

PANELWARE

P120 COMPACT MMI

Version: **2.0** (November 1997)

Model No.: **MAP120-0E**

Table of Contents

Preface	1
General Information	63
Package Contents	65
Technical Data	66
Dimensions	68
Overview of Connection and Operational Elements	69
RS232 Interface	70
Pin-outs	70
Power Supply	71
Operating Mode Switch	72
COMPACT MMI Installation	73
COMPACT MMI Removal	77
Installation Instructions	78
Connection from COMPACT MMI to PLC	79
Connection from P120 to PC	83

PLC Configuration	85
P121 Command Set	86
Command Overview	86
Sorted by Group	87
Sorted by Number	89
Sorted by Command	91
Outputting ASCII Characters (output directly to display)	93
Control Characters	93
Attribute Control	97
Binary/ASCII Conversion	99
Key Code Request	104
Display Lighting	105
Key Lighting	106
Delete Functions	108
ASCII Character Set	110
Index	111

General Information

In a large percentage of modern automation concepts, so-called MMIs (Man Machine Interface) can no longer be done without. Controlled monitoring of machine processing, continuous process value information output and optimal accessing capabilities must be integrated within the MMI. A compatible combination of MMI and controller determines the functionality, power, effectiveness, and last but definitely not least - the cost.

The COMPACT MMI P120 from B&R is an inexpensive, powerful, space saving and extremely universal operator interface panel. It has the comfort of PANELWARE for picture creation and the memory capacity for all pictures and text

to keep the load off of the controller. Picture creation and organizing the operational sequence is all done with PANELWARE Configuration Software (PCS). Configuring and defining parameters are all you have to do when using this tool. PANELWARE data is stored within the local EEPROM of the COMPACT MMI and is processed from there. Communication with the PLC is handled through the MININET protocol.

Energy provision for the electronics of the MMI is done from the controller in order to save on volume and power in the panel.

A 2 x 20 character LCD is used as the display. An LED background lighting with an automatic

shut-off and a practically unending life expectancy has also been integrated. In addition to the alphanumeric display, operator guidance is also assisted with key LEDs.

The best possible adaptability for suiting customer wishes has been integrated into the COMPACT MMI in the form of key legends which can be changed or replaced at any time through the front of the unit. The same method as the key legends has also been used for customized company logos or product names. The MMI is also sealed to IP54 standards.

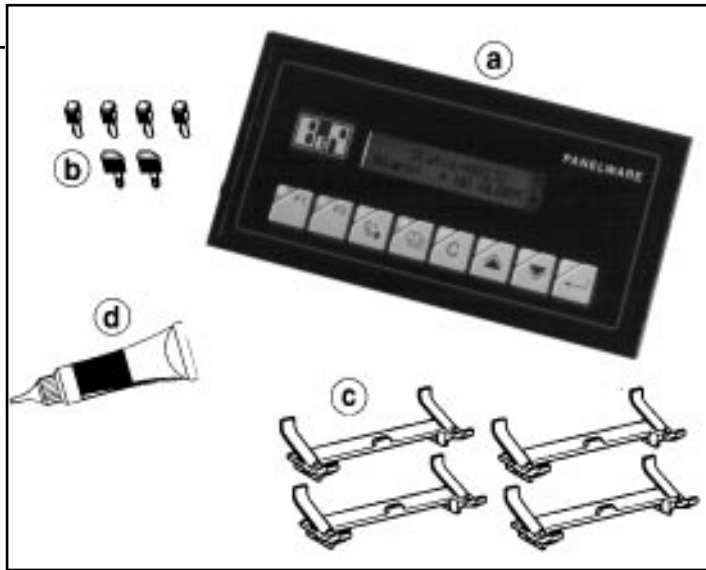
In spite of the advantages of the PANELWARE philosophy there are still other applications which can be solved with a simpler terminal. The P121 variation of the COMPACT has been developed for this reason and especially for

products that cannot be accessed through MININET. The P121 is operated through control sequences from the PLC. The overall visualization is therefore handled externally.

The COMPACT MMI in combination with the COMPACT PLC BRCOMP1-0 makes an extra low cost and very attractive automation package (control and visualization). It is also possible to use the COMPACT MMI with a MINI, MIDI, MULTICONTROL or an M264.

Package Contents

- a COMPACT MMI
- b Mounting pins
- c Spring clips
- d Sealant tube
- This description booklet

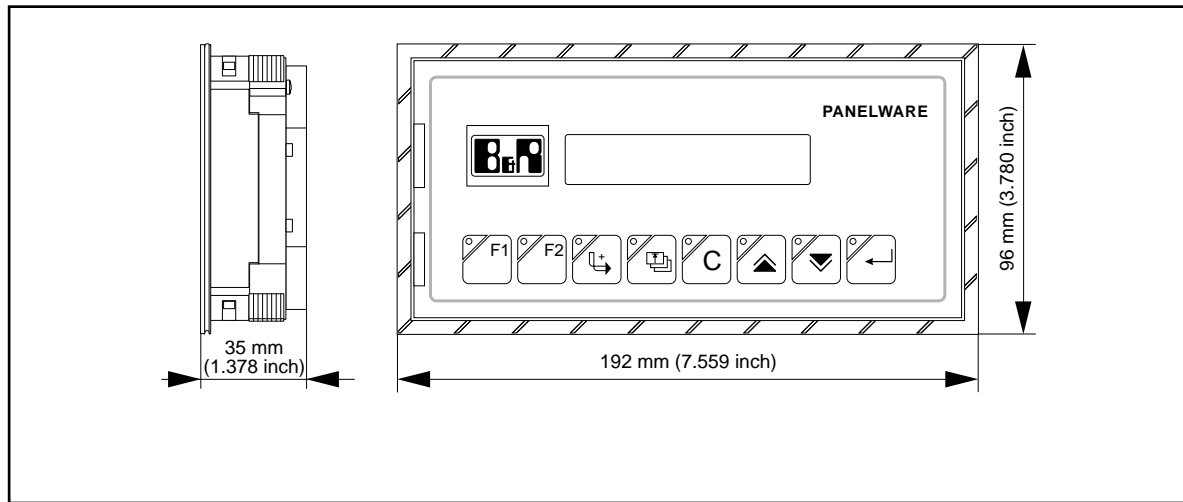


Technical Data

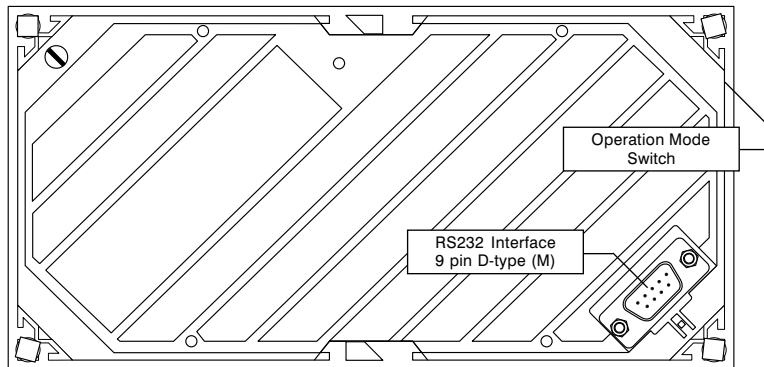
Model Name	P120 COMPACT MMI	P121 COMPACT MMI
Model Number	4B1200.00-590	4B1210.00-590
Dimensions (L x W X H)	192 mm x 96 mm x 35 mm (7.56" x 3.78" x 1.378") - PANELWARE Standard Frame	
Installation Cutout Tolerance	188 mm x 92 mm (7.41" x 3.63") - 0 mm + 0.5 mm (-0" + 0.196")	
Display	2 x 20 LCD, LED-background lighting	
Keyboard	Membrane keypad with 8 Keys, lit with LEDs, Slide-in Key Legends	
RS232 Interface Baudrate	not galvanically isolated 9600 Baud	
Power Supply Voltage Current Temperature Coefficient Ripple	typ. 5.2 V (min. 5 V, max. 5.5 V) 200 mA max. 1 mV/°C max. 50 mV	
Software Control	Creation of the pictures with PANELWARE Configuration Software (PCS Version 1.71 and higher), Application stored in the COMPACT MMI (32 KBytes EEPROM, max. 250 pictures), Data is requested by the P120 automatically from the PLC	Control by the PLC with ESC Sequences (no memory in the P121)

Weight	300 g
Storage Temperature	-20 - 60 °C
Shock Resistance	20 G
Front	Multiple membrane with windows for slide-in key legend and company logo or machine name
Protection Type	IP54 (on the front)
Test Certification	UL, CSA (in preparation)
Operating Temperature	0 - 50 °C
Relative Humidity	10 - 90 %, non-condensing

Dimensions



Overview of Connection and Operational Elements

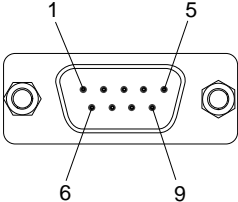


Rear view of the COMPACT MMI

RS232 Interface

A 9 pin D-type male connector can be found on the back of the COMPACT MMI:

Pin-outs

9 pin D-type (M)	Pin	RS232	Description
	1	-	
	2	RXD	
	3	TXD	
	4	+5V	Voltage supply for MMI
	5	GND	Reference potential (Ground)
	6	+5V	Voltage supply for MMI
	7	-	
	8	-	
	9	+5V	Voltage supply for MMI

Attention: The panel is not galvanically isolated. All interface signals refer to ground!

Power Supply

The panel is supplied through pins 4 and 5 (or 6 or 9) of the 9 pin D-type (M) connector. The power supply must match the following specifications:

Voltage:	typ. 5.2 V (min. 5 V, max. 5.5 V)
Current:	200 mA
Temperature Coefficient:	max. 1 mV/°C
Ripple:	max. 50 mV

Operating Mode Switch

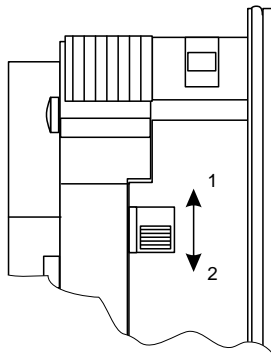
This switch is only found on the COMPACT MMI P120 and not on the P121. Switching between "Teach Mode" and "Run Mode" is done with this switch.

- ❑ **Teach Mode (Position 2)**

In this mode of operation, a project created with the PANELWARE Configuration Software can be transferred from a PC to the P120. If the P120 is switched on in this mode of operation, the text "TEACH-MODE WAITING FOR DATA" is displayed on the display.

- ❑ **Run Mode (Position 1)**

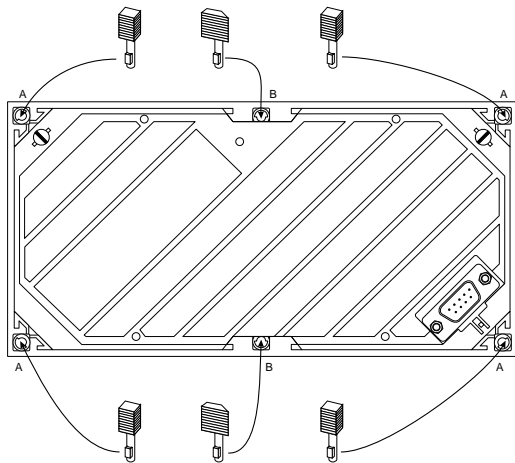
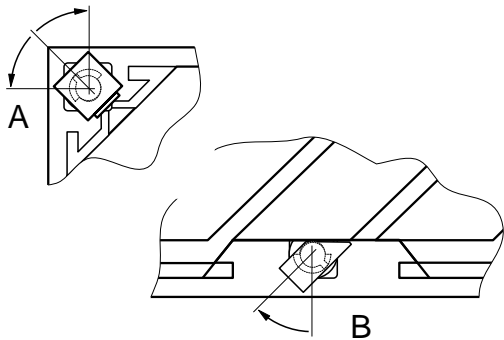
If the P120 is switched on in this mode of operation, the project which has been downloaded to the panel is started.



Operating Mode Switch

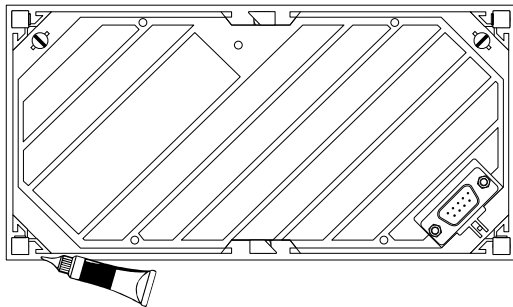
COMPACT MMI Installation

1. Insert mounting pins

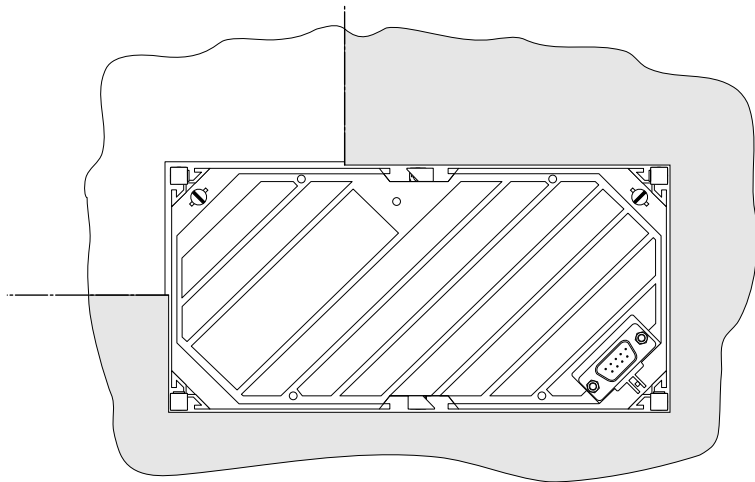


ENGLISH

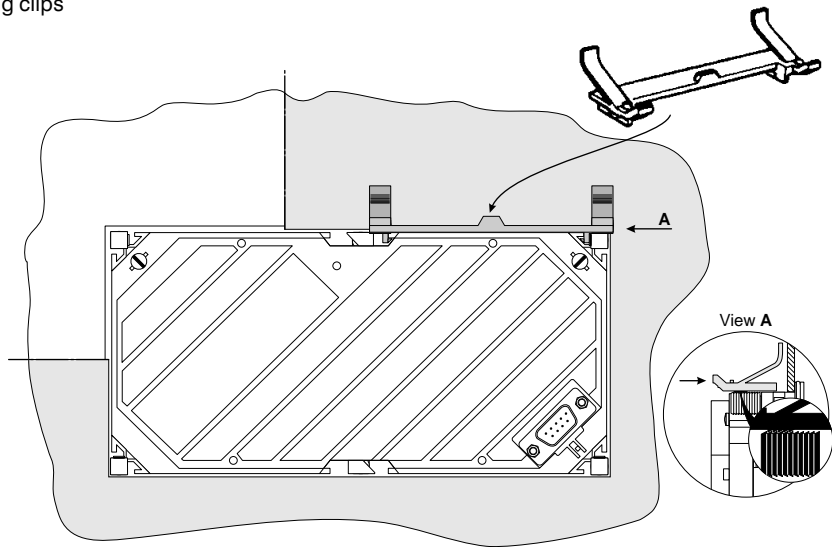
2. Apply sealant



3. Insert panel



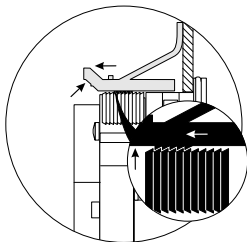
4. Install spring clips



COMPACT MMI Removal

Deinstallation and removal of the panel is done in the reverse sequence

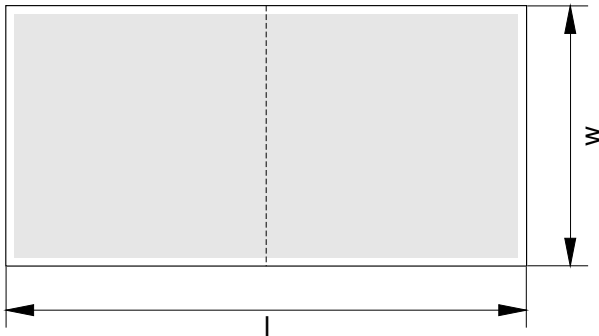
1. Remove spring clips



2. Remove panel
3. Remove and reapply sealant before a new installation
4. The mounting pins do not have to be removed

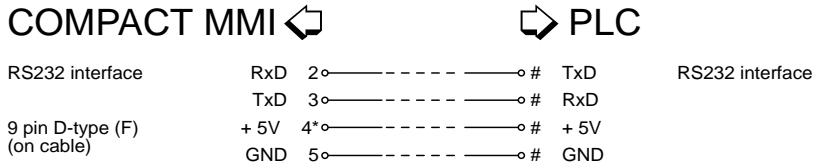
Installation Instructions

- l Length = 192 mm (7.56")
- w ... Width = 96 mm (3.78")
- Cut-out size = 188 x 92 mm
(7.41" x 3.63")



Connection from COMPACT MMI to PLC

To make the connection between the COMPACT MMI and the PLC, the following cable is to be used:

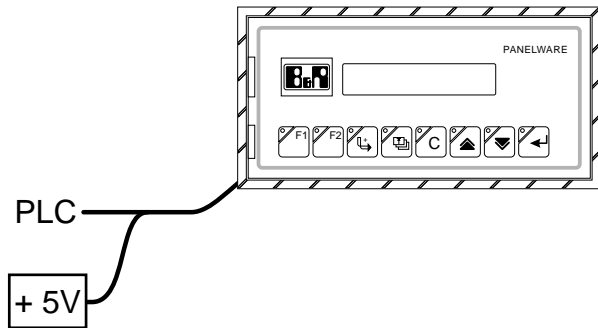


* You can also use pins 6 or 9 instead of pin 4

For pin-outs and proper connection to the PLC interface, please consult the PLC description.

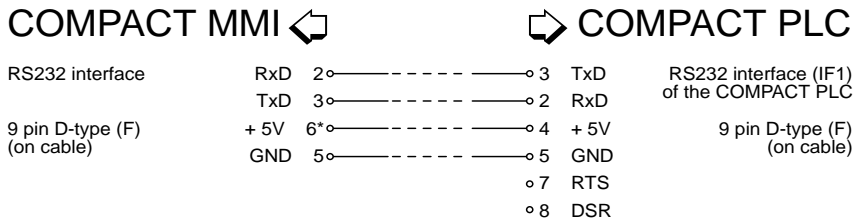
Attention: The voltage drop on the cable must be taken into consideration.

Ensure that the COMPACT MMI is supplied with enough current (max. 120 mA). If there is no 5 V provision through the interface of the PLC, it can be cabled from another source:



Attention: The voltage drop on the cable must be taken into consideration.

The COMPACT MMI is the ideal supplement in combination with the COMPACT PLC. The COMPACT PLC's interface has a built in 5 V supply which can be used for the COMPACT MMI. This requires the following cable:

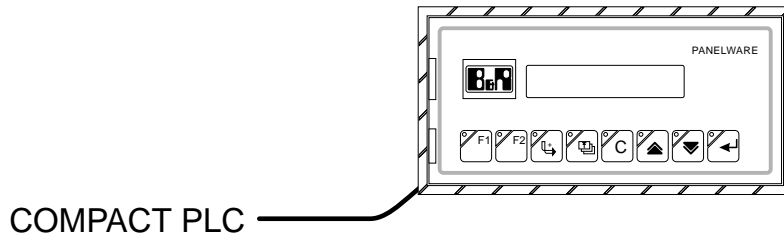


* You can also use pins 4 or 9 instead of pin 6

Standard Cable: BRKACOMP1-0 (1.5 m)

Attention: The voltage drop on the cable must be taken into consideration.

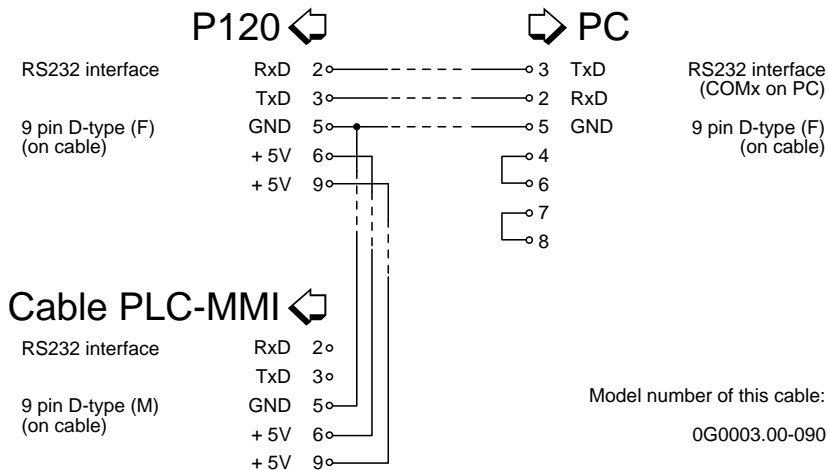
If the COMPACT MMI is connected with the COMPACT PLC it is not necessary to set up an external 5 V power supply:



Attention: The voltage drop on the cable must be taken into consideration.

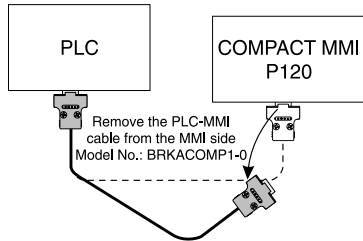
Connection from P120 to PC

To configure the COMPACT MMI with PANELWARE Configuration Software, a connection must be made between the P120 and the PC. Since a serial PC interface (COMx) normally doesn't have a 5 V supply, an adapter cable is switched between the P120 and the PLC. The 5 V power supply is used from the PLC side as shown here.

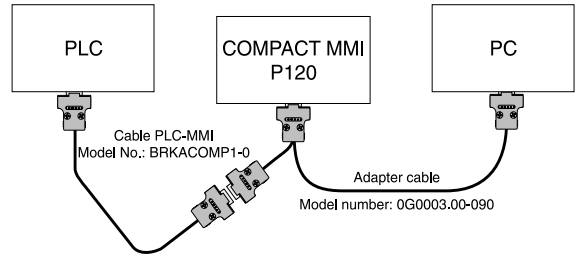


To connect the P120 to the PC, first disconnect the P120 and then connect the adapter cable as shown below:

Disconnect the MMI from the PLC



Connect the adapter cable



The adapter cable guarantees that the COMPACT MMI is still provided with power through the PLC.

PLC Configuration

The PLC is configured exactly the same as a MINI, MIDI, MULTICONTROL or M264 must be for the connection with a BRIT panel (see "PANELWARE Application Manual (B&R Drivers)").

Communication between the PLC and the P120 is done with the MININET protocol. The PLC must operate as a MININET slave with station number \$11 (dec. 17). The baudrate of the PLC interface must be defined with 9600 baud. Station number and baudrate hast to be entered in the PLC software as a FBK parameter (see "Chapter 6 B&R MININET" in "*Standard Software User's Manual*").

P121 Command Set

The COMPACT MMI P121 communicates with the PLC over the RS232 interface. If data that the panel cannot understand is sent from the PLC, it is ignored. There is no error message!

Basically the following information is handled by the P121 operating system:

- ASCII characters (output directly to the screen)
- Control characters (e.g. Cursor position)
- Attribute control
- Binary/ASCII conversion
- Key code requests
- Display and key lighting

Command Overview

A command overview can be found on the following pages. The overview is sorted according to various criteria. This overview is provided to help to find the desired command as quickly as possible.

Sorted by Group

ASCII	hex.	dec.	Command
Control Character			
<Ctrl> H	08	08	Cursor left
<Ctrl> I	09	09	Cursor right
<Ctrl> J	0A	10	Cursor down (Line Feed)
<Ctrl> K	0B	11	Cursor up
<Ctrl> L	0C	12	Cursor HOME
<Ctrl> M	0D	13	Carriage Return
<Ctrl> R (l) (c)	12 (l) (c)	18 (l) (c)	Position cursor to line (l) / column (c)
<ESC> N (l)	1B 4E (l)	27 78 (l)	Position cursor to the first column of line (l)
<ESC> P (c)	1B 50 (c)	27 80 (c)	Position cursor in the current line to column (c)
Attribute control			
<Ctrl> O	0F	15	Attribute: blinking on
<Ctrl> N	0E	14	Attribute: blinking off
<Ctrl> U	15	21	Character blinking
<Ctrl> T	14	20	Character not blinking
Binary/ASCII conversion			
<ESC> U (x)	1B 55 (x)	27 85 (x)	Output binary number (x) as 3 digit decimal number
<ESC> V (x)	1B 56 (x)	27 86 (x)	Output binary number (x) as 2 digit decimal number
<ESC> H (x)	1B 48 (x)	27 72 (x)	Output binary number (x) as 2 digit hexadecimal number

<ESC> Y (x)	1B 59 (x)	27 89 (x)	Output binary number (x) as 2 digit hexadecimal number (with space character)
<Ctrl> Y (x1) (x0)	19 (x1) (x0)	25 (x1) (x0)	Output 2 byte number (x1) (x0) as 4 digit decimal number with decimal point
<Ctrl> Z (x1) (x0)	1A (x1) (x0)	26 (x1) (x0)	Output 2 byte number (x1) (x0) as 3 digit decimal number with decimal point and/or sign
Key Code Request			
<ESC> W	1B 57	27 87	Requests the key code
Display Lighting			
<ESC> G (x)	1B 47 (x)	27 71 (x)	Set lighting period
Key Lighting			
<ESC> E (x)	1B 45 (x)	27 69 (x)	LED (x) ON
<ESC> A (x)	1B 41 (x)	27 65 (x)	LED (x) OFF
<ESC> T	1B 54	27 84	Switch on all LEDs
<ESC> C	1B 43	27 67	Switch off all LEDs
<ESC> L (x)	1B 4C (x)	27 76 (x)	LED (x) slowly blinking
<ESC> S (x)	1B 53 (x)	27 83 (x)	LED (x) quickly blinking
Delete Functions			
<ESC> R	1B 52	27 82	Reset panel
<ESC> B	1B 42	27 66	Clear screen
<ESC> D	1B 44	27 68	Delete line from current cursor position
<ESC> F (l)	1B 46 (l)	27 70 (l)	Delete line (l)
ASCII Characters			
	20 - FF	32 - 255	ASCII Character

Sorted by Number

ASCII	hex.	dec.	Command
<Ctrl> H	08	08	Cursor left
<Ctrl> I	09	09	Cursor right
<Ctrl> J	0A	10	Cursor down (Line Feed)
<Ctrl> K	0B	11	Cursor up
<Ctrl> L	0C	12	Cursor HOME
<Ctrl> M	0D	13	Carriage Return
<Ctrl> N	0E	14	Attribute: blinking off
<Ctrl> O	0F	15	Attribute: blinking on
<Ctrl> R (l) (c)	12 (l) (c)	18 (l) (c)	Position cursor to line (l) / column (c)
<Ctrl> T	14	20	Character not blinking
<Ctrl> U	15	21	Character blinking
<Ctrl> Y (x1) (x0)	19 (x1) (x0)	25 (x1) (x0)	Output 2 byte number (x1) (x0) as 4 digit decimal number with decimal point
<Ctrl> Z (x1) (x0)	1A (x1) (x0)	26 (x1) (x0)	Output 2 byte number (x1) (x0) as 3 digit decimal number with decimal point and/or sign
<ESC> A (x)	1B 41 (x)	27 65 (x)	LED (x) OFF
<ESC> B	1B 42	27 66	Clear screen
<ESC> C	1B 43	27 67	Switch off all LEDs
<ESC> D	1B 44	27 68	Delete line from current cursor position
<ESC> E (x)	1B 45 (x)	27 69 (x)	LED (x) ON

<ESC> F (l)	1B 46 (l)	27 70 (l)	Delete line (l)
<ESC> G (x)	1B 47 (x)	27 71 (x)	Set lighting period
<ESC> H (x)	1B 48 (x)	27 72 (x)	Output binary number (x) as 2 digit hexadecimal number
<ESC> L (x)	1B 4C (x)	27 76 (x)	LED (x) slowly blinking
<ESC> N (l)	1B 4E (l)	27 78 (l)	Position cursor to the first column of line (l)
<ESC> P (c)	1B 50 (c)	27 80 (c)	Position cursor in the current line to column (c)
<ESC> R	1B 52	27 82	Reset Panel
<ESC> S (x)	1B 53 (x)	27 83 (x)	LED (x) quickly blinking
<ESC> T	1B 54	27 84	Switch on all LEDs
<ESC> U (x)	1B 55 (x)	27 85 (x)	Output binary number (x) as 3 digit decimal number
<ESC> V (x)	1B 56 (x)	27 86 (x)	Output binary number (x) as 2 digit decimal number
<ESC> W	1B 57	27 87	Key code request
<ESC> Y (x)	1B 59 (x)	27 89 (x)	Output binary number (x) as 2 digit hexadecimal number (with space character)
	20 - FF	32 - 255	Output ASCII character

Sorted by Command

ASCII	hex.	dec.	Command
<Ctrl> Z (x1) (x0)	1A (x1) (x0)	26 (x1) (x0)	Output 2 byte number (x1) (x0) as 3 digit decimal number with decimal point and/or sign
<Ctrl> Y (x1) (x0)	19 (x1) (x0)	25 (x1) (x0)	Output 2 byte number (x1) (x0) as 4 digit decimal number with decimal point
<ESC> W	1B 57	27 87	Key code request
<ESC> C	1B 43	27 67	Switch off all LEDs
<ESC> T	1B 54	27 84	Switch on all LEDs
<ESC> B	1B 42	27 66	Clear screen
	20 - FF	32 - 255	Output ASCII character
<Ctrl> N	0E	14	Attribute: blinking off
<Ctrl> O	0F	15	Attribute: blinking on
<ESC> G (x)	1B 47 (x)	27 71 (x)	Set lighting period
<ESC> V (x)	1B 56 (x)	27 86 (x)	Output binary number (x) as 2 digit decimal number
<ESC> H (x)	1B 48 (x)	27 72 (x)	Output binary number (x) as 2 digit hexadecimal number
<ESC> Y (x)	1B 59 (x)	27 89 (x)	Output binary number (x) as 2 digit hexadecimal number (with space character)
<ESC> U (x)	1B 55 (x)	27 85 (x)	Output binary number (x) as 3 digit decimal number
<Ctrl> M	0D	13	Carriage Return
<Ctrl> L	0C	12	Cursor HOME
<ESC> P (c)	1B 50 (c)	27 80 (c)	Position cursor in the current line to column (c)
<Ctrl> R (l) (c)	12 (l) (c)	18 (l) (c)	Position cursor to line (l) / column (c)

<ESC> N (l)	1B 4E (l)	27 78 (l)	Position cursor to the first column of line (l)
<Ctrl> H	08	08	Cursor left
<Ctrl> K	0B	11	Cursor up
<Ctrl> J	0A	10	Cursor down (Line Feed)
<Ctrl> I	09	09	Cursor right
<ESC> A (x)	1B 41 (x)	27 65 (x)	LED (x) OFF
<ESC> E (x)	1B 45 (x)	27 69 (x)	LED (x) ON
<ESC> L (x)	1B 4C (x)	27 76 (x)	LED (x) slowly blinking
<ESC> S (x)	1B 53 (x)	27 83 (x)	LED (x) quickly blinking
<ESC> R	1B 52	27 82	Reset panel
<Ctrl> U	15	21	Character blinking
<Ctrl> T	14	20	Character not blinking
<ESC> F (l)	1B 46 (l)	27 70 (l)	Delete line (l)
<ESC> D	1B 44	27 68	Delete line from the current cursor position

Outputting ASCII Characters (output directly to display)

ASCII characters are output directly to the screen in the current cursor position. The cursor is moved one position to the right. All characters in the range from \$20 to \$FF (dec. 32 - 255) are ASCII characters.

Control Characters

These commands are used to move the cursor to a certain position on the display. They can output your characters or text in the desired position on the screen.

Cursor left

ASCII	hex.	dec.
<Ctrl> H	08	08

The cursor is moved one position to the left. When the cursor is in the first column against the left border, this command moves the cursor to the last position in the previous line (the line above). If the cursor is in the HOME position when the command is given, it is moved to the last column of the last line.

Cursor right

ASCII	hex.	dec.
<Ctrl> I	09	09

The cursor is moved one position to the right. If the cursor is in the last column against the right-hand border of the screen, the cursor is moved to the first position of the next line. If the cursor is in the last column of the last line and this command is given, it moves to the HOME position.

Cursor down (Line Feed)

ASCII	hex.	dec.
<Ctrl> J	0A	10

The cursor moves one line down. If the cursor is in the last line, it is moved to the same column of the first line.

Cursor up

ASCII	hex.	dec.
<Ctrl> K	0B	11

The cursor is moved one line up. If the cursor is already in the first line, it is moved to the same column of the last line.

Cursor HOME

ASCII	hex.	dec.
<Ctrl> L	0C	12

The cursor is moved to the first column of the first line.

Carriage Return

ASCII	hex.	dec.
<Ctrl> M	0D	13

The cursor is moved to the first column of the same line.

Cursor positioning

ASCII	hex.	dec.	Range (hex. / dec.)	
<Ctrl> R (l) (c)	12 (l) (c)	18 (l) (c)	$00 \leq (l) \leq 01$ $00 \leq (l) \leq 13$	$0 \leq (c) \leq 1$ $0 \leq (c) \leq 19$

The cursor is moved to column (c) of line (l).

(s) \ (z)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
0																					
1																					

Position cursor to the first column of line (l)

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> N (l)	1B 4E (l)	27 78 (l)	$00 \leq (l) \leq 01$	$0 \leq (l) \leq 1$

The cursor is moved to column 0 of line (l).

Position cursor to column (c) in the current line

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> P (c)	1B 50 (c)	27 80 (c)	$00 \leq (l) \leq 13$	$0 \leq (c) \leq 19$

The cursor is moved to column (c) of the current line.

Attribute Control

Attribute: Blinking on

ASCII	hex.	dec.
<Ctrl> O	0F	15

All characters to follow are displayed with the blinking attribute.

Attribute: Blinking off

ASCII	hex.	dec.
<Ctrl> N	0E	14

All characters to follow are displayed with the not blinking attribute.

Character blinking

ASCII	hex.	dec.
<Ctrl> U	15	21

The character in the current cursor position is displayed with the blinking attribute.

Character not blinking

ASCII	hex.	dec.
<Ctrl> T	14	20

The character in the current cursor position is displayed with the not blinking attribute.

Binary/ASCII Conversion

Output binary number (x) as 3 digit decimal number

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> U (x)	1B 55 (x)	27 85 (x)	$00 \leq (x) \leq FF$	$0 \leq (x) \leq 255$

Binary number (x) is output as a max. 3 digit decimal number in the current cursor position with leading space characters. The cursor is always moved three characters to the right. Output format (Examples): " **0**" ... " **99**" ... "**255**" (The character " " stands for a space character).

Output binary number (x) as a 2 digit decimal number

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> V (x)	1B 56 (x)	27 86 (x)	$00 \leq (x) \leq 63$	$0 \leq (x) \leq 99$

Binary number (x) is output as a max. 2 digit decimal number in the current cursor position with leading space characters. The cursor is always moved two characters to the right. Output format (Examples): " **0**" ... "**99**" (" " stands for a space character). Values 100 - 255 are limited to 99.

Output binary number (x) as a 2 digit hexadecimal number

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> H (x)	1B 48 (x)	27 72 (x)	00 ≤ (x) ≤ FF	0 ≤ (x) ≤ 255

Binary number (x) is output as a max. 2 digit hexadecimal number to the current cursor position with leading space characters. The cursor is always moved two positions to the right. Output format (Examples): "**_0**" ... "**FF**" ("**_**" stands for a space character).

Output binary number (x) as a 2 digit hexadecimal number (with additional space character)

ASCII	hex.	dec.	Range (hex. / dec.)	
<ESC> Y (x)	1B 59 (x)	27 89 (x)	00 ≤ (x) ≤ FF	0 ≤ (x) ≤ 255

Binary number (x) is output as a max. 2 digit hexadecimal number to the current cursor position with leading space characters. The cursor is always moved three positions to the right. Output format (Example): "**_ _0**" ... "**_ FF**" ("**_**" stands for a space character).

Output 2 byte number (x1) (x0) as a 4 digit decimal number with decimal point

ASCII	hex.	dec.	Range (hex. / dec.)
<Ctrl> Y (x1) (x0)	19 (x1) (x0)	25 (x1) (x0)	0000 ≤ (x) ≤ 270F 0 ≤ (x) ≤ 9999

2 byte number (x1) (x0) is output as a 4 digit decimal number with decimal point to the current cursor position. Bits 6 and 7 of (x1) determine the position of the decimal point.

Bit 7	Bit 6	Display format	Example	Number of characters output
0	0	xxxx	0027 9999 4	
0	1	xxx.x	000.0 002.7 999.9	5
1	0	xx.xx	00.00 00.27 99.99	5
1	1	x.xxx	0.000 0.027 9.999	5

Output 2 byte number (x1) (x0) as a 3 digit number with decimal point and/or sign

ASCII	hex.	dec.	Range (hex. / dec.)	
<Ctrl> Z (x1) (x0)	1A (x1) (x0)	26 (x1) (x0)	$0000 \leq (x) \leq 03E7$	$0 \leq (x) \leq 999$

2 byte number (x1) (x0) is output as a 3 digit decimal number with decimal point and/or sign to the current cursor position. Bits 7 and 6 of (x1) determine the position of the decimal point and bits 5 and 4 the sign. ("_" in the following tables stands for a space character).

Bit 7	Bit 6	Bit 7	Bit 6	Display format	Examples	Amount of characters output
0	0	0	0	xxx	000 027 999	3
0	1	0	0	xx.x	00.0 02.7 99.9	4
1	0	0	0	x.xx	0.00 0.27 9.99	4
1	1	0	0	.xxx	000 ..... .027 ..... .999	4
0	0	0	1	+xxx	+000 +027 +999	4
0	1	0	1	+xx.x	+00.0 +02.7 +99.9	5
1	0	0	1	+x.xx	+0.00 +0.27 +9.99	5
1	1	0	1	+.xxx	+.000 +.027 +.999	5

Bit 7	Bit 6	Bit 7	Bit 6	Display format	Examples	Amount of characters output
0	0	1	0	_xxx	_000 _027 _999	4
0	1	1	0	_xx.x	_00.0 _02.7 _99.9	5
1	0	1	0	_x.xx	_0.00 _0.27 _9.99	5
1	1	1	0	_.xxx	_.000 _.027 _.999	5
0	0	1	1	-xxx	-000 -027 -999	4
0	1	1	1	-xx.x	-00.0 -02.7 -99.9	5
1	0	1	1	-x.xx	-0.00 -0.27 -9.99	5
1	1	1	1	-.xxx	-.000 -.027 -.999	5

Key Code Request

Automatic key code sending

If a key is pressed, its code (1 byte) is sent to the PLC immediately and automatically. It is only possible to recognize one key press. If more than one key is pressed at a time, the code of the first key pressed is sent.

In the picture to the right, the key codes of the individual keys are shown.

Key code request

ASCII

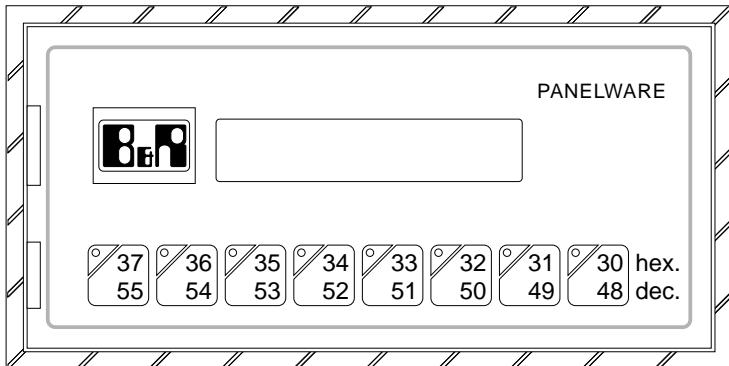
hex.

<ESC> W

1B 57

27 87

dec.



The panel sends the key code (1 byte) of the pressed key back as a response. If no key is pressed \$FF (dec. 255) is sent.

Display Lighting

The COMPACT MMI P121 is equipped with a background lighting LCD display. There are three different background lighting modes:

- Always off
- Automatic shut-off after X minutes
- Always lit

Setting the lighting period

ASCII	hex.	dec.
<ESC> G (x)	1B 47 (x)	27 71 (x)

The display lighting is switched on after every command and after every key press for (x) minutes. Setting the value as (x) = 0 switches the background lighting off permanently and with (x) = 255 the background lighting is switched on.

(x) hex.	(x) dec.	Function
0	0	Lighting always off
1 ... FE	1 ... 254	Automatic shut-off after (x) minutes (The time (x) is restarted after the command <i>SET LIGHTING PERIOD</i> and every time a key is pressed)
FF	255	Lighting always on

Key Lighting

All keys are equipped with key LEDs which can be switched on and off individually. The key LEDs can be used to make application control easier to see and to simplify panel operation. To control a certain LED, the respective key code (x) is given (valid key codes can be found under point "**Key Code Requests**").

LED (x) on

ASCII	hex.	dec.
<ESC> E (x)	1B 45 (x)	27 69 (x)

The LED with key code (x) is switched on.

LED (x) off

ASCII	hex.	dec.
<ESC> A (x)	1B 41 (x)	27 65 (x)

The LED with key code (x) is switched off.

All LEDs on

ASCII	hex.	dec.
<ESC> T	1B 54	27 84

All LEDs are switched on.

All LEDs off

ASCII	hex.	dec.
<ESC> C	1B 43	27 67

All LEDs are switched off.

LED (x) slowly blinking

ASCII	hex.	dec.
<ESC> L (x)	1B 4C (x)	27 76 (x)

The LED with key code (x) blinks at approx. 2 Hz.

LED (x) quickly blinking

ASCII	hex.	dec.
<ESC> S (x)	1B 53 (x)	27 83 (x)

The LED with key code (x) blinks at approx. 4 Hz.

Delete Functions

Reset panel

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

The panel is reset to the same state as just after the unit is powered on.

- All key LEDs switched off
- Screen is cleared
- Background lighting always on

Clear screen

ASCII	hex.	dec.
<ESC> B	1B 42	27 66

The entire display (Lines 0 and 1) is deleted. The cursor is located in the HOME position.

Delete line from current cursor position

ASCII	hex.	dec.
<ESC> D	1B 44	27 68

The contents of the line starting from the current cursor position are deleted. The cursor is moved to the first column of the next line after the command is executed. If the cursor is already in the last line it is moved to line 0.

Delete line (l)

ASCII	hex.	dec.
<ESC> F (l)	1B 46 (l)	27 70 (l)

the contents of line (l) are deleted. The cursor is moved to column 0 of the deleted line.

ASCII Character Set

hex.	2x	3x	4x	5x	6x	7x	Ax	Bx	Cx	Dx
x0		0	@	P	`	p		°	À	Ð
x1	!	1	A	Q	a	q	¡	±	Á	Ñ
x2	"	2	B	R	b	r	¢	²	Â	Ò
x3	#	3	C	S	c	s	£	³	Ã	Ó
x4	\$	4	D	T	d	t	¤	´	Ä	Ô
x5	%	5	E	U	e	u	¥	µ	Å	Õ
x6	&	6	F	V	f	v	|		Æ	Ö
x7	'	7	G	W	g	w	§	.	Ç	×
x8	(	8	H	X	h	x	¨	,	È	Ø
x9	)	9	I	Y	i	y	©	ı	É	Ù
xA	*	:	J	Z	j	z	ª	º	Ê	Ú
xB	+	;	K	[	k	{	«	»	Ë	Û
xC	,	<	L	\	l	|	¬	¼	Ï	Ü
xD	-	=	M	]	m	}	ı̇	ı̈	Í	Ý
xE	.	>	N	^	n	→	®	¾	Î	ß
xF	/	?	O	_	o	←	-	¿	Ï	ß

Conversion Tables and Index

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

$$5/9 \times (^\circ\text{F} - 32) = ^\circ\text{C}$$

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

$$(9/5 \times ^\circ\text{C}) + 32 = ^\circ\text{F}$$

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

Index

A

ASCII Character Output	93
ASCII Charcter Set	110
Attribute Control	97

B

Background Lighting	105
Baudrate	66
Binary/ASCII Conversion	99

C

Cable	
COMPACT MMI - COMPACT PLC	81
COMPACT MMI - PLC	79

Charcter Set	110
Command Overview	86
Sorted by command	91
Sorted by group	87
Sorted by number	89
COMPACT MMI Installation	73
COMPACT MMI Removal	77
Connection from COMPACT MMI to PLC	79
Connection from P120 to PC	83
Control Characters	93
Cursor Commands	93

D

Delete Functions	108
Dimensions	66, 68
Display	66
Display Lighting	105

F

Front 67

I

Installation Cutout 66

 Tolerance 66

Installation Instructions 78

K

Key Code Request 104

Key Codes 104

Key Lighting 106

Keyboard 66

M

Model Name 66

Model Number 66

O

Operating Temperature 67

Operation Mode Switch 72

 Run Mode 72

 Teach Mode 72

P

P121 Command Set 86

 Attribute Control 97

 Binary/ASCII Conversion 99

 Control Characters 93

 Cursor Commands 93

Delete Functions	108
Display Lighting	105
Key Code Request	104
Key Lighting	106
Power Supply	66, 71
Protection Type	67

R

Relative Humidity	67
RS232 Interface	66, 70
5 V Supply	71
Pin-outs	70
Run Mode	72

S

Set Lighting Period	105
Shock Resistance	67
Software Control	66
Storage Temperature	67

T

Teach Mode	72
Technical Data	66
Test Certification	67

W

Weight	67
--------------	----