

Vorwort

Dieses Handbuch wurde in zwei Sprachen verfaßt. Um Ihnen die Handhabung zu erleichtern, ist der deutschsprachige Teil mit einem dunkelgrauen Balken und der englischsprachige durch einen hellgrauen Balken gekennzeichnet.

Preface

This manual has been written in English and in German. In order to differentiate between the two languages quickly, the German section has a dark grey bar and the English section has a light grey bar.

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PANELWARE

P127 COMPACT HMI CAN

Version: **2.2** (January 2019)

Model No.: **MAPWP127-0E**

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1 Safety Guidelines

1.1 Introduction

Programmable logic controllers (e.g. PLCs, etc.), operating and monitoring devices (e.g. Industrial PCs, Power Panels, Mobile Panels, etc.) as well as the B&R uninterruptible power supplies have been designed, developed and manufactured for conventional use in industry.

They were not designed, developed and manufactured for any use involving serious risks or hazards that without the implementation of exceptionally stringent safety precautions could lead to death, injury, serious physical damage or loss of any other kind. Such risk and hazards include in particular the use of these devices in the monitoring of nuclear reactions in nuclear power plants and of flight control systems, in flight safety, in the control of mass transportation systems, in medical life support systems, and in the control of weapons systems.

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or comparable products) or a Slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) in accordance with applicable national and international regulations must be observed. The same applies for all other devices connected to the systems, such as drives.

All tasks such as installation, commissioning and service may only be carried out by qualified personnel. Qualified personnel are persons who are familiar with transport, mounting, installation, commissioning and operation of the product and have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed. The safety guidelines, connection descriptions (rating plate and documentation) and limit values listed in the technical data must be read carefully before installation and commissioning and must be observed.

1.2 Intended Use

Electronic devices are generally not fail-safe. In the event of a failure on the programmable control system, operating or monitoring device or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, such as motors, are made safe.

1.3 Transport and Storage

During transport and storage, the devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere).

1.4 Installation

The installation must take place according to the documentation using suitable equipment.

The devices may only be installed when isolated from the power supply and by qualified personnel.

General safety regulations and nationally applicable accident prevention guidelines must be observed.

Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

1.5 Operation

1.5.1 Protection against Touching Electrical Parts

The operation of programmable logic controllers, operating and monitoring devices and uninterruptible power supplies necessarily means that certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electric shock could occur if you touch these parts. This could result in death, severe injury or material damage.

Before turning on programmable control systems, operating and monitoring devices and uninterruptible power supply, ensure that the housing is properly connected to protective ground (PE rail). The ground connection must be established even when testing the operating and monitoring devices and the uninterruptible power supply or when operating them for only a short time.

Before turning the device on, make sure that all voltage-carrying parts are securely covered.
During operation, all covers must remain closed.

2 General Information

2.1 General Information 4B1270.00-490

The P127 COMPACT HMI CAN is a powerful operator panel with a compact design. This CAN panel has a 4 x 20 LC display.

The display contrast can be set using keys.

This panel is also equipped with a membrane keypad with 24 keys, 12 of which are illuminated with LEDs.

The left key block can be labeled using legend strips, the LOGO can also be changed by using a different legend strip.

The CAN interface is electrically isolated and uses a 9 pin D-type connector.

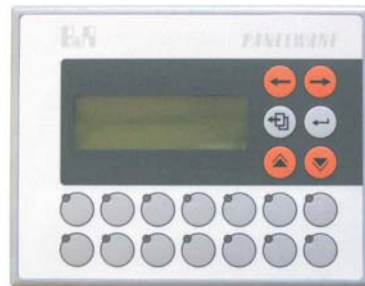
Baud rate and node number can be set using the number switches on the side of the unit.

All of the functions listed above are integrated into a compact housing (145 x 180 x 30 mm).



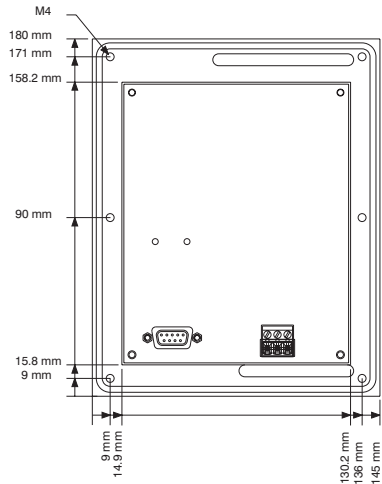
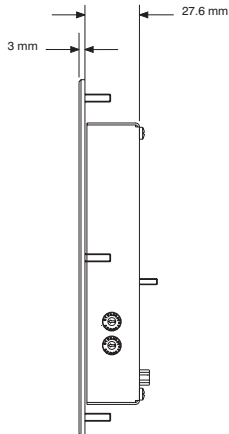
2.2 General Information 4B1270.00-390

The P127 COMPACT HMI CAN is a powerful operator panel with a compact design. This CAN panel has a 4 x 20 LC display. The display contrast can be set using keys. This panel is also equipped with a membrane keypad with 20 keys, 14 of which are illuminated with LEDs. The 14 keys below can be labeled using legend strips. The CAN interface is electrically isolated and uses a 9 pin D-type connector. Baud rate and node number can be set using the number switches on the backside of the unit. All of the functions listed above are integrated into a compact housing (153 x 120 x 43.7 mm).

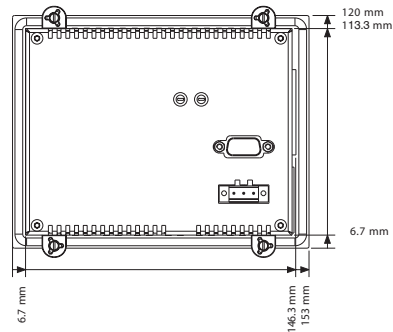
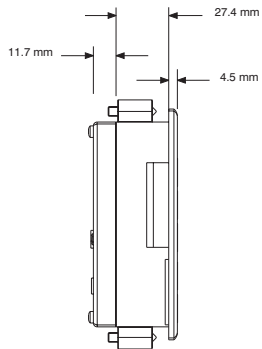
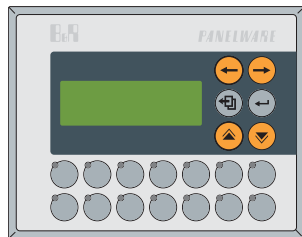


2.3 Dimensions

2.3.1 Dimensions 4B1270.00-490



2.3.2 Dimensions 4B1270.00-390



3 Technical Data

3.1 Technical Data 4B1270.00.490

Model Name	P127 COMPACT HMI CAN
Model Number	4B1270.00-490
LC Display Resolution	4 x 20 characters
Background Lighting Brightness	LED yellow / green 200 cd/cm ²
Keypad	Membrane keypad with 24 keys, 12 with LED illumination (yellow)
Supply Voltage	24 VDC (min. 18 VDC, max 30 VDC)
Power Consumption P_{typ} P_{max}	3.3 W (< Rev E0: 2.8 W) 3.8 W (< Rev E0: 3.3 W)
CAN Interface	9 pin D-type connector (electrically isolated)
Operating Temperature	5 to 50°C
Relative Humidity	5 to 95% (not condensing)
Dimensions	145 mm, 180 mm, 30 mm (W x H x D)

3.2 Technical Data 4B1270.00.390




Model Name	P127 COMPACT HMI CAN
Model Number	4B1270.00-390
LC Display Resolution	4 x 20 characters
Background Lighting Brightness	LED yellow / green 200 cd/cm ²
Keypad	Membrane keypad with 20 keys, 14 with LED illumination (yellow)
Supply Voltage	24 VDC (min. 18 VDC, max 30 VDC)
Power Consumption P_{typ} P_{max}	2.7 W (< Rev E0: 2.2 W) 3.0 W (< Rev E0: 2.5 W)
CAN Interface	9 pin D-type connector (electrically isolated)
Operating Temperature	5 to 50°C
Relative Humidity	5 to 95% (not condensing)
Dimensions	153 mm, 120 mm, 43.7 mm (W x H x D)

4 Component Descriptions




4.1 Changing the Contrast

The P127 is equipped with a 4 x 20 LC display. The display has LED background lighting (yellow/green). The character height is 5 mm. The display contrast can be set using keys shown below. The keycodes sent are not filtered out.

Procedure 4B1270.00-490:

Select the display using the  key, press the  key at the same time to increase the contrast.
Press the  key at the same time to decrease the contrast.

Procedure 4B1270.00-390:

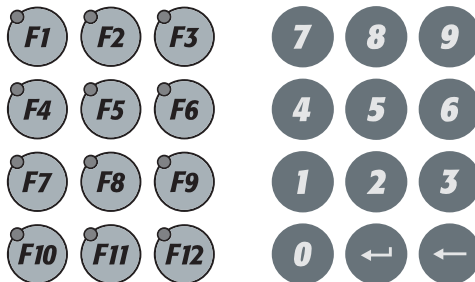
Select the display using the  key, press the  key at the same time to increase the contrast.
Press the  key at the same time to decrease the contrast.

4.2 Membrane Keypad

4.2.1 Membrane Keypad 4B1270.00-490

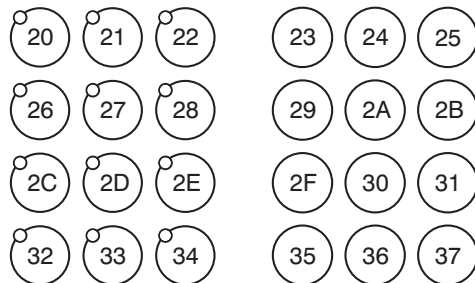
The P127 is equipped with a membrane keypad with 24 keys, 12 of which have LED illumination (yellow). The right key block is permanently labeled, the left key block can be labeled using legend strips.

Special insert strips 4A0026.00-000 are available for this purpose which can be printed with a laser printer.



4.2.1.1 Key and LED Matrix 4B1270.00-490

Keys and LEDs have the following positions in the matrix (LED codes correspond to the respective key codes). Codes standing down are represented in hexadecimals .

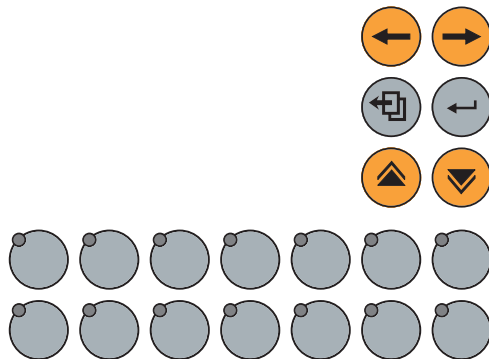


The codes listed above are used for the key blocks. In order to guarantee compatibility to the C130, the lowest key code is 20 (dec. 32).

4.2.2 Membrane Keypad 4B1270.00-390

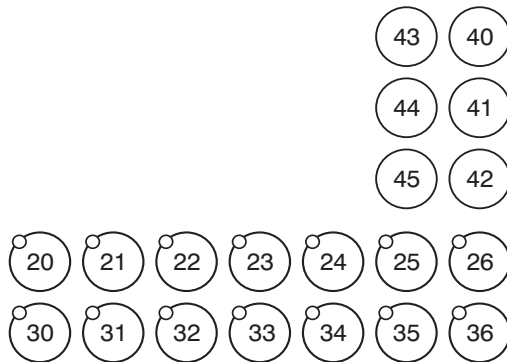
The P127 is equipped with a membrane keypad with 24 keys, 12 of which have LED illumination (yellow). The right key block is permanently labeled, the left key block can be labeled using legend strips.

Special insert strips 4A0046.00-000 are available for this purpose which can be printed with a laser printer.




4.2.2.1 Key and LED Matrix (hexadecimal codes) 4B1270.00-390

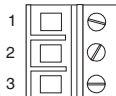
Keys and LEDs have the following positions in the matrix (LED codes correspond to the respective key codes). Codes standing down are represented in hexadecimals.




The codes listed above are used for the key blocks. In order to guarantee compatibility to the C130, the lowest key code is 20 (dec. 32).

4.3 Supply Voltage 4B1270.00-490 und -390

The P127 is supplied with 24VDC using a 3-pin terminal block. The 24VDC on the terminal block is applied to the panel via a 3-pin pin-connector. The supply is protected against surge, burst, ESD and radiated disturbances. The  pin should be connected to ground with as short a line as possible.



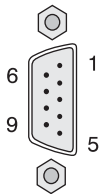
Terminal	Symbol	Description
1		Ground
2	-	GND ⊥
3	+	+24 VDC

4.4 CAN Interface 4B1270.00-490 und -390

The P127 is equipped with a CAN interface. The baud rate and node number can be set using hex switches. These hex switches can be accessed through holes in the housing.

The interface is electrically isolated and uses a 9 pin D-type connector.

9 Pin D-Type Connector (M)

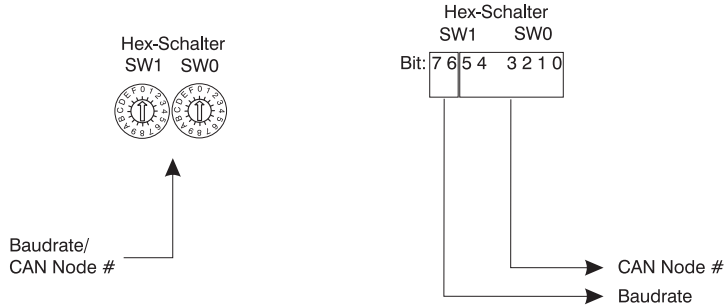


PIN	CAN
1	NC
2	CAN_L
3	CAN_GND
4	NC
5	NC
6	NC
7	CAN_H
8	NC
9	NC

4.4.1 Hex Switches

The hex switches can be used to set the baud rate and CAN node number. Each hex switch represents a 4 bit value. The first 2 bits of hex switch SW1 are used to set the baud rate. The second 2 bits of hex switch SW1 together with all 4 bits of hex switch SW0 determine the CAN node number.

See table on the following page for possible settings.



SW0



SW1

SW1	SW0	Baud(kBit/sec)	Node#
0	1 .. F	250	1 .. 15
1	0 .. F	250	16 .. 31
2	0	250	32
4	1 .. F	125	1 .. 15
5	0 .. F	125	16 .. 31
6	0	125	32
8	1 .. F	20	1 .. 15
9	0 .. F	20	16 .. 31
A	0	20	32
C	1 .. F	500	1 .. 15
D	0 .. F	500	16 .. 31
E	0	500	32

Switch settings that are not shown are invalid.

Invalid settings are indicated on the display with " CAN Node number: -- " and " Baud rate: -- ".

5 Software

5.1 General Information 4B1270.00-490 und -390

Operation

The panel reads ASCII characters, ESC sequences and CSI sequences via CAN using the CAN ID set with the node number. Commands are processed and key codes (with or without repeat function), key release codes and status messages are sent using the set CAN-ID + 1.

The P127 has no memory for application programs.

The background lighting of the display turns itself off after a set time has passed (between 1 and 98 minutes). The default time is 3 minutes by -490 and 1 minute by -390. The background lighting of the display can be turned on again by pressing any key or with the command sequence <ESC> <r>.

5.2 Features 4B1270.00-490 and -390

- Display controlled and other parameters set using ASCII characters , ESC sequences, CSI sequences
- Key codes with set repeat rate (key repeat frequency)
- LEDs on/off, slowly blinking and quickly blinking
- Minimum delay between two CAN frames, e.g. if the controller cannot process keys being pressed fast enough
- Up to 32 can be connected to a CAN bus, (node number set with HEX dial)
- Baud rates: 20kB, 125kB, 250kB, 500 kBaud, (Baud rate set with HEX dial)
- Lifetime signal can be set to monitor the connection and function of the panel
- Cursor visible on display
- Characters can be shown blinking on the display
- Japanese Kata Kana character set (ASCII code >= hexadecimal: A1)
- German characters: Ä,Ö,Ü,ä,ö,ü,ß
- Background lighting of the display turns itself off automatically after defined time
- Contrast adjustment: with membrane keypad
- CAN frames are buffered, 256 byte send buffer and 256 byte receive buffer

5.3 Power-On 4B1270.00-490 und -390

After a power-on, the panel turns on all LEDs for 1 seconds, shows a message on the display and sends a reset code (0x90) on the CAN bus. The version number, the number of LEDs and keys and the node number stopped with the Hex switches are shown on display. If an invalid value number is set, " CAN Node number: — ", " Baud rate — " (-490), " CAN Node number: — " (-390) is shown on the display, and the panel waits for a change. In order to activate the changed node number setting, the panel has to be reset with a power-on.

Default settings:

- No key repeat
- No lifetime signal
- Delay between CAN frames: 10 msec
- Background lighting on for 3 minutes (-490), for 1 minute (-390)
- Cursor on the top/left of display (1/1), not visible

5.4 Interface Description 4B1270.00-490 and -390

CAN bus: 11 bit identifier at 20kBaud, 125kBaud, 250kBaud and 500kBaud. See "Component Descriptions" - "Hex Switches" for node number and baud rate settings.

5.4.1 CAN Identifier

To the panel - calculation of CAN ID for commands sent to the panel:

$$\text{CAN-ID} = 1054 + (\text{node number}-1)*16$$

To the PCC - calculation of CAN ID for key objects:

$$\text{CAN-ID} = 1054 + (\text{node number}-1)*16+1$$

5.4.2 Data Transfer

The P127 can continually receive and process one CAN frame with 8 bytes of data from the PLC every 3 msec (Worst Case: Clear Screen command). A higher data rate is also possible for short periods of time because the P127 has a 256 byte receive buffer.

5.4.3 Data Format of CAN Objects Sent to the Panel

Each command doesn't have to be sent in a separate CAN frame. If only part of a command is sent, the panel waits for the rest of it. An "open" command sequence is cancelled with <ESC> or an invalid parameter and "SYNTAX ERROR" (0x97) is sent to the send ID.

6 Command Set

6.1 General Information 4B1270.00-490 and -390

6.1.1 Data Transfer Panel ⇨ PLC

Information that the B&R operator panel sends to a PLC is normally 1 byte long. The data transferred is either key codes or (error) messages. The format used to send the key codes can be defined from the PLC using control sequences (commands).

The PLC can also send a request to the panel e.g. for a status string containing information about the panel configuration.

The format (of key codes or status strings) sent by the panel is defined for the respective command. Also see "5.3.2 Overview - Data Transfer ⇨ PLC"

6.1.2 Data Transfer PLC ⇨ Panel

The commands that can be sent from the PLC to the panel are described in detail in section "5.2 Commands".

6.1.3 Command Sequences

Most commands consist of sequences with the following structure:

1. Control characters
2. Characters specified by the command
3. Parameters

Control characters can be ASCII characters <ESC> (dec.: 27, hex.: 1B) or <CSI> (dec.: 155, hex.: 9B). The panel only starts to carry out the command if all parameters are given.

All command sequences can be interrupted by the PCC at any time by sending <ESC>. In this case, the panel responds with the error code hex. \$97 (command sequence interrupted).

6.1.4 Syntax

The following syntax is used for commands and control sequences:

<x> Characters in triangle brackets correspond to the ASCII table:

Alphanumeric characters: <a>, <A>, <0>, <9>,

Other characters: <!>, <#>, <ß>,

Control characters: <CSI>, <CR>, <ESC>,

xxx Numbers that are not in brackets are to be interpreted as decimal resp. hexadecimal ASCII values.

(x) Parameters for the respective command.

6.2 Commands

6.2.1 Overview 4B1270.00-490 and 4B1270.00-390

(following commands can be executed by 4B1270.00-490 and 4B1270.00-390)

ASCII.	Hex.	Dec.	Command
(z)=32...255	0...FF	(z)	Write Character
<CR>	0D	13	Carriage Return
<LF>	0A	10	Line Feed
<ESC> <e> (Nr)	1B 65 (Nr)	27 101 (Nr)	LED On
<ESC> <a> (Nr)	1B 61 (Nr)	27 97 (Nr)	LED Off
<ESC> <l> (Nr)	1B 6C (Nr)	27 108 (Nr)	LED Slowing Blinking
<ESC> <s> (Nr)	1B 73 (Nr)	27 115 (Nr)	LED Quickly Blinking
<ESC> <H> (Nr) <d>	1B 48 (Nr) Att	27 72 (Nr) Att	Local Echo On
<ESC> <f> (f1) (f0)	1B 66 (f1) (f0)	27 102 (f1) (f0)	Repeat Frequency Definition
<ESC> (t1) (t0)	1B 62 (t1) (t0)	27 98 (t1) (t0)	Set Time for Background Lighting
<ESC> <Y> (z2) (z1) (z0)	1B 59 (z2) (z1) (z0)	27 89 (z2) (z1) (z0)	Set Minimum Delay
<ESC> <S>	1B 53	27 83	Request Status
<ESC> <E>	1B 45	27 69	Request Extended Status
<ESC> <R>	1B 52	27 82	Reset
<ESC> <r>	1B 72	27 114	Reset Time for Background Lighting
<ESC> <p> <l> (z2) (z1) (z0)	1B 70 6C (z2) (z1) (z0)	27 112 108 (z2) (z1) (z0)	Set Time for Lifetime Signal
<ESC> <N> (z1) (z0) (s1) (s0) (x1) (x0)	1B 4E (z1) (z0) (s1) (s0) (x1) (x0)	27 78 (z1) (z0) (s1) (s0) (x1) (x0)	Display x Characters Blinking
<ESC> <Q> (z1) (z0) (s1) (s0) (x1) (x0)	1B 51 (z1) (z0) (s1) (s0) (x1) (x0)	27 81 (z1) (z0) (s1) (s0) (x1) (x0)	Display x Characters Normally

ASCII.	Hex.	Dec.	Command
<CSI> <2> <J>	9B 32 4A	155 50 74	Clear Screen
<CSI> <D>	9B 44	155 68	Cursor Left
<CSI> <C>	9B 43	155 67	Cursor Right
<CSI> <A>	9B 41	155 65	Cursor Up
<CSI> 	9B 42	155 66	Cursor Down
<CSI> <H>	9B 48	155 72	Cursor Home
<CSI> <E>	9B 45	155 69	Cursor to End
<CSI> (z1) (z0) <;> (s1) (s0) <H>	9B (z1) (z0) 3B (s1) (s0) 48	155 (z1) (z0) 59 (s1) (s0) 72	Cursor Positioning
<CSI> (z1) (z0) <;> (s1) (s0) <f>	9B (z1) (z0) 3B (s1) (s0) 66	155 (z1) (z0) 59 (s1) (s0) 102	also Cursor Positioning
<CSI> <h>	9B 68	155 104	Cursor On
<CSI> <l>	9B 6C	155 108	Cursor Off
<CSI> <5> <m>	9B 35 6D	155 53 109	Blink Mode On
<CSI> <7> <m>	9B 37 6D	155 55 109	also Blink Mode On
<CSI> <0> <m>	9B30 6D	155 48 109	All Attributes Off

6.2.2 Overview 4B1270.00-390 (following commands can only be executed by 4B1270.00-390)

ASCII	Hex.	Dec.	Command
<ESC> <1>	1B 31	27 49	Hex-switch Selecting
<ESC> <f>	1B 46	27 70	Matrix Selecting

WRITE CHARACTER

Description: If a displayable ASCII character (ASCII-Nr. 32 - 126, 128 - 154 and 156 - 255 in the expanded character set) is received from the panel, it is immediately displayed on the screen in the current cursor position and the cursor forward is made one position to the right. The old character is overwritten. If the cursor was in the last position of the line, the cursor remains unchanged.

Command:

Syntax	(z)
hex.	(z)
dec.	(z)

(z) displayable ASCII characters 32 - 126, 128 - 154 and 156 - 255

CARRIAGE RETURN

Description: The cursor is moved to the first position of the current line.

Command:

Syntax	<CR>
hex.	0D
dec.	13

LINE FEED

Description: The cursor is moved to the same position in the next line down.

Command:

Syntax	<LF>
hex.	0A
dec.	10

LED ON 4B1270.00-490

Description: With this command, either individual LEDs or all LEDs can be switched on. Additionally, the *Local Echo* of the selected LED(s) is switched off.

Command:

Syntax	<ESC>	<e>	(Nr)
hex.	1B	65	(Nr)
dec.	27	101	(Nr)

Parameter: (Nr) LED-Number (identical with key number)

(Hex)	(Nr) hex.	Description
31	1F	All LEDs are switched on as described above. The <i>Local Echo</i> for all LEDs is switched off.
32 - 52	20 - 34	The selected LED (Nr) is switched on and the <i>Local Echo</i> is switched off.

LED ON 4B1270.00-390

Description: With this command, either individual or all LEDs can be switched on.

Command:

Syntax	<ESC>	<e>	(Nr)
hex.	1B	65	(Nr)
dec.	27	101	(Nr)

Parameter: (Nr)LED-number (identical to key number)

(Nr)	(Nr) hex.	Discription
31	1F	All LEDs are switched on as described above.
32 – max. 54	20 – max. 36	The selected LED (Nr.) ist switched on.

LED OFF 4B1270.00-490

Description: With this command, either individual or all LEDs can be switched off. The *Local Echo* is also switched off for the selected LED(s).

Command:

Syntax	<ESC>	<a>	(Nr)
hex.	1B	61	(Nr)
dec.	27	97	(Nr)

Parameter: (Nr)LED-Number (identical to key number)

(Hex)	(Nr) hex.	Description
31	1F	All LEDs are turned off. <i>Local Echo</i> for all LEDs is turned off
32 - 52	20 - 34	Selected LED (Nr) and <i>Local Echo</i> for this LED are turned off.

LED OFF 4B1270.00-390

Description: With this command, either individual or all LEDs can be switched off.

Command:

Syntax	<ESC>	<a>	(Nr)
hex.	1B	61	(Nr)
dec.	27	97	(Nr)

Parameter: (Nr)LED-Number (identical to key number)

(Nr)	(Nr) hex.	Description
31	1F	All LEDs are turned off.
32 – max. 54	20 – max. 36	Selected LED (Nr) is turned off.

LED SLOWLY BLINKING 4B1270.00-490

Description: With this command, slow blinking (1 Hz) is switched on for individual key LEDs or all LEDs. In addition the *Local Echo* of the selected LED(s) is switched off.

Command:

Syntax	<ESC>	<I>	(Nr)
hex.	1B	6C	(Nr)
dec.	27	108	(Nr)

Parameter: (Nr)LED-Number (identical with key number)

(Nr)	(Nr) hex.	Description
31	1F	Slow blinking is switched on for all LEDs as described previously. The <i>Local Echo</i> is switched off for all LEDs.
32 - 52	20 - 34	Slow blinking is switched on for the selected LED (Nr) and the <i>Local Echo</i> is switched off.

LED SLOWLY BLINKING 4B1270.00-390

Description: With this command, slow blinking (1 Hz) is switched on for individual key LEDs or all LEDs.

Command:

Syntax	<ESC>	<I>	(Nr)
hex.	1B	6C	(Nr)
dec.	27	108	(Nr)

Parameter: (Nr)LED-Number (identical with key number)

(Nr)	(Nr) hex.	Description
31	1F	Slow blinking is switched on for all LEDs as described previously.
32 – max. 54	20 - 36	Slow blinking is switched on for the selected LED (Nr)

LED QUICKLY BLINKING 4B1270.00-490

Description: With this command, quick blinking (2 Hz) is switched on for individual or for all LEDs. In addition, the *Local Echo* for the selected LED(s) is switched off.

Command:

Syntax	<ESC>	<s>	(Nr)
hex.	1B	73	(Nr)
dec.	27	115	(Nr)

Parameter: (Nr)LED-Number (identical to key number)

(Hex)	(Nr) hex.	Description
31	1F	Quick blinking is switched on for "all" LEDs as described previously. The <i>Local Echo</i> is switched off for all LEDs.
32 - 52	20 - 34	Quick blinking is switched on for the selected LED (Nr) and the <i>Local Echo</i> is switched off.

LED QUICKLY BLINKING 4B1270.00-390

Description: With this command, quick blinking (2 Hz) is switched on for individual or for all LEDs.

Command:

Syntax	<ESC>	<s>	(Nr)
hex.	1B	73	(Nr)
dec.	27	115	(Nr)

Parameter: (Nr)LED-Number (identical to key number)

(Hex)	(Nr) hex.	Description
31	1F	Quick blinking is switched on for "all" LEDs as described previously.
32 – max. 54	20 – max. 36	Quick blinking is switched on for the selected LED (Nr)

LOCAL ECHO ON

Description: With this command the *Local Echo* is switched on for individual LEDs or for all LEDs. *Local Echo* means that each key press causes the respective LED to be simultaneously activated with the attribute set for the LED (i.e. slowly blinking, quickly blinking etc.) for as long as the key is pressed. Releasing the key switches the LED off. This provides the user with an optical signal when pressing a key without putting additional load on the PLC because this is all done within the panel.

Command:

Syntax	<ESC>	<H>	(Nr)	(Att)
hex.	1B	48	(Nr)	(Att)
dec.	27	72	(Nr)	(Att)

Parameter: (Nr)LED-Number (identical to key number)

(Nr)	(Nr) hex.	Description
31	1F	<i>Local Echo</i> turned on for all LEDs.
32 - 52	20 34	<i>Local Echo</i> turned on for the selected LED (Nr).

(Att) Attribute

(Att)	Description
<d>	LED lit continuously when the key is pressed.
<s>	LED blinks quickly (2 Hz) when the key is pressed.
<l>	LED blinks slowly (1 Hz) when the key is pressed.

Default: After a RESET or power-on, *Local Echo* is turned off for all keys.

Remark:**ATTENTION: Following optical signals are only for 4B1270.00-390**

When the Local Echo will activated by LED lighting, slowly blinking or quickly blinking the optical will change.

LED status when key is not pressed	Local Echo when key is pressed
Attribute <d> (char.)	
LED on	LED off
LED off	LED on
LED blinks slowly	LED blinks quickly
LED blinks quickly	LED blinks slowly
Attribute <s> (char.)	
LED on	LED blinks slowly
LED off	LED blinks quickly
LED blinks slowly	LED on
LED blinks quickly	LED off

LED status when key is not pressed	Local Echo when key is pressed
Attribute <I> (char.)	
LED on	LED blinks quickly
LED off	LED blinks slowly
LED blinks slowly	LED off
LED blinks quickly	LED on

REPEAT FREQUENCY DEFINITION

Description: With this command, the repeat frequency is defined for all keys, which are operating in WAIT-REPEAT or REPEAT mode.

Command:

Syntax	<ESC>	<f>	(f)	
hex.	1B	66	(f1)	(f0)
dec.	27	102	(f1)	(f0)

Parameter: (f)..... Repeat frequency in hertz may lie within the following range: If (f)=00, no key repeat

	adjustable range for (f)
Syntax	(f) = < f1 > < f0 > <f1 > < f0 >
char.	(f) = < 0 > < 0 > < 2 > < 5 >
dec.	(f) = < 48 > < 48 > < 50 > < 53 >
hex.	(f) = < 30 > < 30 > < 32 > < 35 >

Default: After a RESET or power-on, no default repeat frequency is set.

SET TIME FOR BACKGROUND LIGHTING

Description: Because of the short life span of the liquid crystal film for LC displays, it is an advantage to protect it. By shutting the display off after a certain period of time when not being used (no key presses), the film is saved and the life span is increased. The amount of time which should pass is set with this command. This command can also be used to switch the lighting on or off explicitly.

Command:

Syntax	<ESC>		(tt)	
hex.	1B	62	(t1)	(t0)
dec.	27	98	(t1)	(t0)

Parameter: <tt>Time in minutes.

(tt) char.	dez.	hex.	Description
<0><0>	<48><48>	<30><30>	Lighting is switched off. In this case the lighting is Also not switched back on with a key press.
<0><1> bis <9><8>	<48><49> bis <57><56>	<30><31> bis <39><38>	Length of time of the screen to stay active after the last key press or screen command in minutes.
<9><9>	<57><57>	<39><39>	The lighting is switched on an remain on, until the lighting is switched off again with (tt) = 0. If the time has been set, the display will go blank after the given amount of time.

SET MINIMUM DELAY

Description: This command can be used to set the minimum amount of time that must pass between two CAN frames which have been sent to the PCC. The maximum delay is 999 msec and can be set in steps of 1 msec. The default delay is 10 msec since the control panel sends a reset code and, if necessary, an error code to the PCC after initialization. The control panel can only receive data or commands after sending the reset code. This value guarantees that a receive task running on the PCC in task class 1 [10 msec] can receive all data. Without this delay, data blocks could be sent every 1 msec (worst case).

Command:

Syntax	<ESC>	<Y>	(zzz)
hex.	1B	59	(z2)(z1)(z0)
dec.	27	89	(z2)(z1)(z0)

Parameter: (zzz) Delay in steps of 1ms.

Valid values: <0><0><0> bis <9><9><9> char.
 <48><48><48> bis <57><57><57> dec.
 <30><30><30> bis <39><39><39> hex.

If the minimum delay is set to 000, the maximum transfer rate is valid.

STATUS REQUEST

Description: This command can be used on the PLC to request a status string from the control panel which contains information about the panel configuration and the hex switch settings.

Command:

Syntax	<ESC>	<S>
hex.	1B	53
dec.	27	83

Structure of the String Sent:

	Start	0.....1.....2.....3..... 012345678901234567890123456789	End
Status-String	<DC2>	Version: x.y Status: abccdefgh	<DC4>
hex.	12	Corresponding ASCII table	14
dec.	18	Corresponding ASCII table	20

Version: **x** Operating system version number
 y Operating system revision

Status: **a** Display code (4 - LC Display 4 x 20)
 b Character C will always be output [C for CAN].
 cc CAN node number [1 to 32].
 d Baud rate: corresponds to the first 2 bits of the first hex dial.
 0 ... 250 KBaud, 1 ... 125 KBaud, 2 ... 20 KBaud, 3 ... 500 KBaud
 e Number of keypad module connected
 f 0
 g 0
 h 0

REQUEST EXTENDED STATUS

Description: The PLC can request an *Extended status string* from the panel which contains more detailed information about the panel used.

Command:

Syntax	<ESC>	<E>
hex.	1B	45
dec.	27	69

The string is 20 characters long. In order to differentiate the status string from key presses, the ASCII character <DC2> is sent before the string and <DC4> is sent after.

Structure of the string:

	Start	0.....1..... 01234567890123456789	End
Status-String	<DC2>	aabbcddeeXXXXXXXXXXXX	<DC4>
hex.	12	Corresponding ASCII table	14
dec.	18	Corresponding ASCII table	20

Status:

aa Number of lines: 04
bb Number of columns (characters per line): 20
c Information, whether the display is graphics-capable
0 Not graphics-capable
dd Height of a 1*1 character in pixels: 08
ee Width of a 1*1 character in pixels: 06
X Free for future expansion

RESET

Description: The panel is put into the same state as after a power-on.

Command:

Syntax	<ESC>	<R>
hex.	1B	52
dec.	27	82

RESET TIME FOR BACKGROUND LIGHTING

Description: The user software can reactivate the background lighting with this command (e.g. for an alarm), without the user having to press a key. After receiving the command, the background lighting is activated for the defined amount of time (as for a key press). If the time is set with (00) or with (99), this sequence has no effect.

Command:

Syntax	<ESC>	<r>
hex.	1B	72
dec.	27	114

SET TIME FOR LIFETIME SIGNAL

Description: In order to check if the panel is working from the controller, a lifetime signal can be activated. The P127 then periodically sends a CAN frame containing "00" (at set interval).

Command:

Syntax	<ESC>	<p>	<l>	(t2)	(t1)	(t0)
hex.	1B	70	6C	(t2)	(t1)	(t0)
dec.	27	112	108	(t2)	(t1)	(t0)

Parameter: <ttt>.... Time in steps of 10 milliseconds from 10...2550 msec
000.....Lifetime signal off

Valid values: <0><0><0> to <2><5><5> char.
 <48><48><48> to <50><53><53> dec.
 <30><30><30> to <32><35><35> hex.

DISPLAY X CHARACTERS BLINKING

Description: Starting from the given cursor position line (z) and column (s) the **blinking** attribute is switched on for (x) amount of characters. The amount of lines displayed on the screen can also be exceeded.

Command:

Syntax	<ESC>	<N>	(z)		(s)		(x)	
hex.	1B	4E	(z1)	(z0)	(s1)	(s0)	(x1)	(x0)
dec.	27	78	(z1)	(z0)	(s1)	(s0)	(x1)	(x0)

Parameter:

(z) Line number
Range: <0><1> to <0><4>
 <30><31> to <30><34>

(s) Column number
Range: <0><1> to <2><0>
 <30><31> to <32><30>

(x) Number of characters which should be displayed with the **blinking** attribute.
Value: <0><1> to <8><0>
 <30><31> to <38><30>

See also: - Display X Characters Normally

DISPLAY X CHARACTERS NORMALLY

Description: Starting from the given cursor position line (z) and column (s), **blinking** attribute is switched off for (x) amount of characters. The amount of lines displayed on the screen can also be exceeded.

Command:

Syntax	<ESC>	<Q>	(z)		(s)		(x)	
hex.	1B	51	(z1)	(z0)	(s1)	(s0)	(x1)	(x0)
dec.	27	81	(z1)	(z0)	(s1)	(s0)	(x1)	(x0)

Parameter:

(z) Line number
Range: <0><1> to <0><4> char.
 <30><31> to <30><34> hex.

(s) Column number
Range: <0><1> to <2><0> char.
 <30><31> to <32><30> hex.

(x) Number of characters which should be displayed with attributes **blinking** switched off.
Value: <0><1> to <8><0> char.
 <30><31> to <38><30> hex.

See also: - Display X Characters Blinking

CLEAR SCREEN

Description: The entire display is cleared and the cursor is placed in home position.

Command:

Syntax	<CSI>	<2>	<J>
hex.	9B	32	4A
dec.	155	50	74

CURSOR LEFT

Description: The cursor is moved one position to the left. If the cursor is found in the first column, this command is ignored.

Command:

Syntax	<CSI>	<D>
hex.	9B	44
dec.	155	68

CURSOR RIGHT

Description: The cursor moves one position to the right. If the cursor is already in the last column, the command is ignored.

Command:

Syntax	<CSI>	<C>
hex.	9B	43
dec.	155	67

CURSOR UP

Description: The cursor moves one position (line) upward. If the cursor is found in the top line, the command is ignored.

Command:

Syntax	<CSI>	<A>
hex.	9B	41
dec.	155	65

CURSOR DOWN

Description: The cursor moves one position (line) downward. If the cursor is found in the bottom line, the command is ignored.

Command:

Syntax	<CSI>	<B>
hex.	9B	42
dec.	155	66

CURSOR HOME

Description: The cursor is placed in the first position of the first line.

Command:

Syntax	<CSI>	<H>
hex.	9B	48
dec.	155	72

CURSOR TO END

Description: The cursor is placed in the last position of the last line.

Command:

Syntax	<CSI>	<E>
hex.	9B	45
dec.	155	69

CURSOR POSITIONING

Description: The cursor is placed in the given position. An invalid position (outside of the display) causes the command to be ignored.

Command:

Syntax	<CSI>	(z)		<;>	(s)		<H>
hex.	9B	(z1)	(z0)	3B	(s1)	(s0)	48
dec.	155	(z1)	(z0)	59	(s1)	(s0)	72

or:

Syntax	<CSI>	(z)		<;>	(s)		<f>
hex.	9B	(z1)	(z0)	3B	(s1)	(s0)	66
dec.	155	(z1)	(z0)	59	(s1)	(s0)	102

Parameter: (z) Line number, beginning with <0><1> char. <30><31> hex. <48><49> dec.
(s) Column number, beginning with <0><1> char. <30><31> hex. <48><49> dec.

CURSOR ON

Description: The cursor position is shown by an underscore, that blinks back and forth with the character above it.

Command:

Syntax	<CSI>	<h>
hex.	9B	68
dec.	155	104

CURSOR OFF

Description: The cursor is switched off. The cursor position is no longer shown.

Command:

Syntax	<CSI>	<I>
hex.	9B	6C
dec.	155	108

BLINK MODE ON

Description: All displayable characters are output with the **blinking** attribute. This command is active until the “All Attributes Off” command is given.

Command:

Syntax	<CSI>	<5>	<m>
hex.	9B	35	6D
dec.	155	53	109

or:

Syntax	<CSI>	<7>	<m>
hex.	9B	37	6D
dec.	155	55	109

Also see: All Attributes Off

ALL ATTRIBUTES OFF

Description: The attributes of any further characters to be output are switched off, i.e., **blinking** is deactivated.

Command:

Syntax	<CSI>	<0>	<m>
hex.	9B	30	6D
dec.	155	48	109

See also: - Blinking Mode On

The following commands can only be executed by 4B1270.00-390:

HEX-SWITCH SELECTING

Description: The position of both Hex-switches is sent on the CAN Bus.

Command:

Syntax	<ESC>	<1>
hex.	1B	31
dec.	27	49

CAN - Frame Structure:

Switch 0	Switch 1
Value	Value

MATRIX SELECTING

Description: The whole copy of the key matrix will dispatched by the CAN Bus. Thereby the number of bytes transmitted is machine-dependent. (Number of scanned arrays and columns)

Command:

Syntax	<ESC>	<1>
hex.	1B	46
dec.	27	70

CAN - Frame setup:

Example: key matrix with 16 keys, during instruction execution (including key switch) no keys are pressed.
(All 16 Releasing Codes are sent)
160 161 162 163 164 165 166 167
168 169 170 171 172 173 174 175

Example: key matrix with 16 keys, during instruction execution the first and the third key are pressed.
(Pressing Code of the two keys)
32 161 34 163 164 165 166 167
168 169 170 171 172 173 174 175

Comment:

The matrix is dependent on the number of keys.

Keys which are not defined sent up to 128 bytes by 4B1270.00-390.

6.3 Data Format of CAN Objects Sent to the PLC

6.3.1 Key Codes

The panel can send the following 1 byte messages to the PLC. The table on the following page lists all 1 byte data that can be sent from the panel to the PLC.

Exception:

The response to the commands “Status Request” and “Request Extended Status” is not listed in the table.

6.3.2 Overview - Data Transfer Panel ⇨ PLC

hex.	dec.	Description
0	0	Lifetime signal
1 - F	1 - 15	t on codes
11	17	<XON> (reserved for software handshake, not used)
12	18	<DC2> (string end)
13	19	<XOFF> (reserved for software handshake, not used)
14	20	<DC4> (string end)
15 – 1E	21 - 30	not used
1F	31	used as start of frame for selecting the encoder
20 – 7E	32 - 126	t on codes
80	127	used to fill the key matrix
81 - 8F	129 - 143	t off codes (key let go Code)
90	144	Panel triggered a reset (after power-on or by a command from the controller)
91 - 96	145 - 150	not used
97	151	Command sequence was interrupted (by f.e. timeout, <ESC> from PLC, unknown command sequence, unvalid parameter)
98	152	not used
99	153	The CAN controller triggered a reset
9A – 9F	154 - 159	not used
A0 - FE	160 - 254	t off codes

6.3.3 Key Object Data

Key Code:

Key not pressed, lifetime signal	0 (0x00)
Key pressed	32...55 or hex: 20...37 see Key/LED Matrix
Key released	Key code + 128 (most significant bit set)

The key numbers are the same as the respective LED numbers. When pressing one or more keys, each new key press causes a key code to be sent. When the key is released, the key code is sent with bit 7 set. If more than one key is pressed, the last key pressed (if pressed at the same time, the last key in the matrix) is stored as the repeat key. When this key is released, repeat mode is ended until another key is pressed.

If several keys are pressed within a key scan cycle (16 msec) or another message (e.g. unknown command sequence 0x97) is sent on the CAN bus, the key codes can also be in the second, third or even the last (eight) byte of the CAN message.

CAN frames are always filled from front to back (byte 0 ... byte 7).

6.4 ASCII Code Table

See tables on the following pages

Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.
000	\$00		016	\$10		032	\$20		048	\$30	0
001	\$01		017	\$11		033	\$21	!	049	\$31	1
002	\$02		018	\$12		034	\$22	"	050	\$32	2
003	\$03		019	\$13		035	\$23	#	051	\$33	3
004	\$04		020	\$14		036	\$24	\$	052	\$34	4
005	\$05		021	\$15		037	\$25	%	053	\$35	5
006	\$06		022	\$16		038	\$26	&	054	\$36	6
007	\$07		023	\$17		039	\$27	'	055	\$37	7
008	\$08		024	\$18		040	\$28	(	056	\$38	8
009	\$09		025	\$19		041	\$29	)	057	\$39	9
010	\$0A		026	\$1A		042	\$2A	*	058	\$3A	:
011	\$0B		027	\$1B		043	\$2B	+	059	\$3B	;
012	\$0C		028	\$1C		044	\$2C	,	060	\$3C	<
013	\$0D		029	\$1D		045	\$2D	-	061	\$3D	=
014	\$0E		030	\$1E		046	\$2E	.	062	\$3E	>
015	\$0F		031	\$1F		047	\$2F	/	063	\$3F	?

Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.
064	\$40	@	080	\$50	P	096	\$60	`	112	\$70	p
065	\$41	A	081	\$51	Q	097	\$61	a	113	\$71	q
066	\$42	B	082	\$52	R	098	\$62	b	114	\$72	r
067	\$43	C	083	\$53	S	099	\$63	c	115	\$73	s
068	\$44	D	084	\$54	T	100	\$64	d	116	\$74	t
069	\$45	E	085	\$55	U	101	\$65	e	117	\$75	u
070	\$46	F	086	\$56	V	102	\$66	f	118	\$76	v
071	\$47	G	087	\$57	W	103	\$67	g	119	\$77	w
072	\$48	H	088	\$58	X	104	\$68	h	120	\$78	x
073	\$49	I	089	\$59	Y	105	\$69	i	121	\$79	y
074	\$4A	J	090	\$5A	Z	106	\$6A	j	122	\$7A	z
075	\$4B	K	091	\$5B	[	107	\$6B	k	123	\$7B	{
076	\$4C	L	092	\$5C	¥	108	\$6C	l	124	\$7C	|
077	\$4D	M	093	\$5D	]	109	\$6D	m	125	\$7D	}
078	\$4E	N	094	\$5E	^	110	\$6E	n	126	\$7E	→
079	\$4F	O	095	\$5F	_	111	\$6F	o	127	\$7F	

Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.
128	\$80		144	\$90		160	\$A0		176	\$B0	ー
129	\$81	ü	145	\$91		161	\$A1	▣	177	\$B1	ア
130	\$82		146	\$92		162	\$A2	「	178	\$B2	イ
131	\$83		147	\$93		163	\$A3	」	179	\$B3	ウ
132	\$84	ä	148	\$94	ö	164	\$A4	ゝ	180	\$B4	エ
133	\$85		149	\$95		165	\$A5	・	181	\$B5	オ
134	\$86		150	\$96		166	\$A6	ヲ	182	\$B6	カ
135	\$87		151	\$97		167	\$A7	ア	183	\$B7	キ
136	\$88		152	\$98		168	\$A8	イ	184	\$B8	ク
137	\$89		153	\$99	Ö	169	\$A9	ウ	185	\$B9	ケ
138	\$8A		154	\$9A	Ü	170	\$AA	エ	186	\$BA	コ
139	\$8B		155	\$9B		171	\$AB	オ	187	\$BB	サ
140	\$8C		156	\$9C		172	\$AC	カ	188	\$BC	シ
141	\$8D		157	\$9D		173	\$AD	ユ	189	\$BD	ズ
142	\$8E	Ä	158	\$9E		174	\$AE	ヨ	190	\$BE	セ
143	\$8F		159	\$9F		175	\$AF	ツ	191	\$BF	リ

Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.	Dec.	Hex.	Char.
192	\$C0	ヲ	208	\$D0	ミ	224	\$E0		240	\$F0	
193	\$C1	チ	209	\$D1	ム	225	\$E1	ß	241	\$F1	
194	\$C2	ツ	210	\$D2	メ	226	\$E2		242	\$F2	
195	\$C3	テ	211	\$D3	モ	227	\$E3		243	\$F3	
196	\$C4	ト	212	\$D4	ヤ	228	\$E4		244	\$F4	
197	\$C5	ナ	213	\$D5	ユ	229	\$E5		245	\$F5	
198	\$C6	ニ	214	\$D6	ヨ	230	\$E6		246	\$F6	
199	\$C7	ヌ	215	\$D7	ラ	231	\$E7		247	\$F7	
200	\$C8	ネ	216	\$D8	リ	232	\$E8		248	\$F8	
201	\$C9	ノ	217	\$D9	ル	233	\$E9		249	\$F9	
202	\$CA	ハ	218	\$DA	レ	234	\$EA		250	\$FA	
203	\$CB	ヒ	219	\$DB	ロ	235	\$EB		251	\$FB	
204	\$CC	フ	220	\$DC	ワ	236	\$EC		252	\$FC	
205	\$CD	ヘ	221	\$DD	ン	237	\$ED		253	\$FD	
206	\$CE	ホ	222	\$DE	ハ	238	\$EE		254	\$FE	
207	\$CF	マ	223	\$DF	カ	239	\$EF		255	\$FF	

6.5 Error Handling:

Before installing a panel in a switching cabinet, operator station or machine, it makes sense to test it completely.

6.5.1 Error Handling 4B1270.00-490

6.5.1.1 Visual Check

Before power-on, check the following points:

- Check mechanical connections
- If necessary, check the position of the number switches (node number, baud rate).

6.5.1.2 Start-up

The first test to be carried out is to apply the 24 V supply to the panel.

All LEDs should light up for a short time and the following message should appear on the display:

```
B&R Compact CAN HMI
V X.X CAN Node number:--
Baud rate: ---kBaud
12 LED      24 Keys
```

If this message appears on the display, the processor, display and internal power supply are working correctly. If a valid node number and Baud rate are set, the node number and baud rate that are set will be shown instead of "--".

- Display remains dark: Is the supply voltage really between 18 and 30 VDC?
- The display contrast has to be able to be set darker or brighter using keys 7 and 8 or 7 and 9.
- The above message is shown on the display, but commands cannot be received on the CAN interface:
Does the CAN identifier correspond to the set node number, is the correct baud rate set?
Is the correct CAN cable being use? --> See CAN Bus Specification

6.5.1.3 Start Application

Proper operation of the CAN interface on the P127 cannot be checked with the previous tests.

To test the panel completely, the application can be started before installing the panel in order to check its functionality.

6.5.2 Error Handling 4B1270.00-390

6.5.2.1 CAN-Bus is disconnected

If the CAN Bus is disconnected the out buffer sends data up to 256 Bytes. This 256 Bytes are stored in the out buffer until the connection is established again. After this the out buffer is emptied.

If the size of the out buffer is exceeded the rest is deleted.

The state of the LEDs remain the same.

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Conversion Tables

Metric and English Equivalents

Some the values in this manual are only given as metric values. The following formulas and charts are given to help with any conversion problems that you may have.

Temperature

Below are two formulas to help in the conversion from Fahrenheit to Centigrade and vice versa.

Linear Measure & Weights

This document includes the product dimensions and cutout sizes in metric. Use the conversions below to calculate these measurements into the equivalent imperial units.

Fahrenheit °F	Metric °C
-40	-40
-20	-28.89
-10	-23.33
-5	-20.56
0	-17.78
10	-12.22
20	-6.67
30	-1.11
40	4.44
50	10.00
60	15.56
70	21.11
80	26.67
90	32.22
100	37.78
110	43.33
120	48.89
130	54.44
140	60.00
150	65.56

$$5/9 \times (°F - 32) = °C$$

Metric °C	Fahrenheit °F
-40	-40.00
-35	-31.00
-30	-22.00
-25	-13.00
-20	-4.00
-15	5.00
-10	14.00
-5	23.00
0	32.00
5	41.00
10	50.00
15	59.00
20	68.00
25	77.00
30	86.00
35	95.00
40	104.00
45	113.00
50	122.00
55	131.00
60	140.00

$$(9/5 \times °C) + 32 = °F$$

English Units	Metric Units
1 inch	25.4 millimeters 2.54 centimeters
1 foot	30.48 centimeters 3.048 decimeters 0.3048 meter
1 yard	0.9144 meter
0.03937 inch	1 millimeter
0.3937 inch	1 centimeter
3.937 inches	1 decimeter
39.37 inches 3.2808 feet 1.0936 yards	1 meter
3280.8 feet 1093.6 yards 0.62137 mile	1 kilometer

English Units	Metric Units
1 pound	0.45359 kilogram
1 ounce	28.350 grams
1 short ton tons	907.18 kilograms 0.90718 metric
1 long ton	1016.0 kilograms 1.0160 metric tons