should be made using an alignment pin.

An oscilloscope or LEGIC® Powermeter, order number 04032432, can be used for adjustment.

Adjusting using an oscilloscope

The logic probe is converted into a measuring loop (connect logic probe ground to test tip) or extend the test tip by a short piece of wire (antenna effect). The logic probe must be fastened in front of the reader. The pulses are then set to max. amplitude.

Adjusting using LEGIC® Powermeter

Fasten the powermeter in front of the reader. Adjust the knob on the powermeter so that the LED field is lighted in yellow/green.

Then select maximum amplitude on the trimmer.

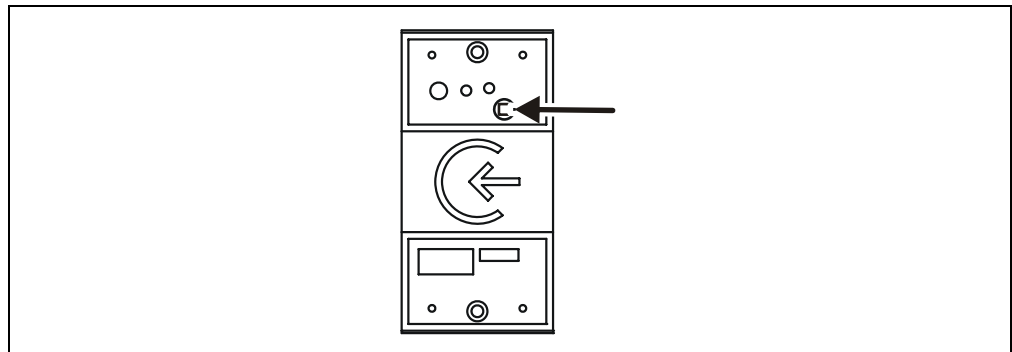


Fig. 14: Trimmer position for reader adjustment

7 System mode



The system mode allows parameter setting for the device.

Remark

Default parameters can be modified in system mode. However, this is only required for special applications.

The "online" and "stand-alone" modes described in this manual require factory settings. Therefore, parameters have not to be changed in system mode for these operating modes.

The system mode is an imitation of the operating system. It can be accessed via the data interface of the device. A service PC is connected by means of the parameter setting tool, order number 04036126.

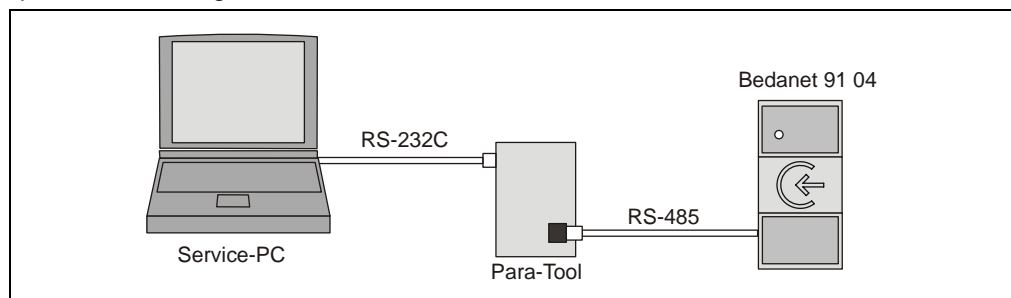


Fig. 15: Connecting the service PC to B-Net 91 04

Connection is established via a standard terminal software, e.g. HyperTerminal. A protocol is not used. The following communication parameters are valid:

Baud rate: 9600 Baud
 Parity: even
 Data bits: 7
 Stop bits: 1

The system mode is started by:

- continuously pressing the cold start button (see chapter 6.2) for 2 seconds:
- or
- executing the command <ESC>[=99x

This method requires connection to a control unit that supports this command.

Activation of the system mode is confirmed by a flashing status LED and an acoustic signal.

After starting system mode, the device replies with the prompt (<CR>, <LF>, '>').

System mode can only be exited via the commands RUN, ORIGIN, a warm start or a cold start. It is not cancelled via timeout.

7.1 Commands

Commands only contain capital letters and terminate with <CR>.

When entering commands, the characters following the command are ignored, as parameters might follow if the device is provided with an operating system. A wrong command is shown as follows:

```
Command not found
>_
```

Once a command has been called successfully, it will be processed.

Upon termination of a command, the device terminal displays a prompt.

If the output of a command is too large for the screen, the stopped output can be continued with <CR> (Enter key).

If an error is detected upon termination of the command, an error message is displayed before outputting the prompt:

```
Write Error
>_
```

After entering <BS> (backspace key) or (delete key), the last entered character is deleted and the cursor is put back one character.

All entered characters are sent back as echo.

It is checked whether the parameters are correct, and only correct parameters are applied. The parameters are only accepted if the format (length) is strictly adhered to.

Before entry, a parameter description is displayed. The currently valid parameter values, surrounded by simple quotation marks ('parameter'), are then transmitted in the required input format.

Preset parameters can be applied by means of <CR> (Enter key).

The character '_' represents the cursor in the following examples.

7.1.1 SETHWC

The SETHWC command (Set Hardware Configuration) is used to enter the parameters defining the hardware of device.

After having changed the hardware parameters, a cold start must be performed so that the device applies the defined state. The hardware parameters are not changed by the cold start.

Example:

```
>SETHWC
Protocol
  Type           : '01'           : 01
AUX 1
  Type           : '16'           : 16
  CIR            : '00'           : 00
Serial Interface
  Baudrate       : '009600'       :
  Number of Data Bits: '8'         :
  Parity         : '0'            :
  Number of Stop Bits: '1'         :
  Flow Control   : '0'            :
LEDs
  Number         : '02'           : 02
Outputs
  Number         : '01'           : 01
```

7.1.1.1 Description of the Parameters

Protocol Type:

2-digit protocol to control unit (data interface)

- 00 no protocol
- 01 BPA/9 protocol
- 02 BPA/9 protocol with activatable header

Keyboard type:

2 digits: Keyboard type

- 00 No keyboard

Driver type for AUX channels:

2-digit type for AUX 1

- 00 no component
- 16 Serial driver for LEGIC prime - read-only
(data such as LEGIC MAG reader without protocol)
 - serial interface
 - CIR: Information from LEGIC SM100-S
 - Interface parameter: 9600 baud, 8 data bits, no parity, 1 stop bit
- 18 Serial driver for LEGIC advant - read-only
(data such as LEGIC MAG reader without protocol)
 - serial interface
 - CIR: Information from LEGIC advant SM
 - Interface parameter: 9600 baud, 8 data bits, no parity, 1 stop bit
- 32 Serial driver for LEGIC prime - read and write
(protocol corresponding to ISO 7816-4)
 - serial interface
 - CIR: Information from SM100-S
 - Interface parameter: 9600 baud, 8 data bits, no parity, 1 stop bit
- 34 Serial driver for LEGIC advent - read and write
(protocol corresponding to ISO 7816-4)
 - serial interface
 - CIR: Information from LEGIC advant SM
 - Interface parameter: 9600 baud, 8 data bits, no parity, 1 stop bit

If the serial interface is used for a driver, specify the interface parameters also. For some drivers, the above-mentioned parameters must be firmly defined, for transparent drivers, the following parameters are possible:

Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 baud

Data bits: 7, 8

Parity: 0 (no), 1 (odd), 2 (even)

Stop bits: 1, 2

CIR type:

2-digit type for CIR 1+2

00 No CIR

01 CIR exists

Status and generation depend on component for AUX channel

LEDs

2-digit number of LEDs

00 No LEDs

01 1 LED

02 2 LEDs

Outputs

2-digit number of outputs

00 no output

01 1 output

7.1.1.2 Default configuration

Protocol type	01	BPA/9 protocol
AUX 1	16	LEGIC prime – read-only
	00	No CIR
Serial interface	9600 Baud, 8 data bits, no parity, 1 stop bit	
Number of LEDs	02	
No. of outputs	01	

7.1.2 GETHWC

The GETHWC command (Get Hardware Configuration) displays the parameters described under SETHWC.

Example with default values:

```
>GETHWC
Protocol
  Type           : '01'
AUX 1
  Type           : '16'
  CIR            : '00'
Serial Interface
  Baudrate       : '009600'
  Number of Data Bits: '8'
  Parity         : '0'
  Number of Stop Bits: '1'
  Flow Control   : '0'
LEDs
  Number         : '02'
Outputs
  Number         : '01'

>_
```

7.1.3 GETPRG

The GETPRG command (Get Program Number) requests the program number of the device.

Example:

```
>GETPRG
Program Number      : '844-00-X-K00'

>_
```

7.1.4 LOWPAR

The LOWPAR command (Low Level Parametrierung) is used to adjust the parameters of the data interface.

The parameters for a protocol are only requested if a protocol with SETHWC command has been registered.

These parameters are reset to default values after a cold start.

Low level parameters without protocol (protocol type 00):

```
>LOWPAR
Serial Interface
  Baudrate           : '019200'       : 009600
  Number of Data Bits : '7'           : 7
  Parity             : '2'           : 2
  Number of Stop Bits : '1'           : 1
  Flow Control       : '0'           : 0
>_
```

Low level parameters with protokol BPA/9 (protokol type 01):

```
>LOWPAR
Serial Interface
  Baudrate           : '019200'       : 009600
  Number of Data Bits : '7'           : 7
  Parity             : '2'           : 2
  Number of Stop Bits : '1'           : 1
  Flow Control       : '0'           : 0
Protocol BPA/9
  Group (GID)        : '00'           : 01
  Device (DID)       : '00'           : 01
  Poll / Cont. Mode  : '0'           : 0
  Fast Select        : '0'           : 0
  Add. <CR>          : '0'           : 0
  Response-TO        : '003'         : 003
  Activity-TO        : '004'         : 004
  Output Delay       : '000'         : 000
```

Additional parameters with protocol type 02:

```
Header Length
Up           : '00'           : 00
Down        : '00'           : 00

>_
```

7.1.4.1 Description of the Parameters

Serial interface:

- 5 digits: Baud rate (01200 to 76800)
- 1 digit: Number of data bits (7, 8)
- 1 digit: Parity (0 or N = no; 1 or O = odd; 2 or E = even)
- 1 digit: Number of stop bits (1, 2)

BPA/9:

- 2 digits: Group number (00 to 29)
- 2 digits: Device number (00 to 59)
- 1 digit: Polling (0) or contention mode (1)
- 1 digit: Quick call (0 or 1)
- 1 digit: Additional end character (0 or 1)
- 3 digits: Response timeout (001 to 999 = 0.1 – 99.9 sec.)
- 3 digits: Operating timeout (001 to 999 = 0.1 – 99.9 sec.)
- 3 digits: Transmit delay (000 to 999 = 0.0 – 99.9 sec.)

Header Up/Down:

- 2 digits: Header when sending (00 to 05)
- 2 digits: Header when receiving (00 to 05)

**Remark**

The parameters for "serial interface" as well as GID and DID can only be changed using the LOWPAR command if the DIP switch 10 is set to OFF, see chapter 5.9.

7.1.5 RUN

The command RUN (restart of the program) is used to quit the system mode and perform a warm start.

Example:

```
>RUN_
```

or

```
>RUN, ,S_
```

The warm start is indicated by the following message:

```
>Restarting ...
```

7.1.6 ORIGIN

The ORIGIN command resets the device to factory settings. This applies to all cold start parameters, to hardware parameters that can be set using the SETHWC command and to the diagnostics data.

Example:

```
>ORIGIN_
```

The following messages appear:

```
Resetting device to delivery state  
Are you sure?
```

After acknowledgement with '1' or 'Y', the factory settings are restored, and the following message is displayed:

```
>Restarting ...
```

In all other cases, there is no action, and the system mode remains active.

7.1.7 GETDGN

The GETDGN command is used to query diagnostics data (possible errors).

Query without error messages:

```
>GETDGN_  
No Errors found  
  
>_
```

Query with error messages:

```
>GETDGN  
Errors found          : 01  
Code: 010           Meaning: Error while allocating memory  
  
>_
```

The following error codes are possible:

```
1   Unspecific Error  
2   Unknown Error  
10  Error while initializing Task Manager  
11  Error while creating Task  
12  Error from Task Manager  
20  Error while initializing EEPROM  
21  Error while writing to EEPROM  
22  Error while reading from EEPROM  
30  Error while allocating memory  
31  Error while initializing Buffer  
40  Error while writing to Display
```

7.1.8 RSTDGN

The RSTDGN command is used to delete all diagnostics data.

Example:

```
>RSTDGN  
  
>_
```

8 Description of the Subpartyline

In online mode, data transfer takes place via the subpartyline. The subpartyline is an RS485 bus operated in 2-wire technology.

Normally, transmission takes place at 19,200 baud, parity even and one stop bit. Alternatively 9,600 baud are also possible. 7 bit ASCII characters are transmitted.

8.1 BPA Subset

The BPA (Benzing Protocol Aynchronous) is a master slave protocol with the subterminal being the slave. The master is always the superior control unit. The BPA's overall control is performed by the control unit.

The BPA subset is a protocol with reduced functionality adapted to data exchange with subterminals.

8.2 Addressing

Because several subterminals can be connected to a control unit, these must be distinguished by addresses. For this, two addresses exist. The group ID (GID) is a group address, the device ID (DID) the actual device address. These addresses are set at the subterminal. The range of values goes from 0 to 7 for the GID and from 0 to 15 for the DID.

In transmission these addresses are always represented in ASCII characters. For transmit polling the upper case letters are used. For receive polling for the GID lower case letters are used:

Address	DID _(hex)
0	@ ₍₄₀₎
1	A ₍₄₁₎
2	B ₍₄₂₎
3	C ₍₄₃₎
4	D ₍₄₄₎
5	E ₍₄₅₎
6	F ₍₄₆₎
7	G ₍₄₇₎
8	H ₍₄₈₎
9	I ₍₄₉₎
10	J _(4A)
11	K _(4B)
12	L _(4C)
13	M _(4D)
14	N _(4E)
15	O _(4F)

Address	GID _(hex)	
	Transmit polling	Receive polling
0	@ ₍₄₀₎	' ₍₆₀₎
1	A ₍₄₁₎	a ₍₆₁₎
2	B ₍₄₂₎	b ₍₆₂₎
3	C ₍₄₃₎	c ₍₆₃₎
4	D ₍₄₄₎	d ₍₆₄₎
5	E ₍₄₅₎	e ₍₆₅₎
6	F ₍₄₆₎	f ₍₆₆₎
7	G ₍₄₇₎	g ₍₆₇₎

8.3 Control Characters and Control Sequences



Remark

Control characters are displayed in angle brackets, e.g. ESC (1B_{hex}) as <ESC>. An underline character “_” is used as blank (20_{hex}).

In the following examples “0” is used as group address (GID) and “1” as device address (DID).

The following characters and sequences are used as control characters:

Control characters/ sequence Meaning

<STX>	STX	Start of Text	Beginning of the text
<ETX>	ETX	End of Text	End of the text
<EOT>	EOT	End of transmission	End of the transmission
<NAK>	NAK	Negative Acknowledgement	Negative feedback
<ENQ>	ENQ	Enquiry	Enquiry
<DLE> 0	ACK0	Acknowledgement 0	Alternating positive feedback
<DLE> 1	ACK1	Acknowledgement 1	
<DLE> <	RVI	Reverse Interrupt	Reverse Interrupt

ACK0, **ACK1** and **RVI** consist of two characters. The second character (0, 1, <) added to the control character **DLE** defines which of the three control characters is meant.

The handshake in the BPA is effected via control characters and control sequences.

The control sequences are:

<EOT>	@	@	A	A	<ENQ>	Transmit polling
<EOT>	'	'	A	A	<ENQ>	Receive polling

These control sequences are used to notify the subterminal whether it has to send existing data records, or if it has to receive a data record. For receive and transmit polling, the two addresses are sent twice in order to have a verification possibility.

<EOT> GID GID DID DID <ENQ>

8.4 Data Records

Data records are marked up by the control characters **STX** (beginning) and **ETX** (end). The **ETX** is followed by an **LRC** - a check character which is calculated by exclusive OR of the data and the ETX control character. The **STX** is not considered in this calculation.

<STX> Data <ETX> <LRC>

8.5 Data from Subterminal to Control Unit

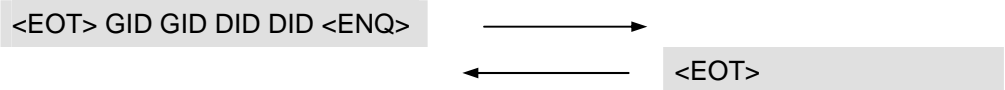
Transmit polling



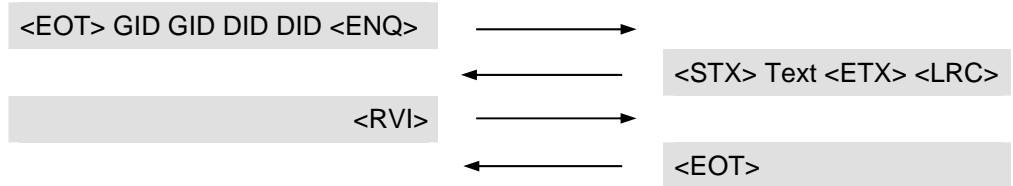
The subterminal does not respond if the address is different from its own address, or if an error has been detected, or if the two address characters are different. The control unit repeats the transmit poll after an internal time-out.



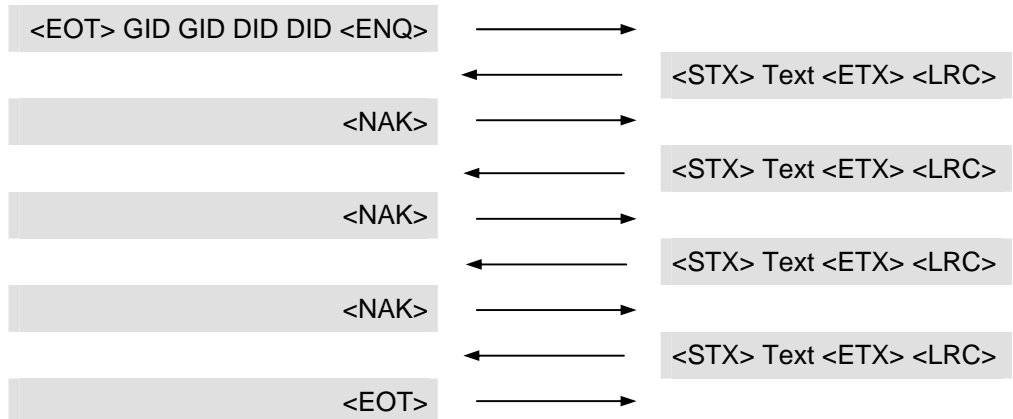
In the case of the same address, the subterminal must respond. If it has no data for the control unit, an EOT is sent. This completes the entire transmission process.



If data exists, these data is sent and the control unit's acknowledgement is waited for. If an RVI is received, the data is acknowledged which is confirmed by the subterminal by an EOT. This completes the transmission.



If the control unit answers with NAK, the subterminal will repeat the data transmission. The control unit repeats the NAK up to two times and then terminates the transmission by EOT. This does not yet acknowledge the data record and therefore it must not be discarded by the subterminal. The subterminal has to wait for the next transmit poll to send the data record.



8.6 Data from the Control Unit to the Subterminal

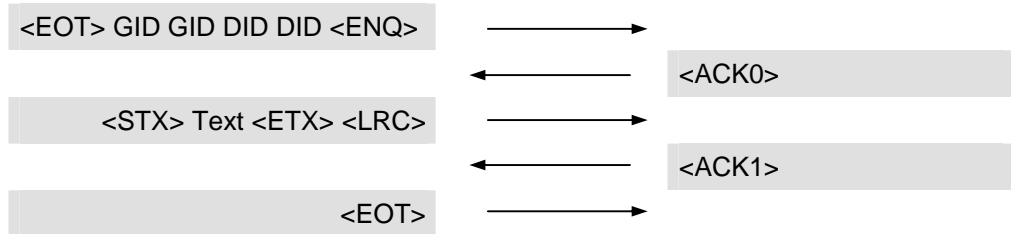
Receive polling



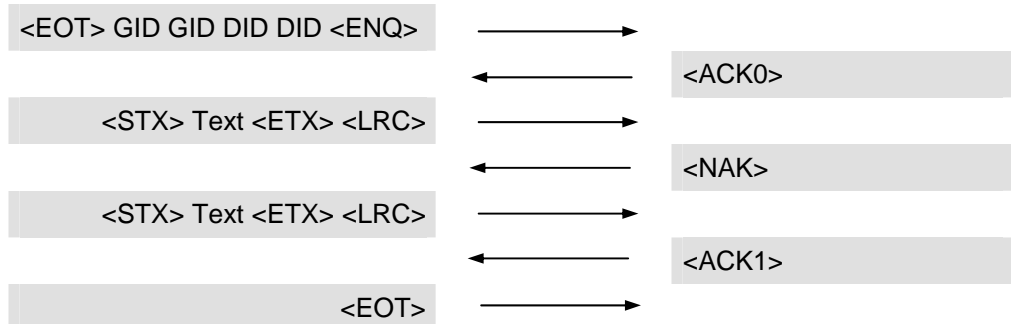
The subterminal does not respond if the address is different from its own address, or if an error has been detected, or if the two address characters are different. The control unit repeats the receive poll after an internal time-out.



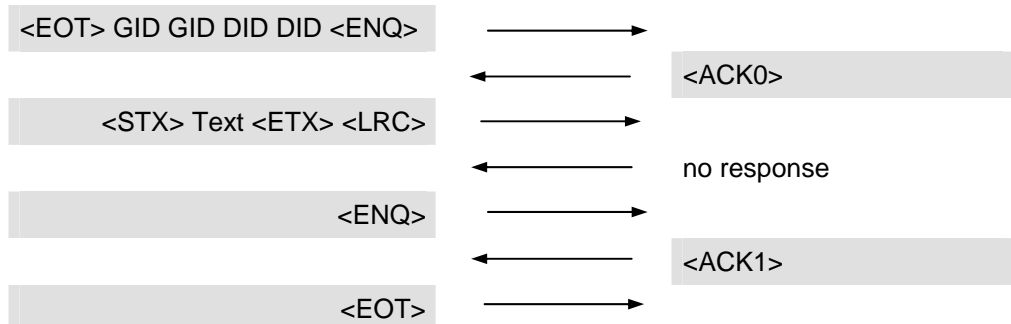
If the address has been detected correctly, the receive poll is acknowledged by the subterminal by ACK0. After that the control unit sends the data record, which is acknowledged by ACK1 if correctly received. If the control unit receives a correct acknowledgement, the control unit terminates the transmission by sending an EOT.



If the control unit's data record has not been received correctly, the subterminal will acknowledge by sending an NAK until the record has been understood.



If the control receives no correct acknowledgement, it will send an ENQ to request a retry of the acknowledgement.



8.7 Escape sequences

The subterminal functions are controlled by the following escape sequences.

Which ESC sequences are used or supported depends on the particular control unit.

8.7.1 Controlling LED, relay and beeper

With the following sequences, the relay and the acoustic signal transmitter (beeper) in the subterminal are controlled.

Meaning	Code
Switching on LED n	<ESC> [Pnq
Switching on flashing LED n	<ESC> [?Pnq
Switching off LED n	<ESC> [=Pnq

Pn: Number of the local LED: 1 to 2

Meaning	Code
Switch off relays and beeper	<ESC> [q
Turn on beeper	<ESC> [99q
Switch on beeper alternatingly	<ESC> [?99q
Turn off beeper	<ESC> [=99q
Switch on relay	<ESC> [3q
Switch off relay	<ESC> [=3q

The acoustic signal transmitter in the subterminal is activated by means of the control character <BEL> for 0.3 seconds. The acoustic signal transmitter does not have to be switched off afterwards.

Meaning	Code
Activate the beeper dynamically	<BEL>

8.7.2 Reset

The following ESC sequence will reset the subterminal. The same settings as after a warm start apply for all parameters.

Meaning	Code
Perform reset	<ESC>c

After a reset, the subterminal will send the ESC sequence "LOG IN".

Meaning	Code
LOG IN	<ESC> [98~

8.7.3 Device configuration

The device configuration of the subterminal is requested by means of the following ESC sequence. The subterminal sends the ESC sequence "Device configuration" in response.

Meaning	Code
Requesting equipment configuration	<ESC> [c
Response from the subterminal	<ESC> [: 2 ; <i>Ps</i> ; <i>Ps</i> ; . . c

The number of configuration entries may vary depending on the device configuration. The individual configuration entries are separated from each other by ";" (semicolon).

Example:

```
<ESC> [ : 2 ; 3 ; ?10 ; ?1000 ; ?1116 c
```

Ps:

State:	
0	= Keypad present
3	= No keyboard available
?10	= Channel AUX 1 present
?13	= Channel AUX 1 not available

Type:

?1000	No keyboard available
?1100	Channel AUX 1 not available
?11xx	Component type xx at AUX 1 channel

8.7.4 Program number

The program number (version of the terminal software) is requested by means of the following ESC sequence. The subterminal will send the ESC sequence "Report program number" in response.

Meaning	Code
Request program number	<ESC> [? c
Response from the subterminal	<ESC> [?18 O<ESC>P844-00-X-K00<ESC>\

1 2

1) Space = 20_{Hex}
 2) O as in Otto = 4F_{Hex}

8.7.5 Recorded data

After entering a badge, the subterminal will send the following sequence.

Meaning	Code
Badge data	<ESC> [?11 O<ESC>PDATA<ESC>\ 1 2
1) Space = 20 _{Hex}	
2) O as in Otto = 4F _{Hex}	

DATA: Badge data

After pressing a key, the subterminal will send the following sequence.

Meaning	Code
Key (displayable character)	20 _{Hex} . . 7E _{Hex}
"E" key (Enter)	<CR>
"C" key (Clear)	<ESC> [2N

8.7.6 Hex Representation of the Recorded Data

The Hex representation of the collected data are set by means of the following ESC sequences.

Meaning	Code
Hex representation with letters	<ESC> [?14i
Hex representation with special characters	<ESC> [?15i

Example:

Hex representation with letters: 0123456789ABCDEF

Hex representation with special characters:* 0123456789 : ; <=> ?

*Default

8.7.7 Acoustic acknowledgement for reading

As the search through the customer number list can take up to approximately 1 second, the correct reading of a badge can be acknowledged with a short acoustic signal.

This acoustic acknowledgement can be switched on/off with the following ESC sequence:

Meaning	Code
Acoustic acknowledgement on	<ESC> [?16i
Acoustic acknowledgement off *	<ESC> [?17i
* Default	

8.7.8 Customer number list

If no entries are stored in the customer number list (factory setting), only those badges are accepted which have a segment containing SSC 02 and a fixed structure of badge data according to Kaba group header. Non-segmented badges may have an arbitrary SSC, but must also be coded according to Kaba group header.

The customer number list allows to accept also badges with a different SSC and another data field structure. Moreover, it can be determined if only the SSC decides on the identification of the badge or if the whole customer number must match so that the badge is passed on to the control unit. In the list, up to 5 badge/customer numbers can be stored. This list is retained also in case of power failure.

As soon as an entry in the customer number list is stored, the SSC 02 default check is no longer valid. If the customer number list is deleted, the SSC 02 default check is performed again.

The following ESC sequence allows a customer number to be deposited in the customer number list of the terminal.

```
<ESC>[?19_0 <ESC>Paabbbbbbbcccccddeeffgghh<ESC>\
      1 2
```

- 1) Space = 20_{Hex}
- 2) O as in Otto = 4F_{Hex}

aa	Number of relevant bytes which are used for customer number verification.
	00 = Delete list
	01 = Byte 1
	...
	07 = Byte 1-7
b...b	Customer number (hex) consisting of SSC/SC/SC/SC (4 bytes); 8 digits
c...c	Badge number (hex) 3 bytes 6 digits
dd	Start address of data bytes (BCD); 2 digits
ee	Number of data bytes (BCD); 2 digits
ff	Address of CRC (BCD); 2 digits
gg	CRC check; 2 digits
	00 = none
	01 = CRC8
	02 = CRC16
hh	Start segment, segment number from search is started (BCD) 2 digits

The parameters a to h have a fixed length of 26 digits.



Remark

If a list entry contains 14 digits of customer and badge number, a single badge will be authorized.

If a list entry contains, for example, only an 8-digit customer number, a badge group will be authorized.

The following example corresponds to the setting according to Kaba group header.

```
<ESC>[?19_0<ESC>P04020000000000001411250101<ESC>\
```

The following ESC sequences allow the entries of the customer number list to be requested.

Meaning	Code
1. Request entry	<ESC>[?1c
Request another entry	<ESC>[?2c

As response, the subterminal sends the ESC sequence "Customer number list", description see above.

```
<ESC>[?19_0 <ESC>Paabbbbbbbccccccddeeffgghh<ESC>\
```

8.7.9 Control stand-alone operation

The device can also be operated as a stand-alone unit. When a simple badge or customer number check is sufficient, a simple access control can be implemented. To do this, the stand-alone mode is activated, and the respective badge or customer numbers are deposited in the customer number list.

If a list entry contains 14 digits of customer and badge number, a single badge will be authorized.

If a list entry contains, for example, only an 8-digit customer number, a badge group will be authorized.

The subterminal will then independently decide if the relay is pulled-in or not. This allows the subterminal to be operated without the connection to a control unit.

In order to activate the stand-alone feature, the internal relay selection must be activated by the following ESC sequence. In addition, the relay pull-in time can be set.

If stand-alone mode is switched on, the relay is only activated by this operating mode. The ESC sequences "Activate/switch off relay" are then without effect.

The parameter "Control stand-alone mode" is also retained in case of power failure.

Meaning	Code
Stand-alone operation control	<ESC> [a ; bbp
a	Stand-alone operation 0 = off 1 = on
bb	Relay pull-in time 1 or 2 digits 01-99 = pull-in time in seconds

8.8 ASCII Table

	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
	0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

9 Packaging / Returns

Not properly packaged components and devices can cause costs due to damages during shipping.

Please note the following when dispatching Kaba products.

Kaba GmbH is not liable for products that have been damaged due to negligent packaging.

9.1 Complete Devices

The original packaging has been specifically designed to fit the device. It offers maximum protection against damage in transit.



NOTICE!

When returning an item, please ensure that you always use the original packaging.

If this is not possible, packaging must be provided which ensures that the device is not damaged during shipping and handling.

- Use a robust and thick-walled transport box or cardboard box. Approximately 8 to 10 cm of room needs to be allowed on either side of the device.
- Wrap the device with a suitable foil or put it into a bag.
- Place a sufficient quantity of padding, for example foam pads or air cushions, all around the device. Movements of the device inside the packaging must be excluded.
- Use only dustless and environmentally friendly padding material.

9.2 Electronic Assemblies



ESD sensitive electronic assemblies such as printed circuit boards, readers, etc. must be stored, transported, and shipped in appropriate ESD protective bags.

Packing of electronic assemblies may only

- take place at ESD secure workstations
- be done by persons familiar with general ESD safety standards and who apply them on a regular basis.

Returning electronic assemblies in packaging with sufficient ESD protection is a prerequisite for

- the submission of warranty claims after functional failures of any type.
- replacement of printed circuit boards and electronic components in exchange.

Electronic components delivered in packaging without sufficient ESD protection are --in order to maintain a high quality standard-- neither analyzed nor repaired but directly disposed of.

9.3 Labeling

Complete return documents and a correct labeling allow for fast processing.

Please make sure that each package includes a delivery note. The delivery note should contain the following information:

- Number of devices or components per package
- Product numbers, serial numbers, specifications
- Name and address of your company / contact person
- Reason for return, e.g. repair exchange
- Meaningful and detailed error description

Returns from countries outside the European Union require a customs invoice stating the real customs value.

Some countries (e.g. Switzerland) require a preference.

10 Disposal



This product complies with the WEEE directive and is, according to DIN EN 50419, marked with the “Crossed out garbage can” symbol. See chapter 3.3 Labeling.

The symbol refers to separated disposal of electric and electronic devices in EU countries.

Please do not dispose of the device in your regular garbage.

Used devices contain valuable materials that should be recycled. Used devices should therefore be disposed of via your country’s take back system.

At the end of use of the goods supplied, Kaba GmbH will take them back for a proper disposal in accordance with the legal regulations (German law on the disposal of electrical equipment). Charges incurred for transport to the manufacturer will be at the expense of the owner of the waste electrical equipment.



Please dispose of in an environmentally responsible way

The packaging materials are recyclable. Please do not throw packaging material into your regular garbage can. Always take it to a recycling center or have it picked up by your local waste recycler.

11 Index

A

Access Control Unit	13
Acoustic acknowledgment	48
Acoustic signal generator	12

B

Baud Rate	24
Beeper	12
BPA subset	42
BPA9/Subset	9

C

CE	10
Clearances	15
Cold start	29
Conformity	10
Connectors	14
Control stand-alone operation	51
Controlling relay and beeper	46
Current consumption	9
Customer number list.....	13

D

Data retention in case of power failure	9
Description of connections	22
Device address	23
Device configuration	47
DID.....	23
Digital outputs	12
Dimensions	9
DIP switch.....	23
Disposal	55
Door opener	16, 17

E

Entry.....	12
Escape sequences	46

ESD (Electro Static Discharge) Protective Measures	7
--	---

G

GID.....	23
Grounding	14
Group address	23

H

Hex representation of the recorded data	48
Hole pattern	19

I

Identification plate	10
Installation	14
Installation diagram.....	16
Installation Lines	18
Installation site	14
Interface	9

L

LED	12
LEGIC® Media.....	12
Line requirements	18

M

Mounting	14, 19
Mounting height	14

O

Online mode.....	13, 27
Operating voltage.....	9
Output	9
Outputs	12

P

Parameter setting tool.....	13
Power Supply	16, 17
Product description	8
Program number	47

Protection class	9	S	
Protocol.....	9	Service PC	13
R		Stand-alone operation	13, 28
Rated reader range.....	12	Standards.....	10
Reader	9	Start-Up.....	26
Reader range.....	12	Status LED.....	29
Reading distance	12	Subpartyline description	42
Recorded data	48	Subterminal.....	13
Relay.....	12	Switch base.....	23
Relay output.....	9	T	
Relay pull-in time	51	Technical data.....	9
Reset.....	46	Terminal frame.....	15
RoHS	10	U	
RS-485.....	9	Use as Directed	6

