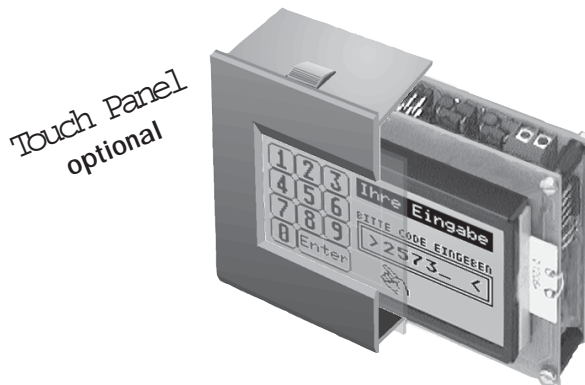


GRAPHIC UNIT 128x64 DOTS

WITH CHARACTER SETS AND GRAPH COMMANDS



Housing size:
102 x 80 x 36mm

FEATURES

- * 128x64 DOTS SUPERTWIST-LCD WITH LED- ILLUMINATION (GREEN)
- * BLACK SNAP-IN HOUSING WITH ANTIREFLEX GLASS
- * TEXT MODE WITH SCROLL FUNCTION AND CR/LF EVALUATION
- * 10 FONTS FROM 3,1mm (8x32 CHAR.) TO 4,2mm (8x21) UP TO 16,6mm (2x8)
- * DRAWING LINES; ERASE AND INVERT AREAS
- * CONNECTOR FOR 8x8 MATRIX PAD (EA KIT128-V24 AND -422 ONLY)
- * SUPPLY VOLTAGE: +5V / typ. 45mA (EA KIT128-422 TYP. 160mA)
- * BAUDRATES 1200,2400,4800,9600,19200BD (EA KIT128-V24,-422,-GXT ONLY)
- * ADRESSABLE: SEVERAL DISPLAYS ONTO A SINGLE INTERFACE LINE
- * GXT- VERSION: DISPLAY OF UP TO 256 TEXT BLOCKS OR GRAPHICS STORED IN EPROM OR OPTIONAL FLASH EPROM (OPT-FLASH128)
- * GXT- VERSION: SELECTION THROUGH 8 LINES (SCREW TERMINAL 8 PIN)

OPTIONS

- * 8x4 TOUCH PANEL FOR VERSIONS RS-232C AND RS-422
- * FOR 24V SUPPLY: OPT-18/36V, I.E. FOR SPS APPLICATIONS (+18..+36V)

ORDERING INFORMATION

GRAPHIC UNIT FOR V.24/RS-232 WITH KEYBOARD CONN.	EA KIT128-V24
FOR RS-232C WITH TOUCH PANEL 8x4	EA KIT128-V24TP
FOR RS-232C WITH TOUCH PANEL 8x4, BLUE-WHITE	EA KIT128-V24TPB
FOR RS-422 WITH KEYBOARD CONNECTOR	EA KIT128-422
FOR RS-422 WITH TOUCH PANEL 8x4	EA KIT128-422TP
WITH SERIAL SYNCHRONUOUS INTERFACE	EA KIT128-SYNC
FOR 8-BIT DATABUS OR CENTRONICS	EA KIT128-BUS
TEXT- /GRAPHICS DISPLAY FOR 256 TEXTS / GRAPHICS	EA KIT128-GXT
TOUCH PANEL 8X4 FOR VERSION -V24 AND -422	EA TOUCH8X4-A
SUB-D PLUG CABLE FOR PC (RS-232) CONNECTION	EA KV24-9B

GUIDE	FOR VERSION	PAGE
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INTRODUCTION

The display kit EA KIT128 features a compact and an extremely simple programmable display unit. It shows simultaneously various fonts in different sizes. Graphic elements like company logos, icons and symbols are quickly created and displayed with comfortable instructions by graphic programs, i.e. Windows Paint. Also measurement graphs, diagrams and trend curves are thanks to the manyfold available graph commands quickly created.

Remarkable is the Cyrillic character set in 2 sizes, also the feature to connect either a matrix pad or a touch panel (only versions -V24 and -422 have an input terminal for key board connection).

PUTTING INTO OPERATION, QUICK START UP

Before connecting the module please read first the instructions for operating and handling the module on last page of this data sheet.

Modul supply is +5 Volts/ max. 410mA which are connected to a 2 pin screw terminal block. After power on supply voltage the cursor will flash in the upper left hand corner. Adjustment of display contrast is possible by screw driver on a built in potentiometer.

The module can be connected now with the main processor unit according to the type of module version (see pages 7-10). For connecting the EA KIT128-V24- display, ELECTRONIC ASSEMBLY can deliver as an accessoir a ready to use cable type EA KV24-9B, which directly plugs into the 9-pol. SUB-D socket (i.e COM1) of the PC.

If data connection is correct, text's can be shown on display immediate (i.e. with assistance of the PC-program TERMINAL.EXE), available under purchase description EA DISK9719. Before using DOS command COPY xxxxx COM1, the interface must be initialised with MODE COM1:12,N,8,2. Various cursor controls like i.e. CR-LF are also possible. Switching to different character sizes or applying graph commands are described on page 4 and 5.

SURVEY

EA KIT128-V24 with RS-232C interface and keyboard query

This graphic module can be connected directly by cable type EA KV24-9B to a PC- serial port. Baudrate is settable to 1200, 2400, 4800, 9600 or 19200 baud. Also a key pad (with max. 8x8 matrix) can be connected.

EA KIT128-422 for big distances with keyboard query

This graphic module can be connected to a RS-422-port and allows distances of up to 1200 meters. Baudrate is settable to 1200, 2400, 4800, 9600 or 19200 baud. A key pad with max. 8x8 matrix can be connected.

EA KIT128-BUS for a 8 bit processor bus or for centronics link

This graphic module can be connected to a fast processor bus. Available is a LOW- and a HIGH-active CS. Additional eight output lines for actuating purposes are accessible by commands.

EA KIT128-SYNC serial clocked for direct connection to μ C

This graphic module is designed especially for micro controller with a few outputs only. A clock- and data line transfers commands to the controller. There is a LOW- and a HIGH-active CS available. Additional eight output lines for actuating purposes are accessible by commands.

EA KIT128-GXT text- and graphic controller with 8 inputs and RS-232C

From non volatile memory may be called off up to 256 texts/graphics through 8 data lines. Texts/graphics are stored in an EPROM/ FLASH-EPROM. The lines are high-active and are on internal Pull-Down (100 k Ω) resistors and Z-Diodes. This inputs can be operated by potentialfree switches. Direct connection to +5V or to +24V (SPS) level is allowed as well. Eight additional outputs for various control purposes can be used by commands. For module type EA KIT128-GXT an utility program disk type EA DISK9719 is required.

Summary EA KIT128								
Part No.	Data Input	Keyboard connect.	integr Fonts	Additional Outputs	Current w/o LED	Current with LED	Connectors	Features
EA KIT128-V24	RS-232C / V.24	yes	10	upon request	45 mA	300 mA	2 Pinsockets 2x5/2x8	Wide area standard
EA KIT128-422	RS-422	yes	10	upon request	160 mA	410 mA	2 Pinsockets 2x5/2x8	For big distances
EA KIT128-SYNC	1-Bit serial: Data, Clock	no	10	yes	20 mA	270 mA	1x10 Pinsocket	For microcontroller
EA KIT128-BUS	8-Bit parallel	no	10	yes	20 mA	270 mA	1x16 Pinsocket	For microcontroller
EA KIT128-GXT	Texts/Graphs through 8 lines	no	10	yes	45 mA	300 mA	8 Terminal screw blocks	Stand-Alone / SPS

EA DISK9719, UTILITY PROGRAMS

With order description EA DISK9719 a disc for PC's will be delivered, which contents several utility programs for own developments. On disc are a terminal program for DOS, a font editor including sample character sets and a font conversion program for converting into character set format of EA KIT128. Also available on disk is a conversion program for converting Windows Bitmap-Graphics (*.BMP) into image format of EA KIT128. A compiler for creating macros and scripts resp. text- and graphic- blocks are on disc as well.

TOUCH PANEL 8x4 (EA KIT128-V24TP AND -422TP ONLY)

The versions EA KIT128-V24TP and -422TP features a transparent touch pad with 32 fields. With touching the display datas can be transferred or actions are triggered. An inside buzzer acknowledges key strokes.

EA OPT-18/36V

All versions with option EA OPT-18/36V can be operated on unstabilized supply voltage between 18V to 36V. Please make sure that the voltage on all display inputs does not exceed 5Volts (except EA KIT128-GXT with 4V to 50V inputs and all RS-232C interfaces with \pm 12V levels).

TEXT / GRAPH / INSTRUCTIONS POOL

After power on the cursor flashes in first line and the module is ready for receiving. All incoming characters are shown in ASCII format (exception: CR, LF, FF, ESC). Carriage return is done automatically or with CR/LF- command. When display is filled, page scrolls to the top line by line. Command 'FF' (form feed) clears the display.

All additional commands (position cursor, select font, graph instructions, ...) must be started by an ESCAPE (hex 1B) followed by a command letter (capital- and small letters are equal) and some parameters more. Parameter handover is made in 8-bit binary form (not in ASCII).

Table of commands (all versions)											
Command	Codes					Description					
Commands for text mode											
Form feed (FF)	^L					Clears display and moves cursor to position (1,1)					
Carriage Return (CR)	^M					Cursor to left hand side					
Line feed (LF)	^J					Cursor to 1 line below, with evtl. scrolling					
Cursor On / Off	ESC	C	n1			n1=0: hidden cursor; n1=1: cursor flashes					
Position cursor	ESC	O	n1	n2		n1=column; n2=line; origin top left is (1,1)					
Inverse characters	ESC	J	n1			n1=0: normal characters; n1=1: inverse characters					
Autom. line break up	ESC	W	n1			n1=0: Autom. line break up off; n1=1: on					
Graph commands											
Character-mode	ESC	V	n1			n1: 1=set; 2=clear; 3=invers; 4=replace; 5=invers replace;					
Set ASCII-characters	ESC	A	x1	y1	n1	Character n1 will be placed to coordinate					
Display character chain	ESC	Z	x1	y1	...	NUL	Display character chain(...); character 'NUL' (Binary 0) = End				
Set point	ESC	P	x1	y1		Coordinates (0,0) to (127,63)					
Draw line	ESC	G	x1	y1	x2	y2	Beginning- and end coordinates (0,0) to (127,63)				
Continue line draw	ESC	T	x1	y1		Draw line from last end point to x1, y1					
Draw box	ESC	R	x1	y1	x2	y2	Opposite corner points (0,0) to (127,63)				
Clear Area	ESC	L	x1	y1	x2	y2	Opposite corner points (0,0) to (127,63)				
Invert Area	ESC	I	x1	y1	x2	y2	Opposite corner points (0,0) to (127,63)				
Fill Area	ESC	S	x1	y1	x2	y2	Opposite corner points (0,0) to (127,63)				
Define Bargraph	ESC	-	L R O U	Nr	x1	y1	x2	y2	AW	EW	Define Bar to L(left),R(right),O(top),U(bottom) with 'No' (1..8). x1,y1,x2,y2 surrounds the rectangular of bargraph. AW, EW represents the values for 0% and 100%.
Draw Bargraph	ESC	-	Nr	Wert		Set Bargraph with 'No' (1..8) to new user-'value'					
Load Bitmap	ESC	B	x1	y1	Daten	Load display range to x1,y1; see display build up for datas					
Other commands											
Set Font	ESC	F	n1			n1=1: Font No. n1 (1..8)					
Wide characters	ESC	E	n1			n1=0: normal character size; n1=1: wide characters					
Define characters	ESC	U	n1	Daten		n1=Character No.; Datas=No.of Bytes according to Font					
Display commands	ESC	D	n1			n1=0:Off;n1=1:On;n1=2:Clear.;n1=3:Invert.;n1=10..20:LED-brightness					
Illumination On / Off	ESC	H	n1			n1=0: Illum. Off; n1=1: Illum. On; n1=2..255: for n1 seconds On					
Select Controller	ESC	K	S	n1		Activate controller with adress n1 (n1=0..254; n1=255: all)					
Deselect Controller	ESC	K	D	n1		Deactivate controller with adress n1 (n1=0..254; n1=255: all)					
Select/Deselect Adress	ESC	K	A	n1		Define new adress n1 for controller (i.e for Power-On Makro)					
Set output port	ESC	Y	n1	n2		n1=0: Set all 8 outputs according to n2 (=8-Bit binary value) n1=1..8: Reset output n1 (n2=0); set (n2=1); invert (n2=2)					
Wait (Pause)	ESC	!	n1			Wait n1 tenth-seconds until next output shows up					
Status Check	ESC	?	C	n1		n1=0: Signal on RS232/422: 'O'=OK; 'E' or no reaction=ERROR n1=1..8: OUT1..8 will be inverted=OK; no reaction=ERROR					
Macro commands											
Run Script	ESC	Q	n1			Process Script n1 (max. 2 levels)					
Run Macro	ESC	N	n1			Process Macro n1 (max. 2 levels)					
Autom. Run of Makros	ESC	X	n1	n2	n3	Cyclic Processing of Macros from n1 to n2 (n3=pause in 1/10 sec)					

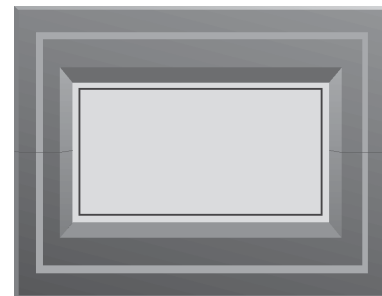
Additional commands for -V24 and -422							
Query matrix key pad	ESC	M	n1				n1=0: Automatic query OFF n1=1: Automatic query total status ON n1=2: Automatic query single key mode ON n1=3: Aktuellen Zustand der Matrixtastatur senden
Matrix key pad blank out	ESC	M	4	n1			In order to use the output ports with command 'ESC Y', the matrix key pad query cannot be used. A '0' within the 8-Bits of parameter n1 deactivates the specified output line.
Transmit graph	ESC	>					The complete content of graph will be transmitted by a leading 'B' - mark, followed from height and width in number of dots and the graph datas.
Transmit bytes	ESC	=	n1	...			After n1 following bytes are transmitted on V.24 (i.e. driving an external serial printer on RS232-C interface)
Read output port	ESC	?	Y	n1			n1=0: read all 8 outputs OUT1..8 in 8-bit binary form n1=1..8: read outputs OUT<n1> (1=high=5V, 0=low=0V)
Commands for operating Touch-Panels (EA TOUCH8x4-A)							
Define touch key	ESC	*	f1	f2	Ret. Code	Form	Displ. text
Touch key reaction	ESC	*	A B C D				A:= no buzz when touching the touch key B:= short buzz when touching the touch key C:= non inverting when touching the touch key D:= automatic inverting when touching the touch key
Invert touch key	ESC	*	I		Ret. Code		Touch key will be inverted with the related return code
Reset touch key	ESC	*	R				Resets all touch keys (= 32 fields with codes 1..32)
Buzz on / off	ESC	.	n1				n1=0: buzz off; n1=1: buzz on; n1=2..255: for n1 1/10sec. on.

Additional commands for -GXT							
Get Display Data	ESC	>					Complete content of graph will be transmitted. Transmission starts with a 'B' followed by height and width in pixel and the graph datas.
Transmit bytes	ESC	=	n1	...			n1- Bytes will be sent in sequence on V.24 (i.e. driving an external serial RS232-C printer interface)
Read output port	ESC	?	Y	n1			n1=0: All 8 output ports OUT1..8 read as 8-Bit Binary value n1=1..8: output ports OUT<n1> read in (1=high=5V, 0=low=0V)

EXAMPLE FOR APPLYING COMMANDS

Below examples in various programming languages will draw a rectangle on display.

Example	Codes output
for compiler	#R 0, 0, 127, 63
in hex	\$1B \$52 \$00 \$00 \$7F \$3F
in decimal	27 82 0 0 127 63
for Turbo-Pascal	write(aux, chr(27), 'R', chr(0), chr(0), chr(127), chr(63));
for 'C'	fprintf(stdaux, "%c%c%c%c%c%c", 27, 'R', 0, 0, 127, 63);
for Q-Basic	OPEN "COM1:1200,N,8,2,BIN" FOR RANDOM AS #1 PRINT #1,CHR\$(27)+"R"+CHR\$(0)+CHR\$(0)+CHR\$(127)+CHR\$(63)



MACROS

Several commands can be combined to a macro and can be executed by command *Run Macro*. Macros will be created with the compiler on disk EA DISK9719 and will be burned with an EPROMer into EPROM of EA KIT128.

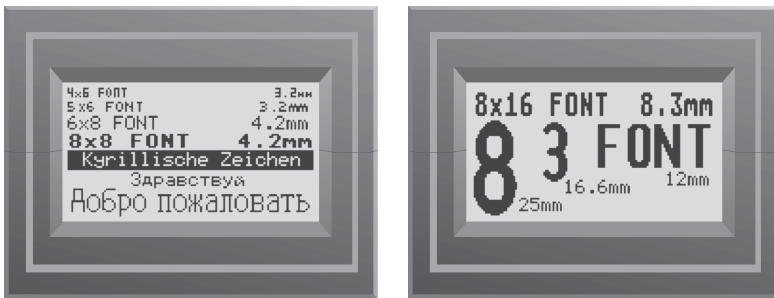
Power-On-Macro will be executed automatically immediate after supply voltage is available. Also commands like *Cursor off* (ESC C 0), *set Font 3* (ESC F 3), *Baudrate 9600 Baud* (ESC + 3^{*)}). A short description can be found on page 11.

^{*)} Setting baudrate with software is possible only when all 4 solder jumpers LB1..4 are open.

CHARACTER SETS

Display module EA KIT128 contents 10 character sets. All of them are available in text mode as well as in graph mode. Graph mode allows character positioning pixel by pixel (commands 'ESC A' and 'ESC Z') where coordinate- values refer to top left hand corner.

No.	Character height	Lines x Character	Size in Dots	ASCII-Range	Free def. ASCII-Code(s)	Remarks
1	4,2 mm	8 x 21	6 x 8	32 - 255	0..9	extended ASCII-Code
2	4,2 mm	8 x 16	8 x 8	32 - 255	0..7	extended ASCII-Code
3	8,3 mm	4 x 16	8 x 16	32 - 255	0..3	extended ASCII-Code
4	3,1 mm	8 x 32	4 x 6	32 - 158	0..15	Micro Characters
5	3,1 mm	8 x 25	5 x 6	32 - 158	0..11	Mini Characters
6	16,6 mm	2 x 8	16 x 32	42 - 58	0	Big Numbers '0'-'9', '+', '-', '/'
7	16,6 mm	2 x 8	16 x 32	32 - 127	0	ASCII-Code
8	25 mm	1 x 5	24 x 48	45 - 58	-	Super Big Numbers '0'-'9', '-','/':'
9	4,2 mm	8 x 21	6 x 8	64 - 128	0..9	Cyrillic Characters
10	8,3 mm	4 x 16	8 x 16	64 - 128	0..3	Cyrillic Characters



CUSTOMIZED CHARACTERS

Up to 16 characters per character set can be defined by your own, depending on size of character. These characters are in form of ASCII codes 0..15 and are stored in a 64 Byte sized internal RAM- area until supply voltage is switched off.

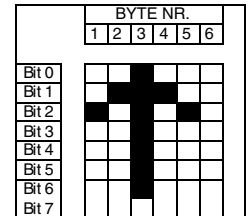
Caution: When own characters are created, do not execute the bargraph command.

Example 1:

instruction for ASCII-no.3, with 6x8 character set will create an upward pointing arrow.

ESC U \$03

\$04 \$02 \$7F \$02 \$04 \$00



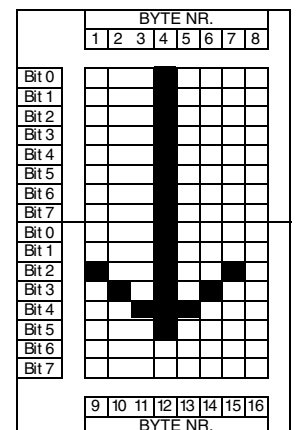
Exempel 2:

instructions below creates a downward pointing arrow with ASCII-no.2 and 8x16 character set.

ESC U \$02

\$00 \$00 \$00 \$FF \$00 \$00 \$00 \$00

\$04 \$08 \$10 \$3F \$10 \$08 \$04 \$00



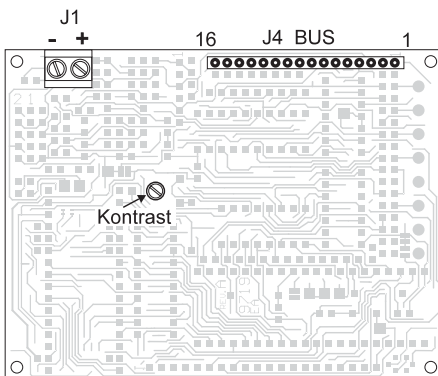
+ Lower	\$0	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	\$A	\$B	\$C	\$D	\$E	\$F
Upper	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
\$20 (dez: 32)	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
\$50 (dez: 80)	p	q	r	s	t	u	v	w	x	y	z	[\]	^	_
\$60 (dez: 96)	`	~	ab	bc	cd	de	ef	gh	ij	kl	mn	op	qr	st	uv	wx
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	[\]	^	_
\$80 (dez: 128)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$90 (dez: 144)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$A0 (dez: 160)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$B0 (dez: 176)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
\$C0 (dez: 192)	L	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
\$D0 (dez: 208)	L	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
\$E0 (dez: 224)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$F0 (dez: 240)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?

Font 3

+ Lower	\$0	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	\$A	\$B	\$C	\$D	\$E	\$F
Upper	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
\$20 (dez: 32)											x	+	,	-	.	÷
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?

Font 6

CONNECTING EA KIT128-BUS TO AN 8 BIT DATA BUS



Bottom view

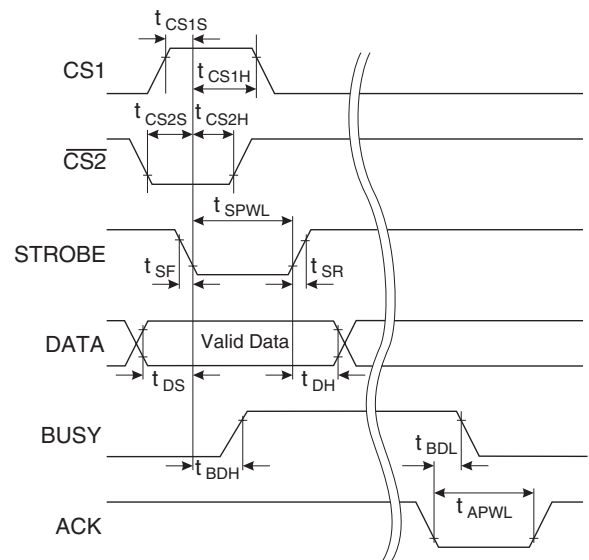
The display module EA KIT128-BUS is suitable for direct connection to an 8-bit data bus of a microprocessor system. Data handover happens at the L-H rise on pin "STROBE". Output "BUSY" marks with H-level that no instructions will be accepted anymore. When display EA KIT128-BUS has finished processing, pin "ACK" shows low level for short time, which allows i.e. trigger of an interrupt. Both inputs

CS1 and CS2 can be fed by the address decoder or are connected to VDD resp. to GND. Current consumption is 20mA typically, and typ. 270mA with LED illumination on.

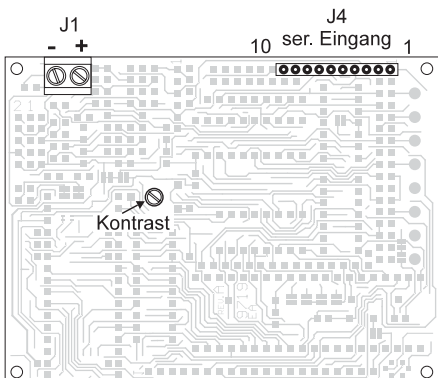
BUS Connector J4			
Pin	Symbol	Level	Function
1	CS1	H	Chip select high
2	/CS2	L	Chip select low
3	ACK	L	Acknowledge
4	NC	-	No Connect
5	BUSY	H	In Process
6	STROBE	L	Takeover Datas
7	VDD	H/L	+5V
8	GND	L	0V Ground
9	DATA 7	H/L	Bit 7 (MSB)
10	DATA 6	H/L	Bit 6
11	DATA 5	H/L	Bit 5
12	DATA 4	H/L	Bit 4
13	DATA 3	H/L	Bit 3
14	DATA 2	H/L	Bit 2
15	DATA 1	H/L	Bit 1
16	DATA 0	H/L	Bit 0 (LSB)

Timing -BUS and -SYNC					
Item	Symbol	Standard Value			Unit
		min.	typ.	max.	
Chip Select 1 Setup Time	t_{CS1S}	25			ns
Chip Select 1 Hold Time	t_{CS1H}	0			ns
Chip Select 2 Setup Time	t_{CS2S}	34			ns
Chip Select 2 Hold Time	t_{CS2H}	0			ns
Strobe Pulse Width Low	t_{SPWL}	20			ns
Strobe Fall Time	t_{SF}		5		ns
Strobe Rise Time	t_{SR}		5		ns
Data Setup Time	t_{DS}		6	12	ns
Data Hold Time	t_{DH}		0	4	ns
Busy Delay Time High	t_{BDH}		20		ns
Busy Delay Time Low	t_{BDL}		20		ns
Acknowledge Pulse Width Low	t_{APWL}		1100		ns

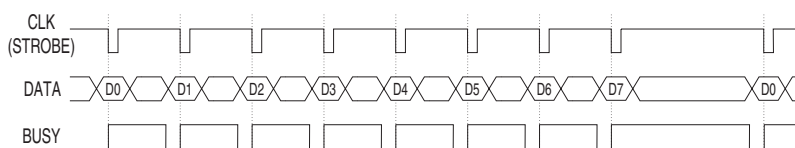
$V_{DD}=5,0V \pm 5\%$
 $T_a=25^\circ C$



SYNCHRONOUS VERSION EA KIT128-SYNC



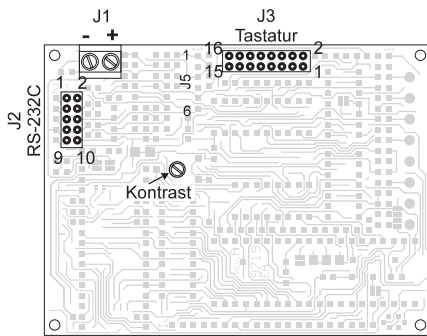
Bottom view



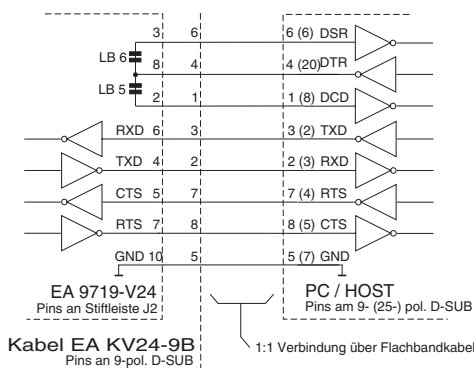
Module EA KIT128-SYNC is designed for connecting to a microcontroller. There is one clock- and one data line available. Communication is performed through 8 serial data bits, which can be transmitted with clock rates from 0...20 kcps. Output "BUSY" marks with H-level that further instructions won't be accepted. When display EA KIT128-SYNC has finished processing, pin "ACK" shows a short Low-level, which allows to trigger i.e. an interrupt. Timing is the same as on version EA KIT128-BUS. To synchronize the data stream, a Low Puls (>1µs) at input SYNC will reset the internal bit counter. Both inputs CS1 and CS2 can be fed by the address decoder or are connected to VDD resp. GND. Current consumption is 20mA typ., and typ. 270 mA with LED-illumination on.

Synchron. serial connector J4			
Pin	Symbol	Level	Function
1	CS1	H	Chip select high
2	/CS2	L	Chip select low
3	ACK	L	Acknowledge
4	SYNC	L	Bit counter reset
5	BUSY	H	In Process
6	CLK	L	Clock input
7	VDD	H	+5V Supply
8	GND	L	0V Ground
9	DATA	H/L	Data bit
10	NC	-	No Connect

V.24/RS-232C VERSION EA KIT128-V24(TP)



Bottom view



Display module EA KIT128-V24(TP) is designed for connection to a bi-directional serial interface with true RS-232C levels ($\pm 10V$). Optionable EA KV24-9B can be plugged directly onto pin block J2. This cable has on other end a 9-pin. D-SUB plug, which fits COM1 of a PC. The module offers handshake lines RTS and CTS. A minus 10V level on pin RTS signals that no more data can be accepted until RTS shows a +10V level. On the other hand the EA KIT128-V24 blocks the data output if a -10V level is applied to pin CTS. In this case there is a possibility that keyboard inputs may get lost.

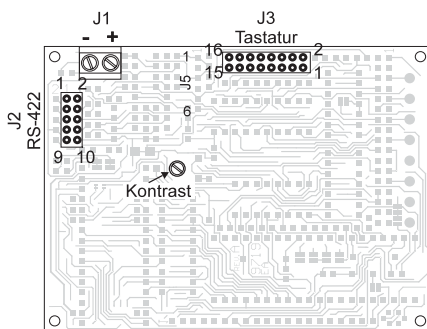
Transfer parameters for data are factory set to 8 data bits, 1 stop bit and 1200 Baud. Bridging solder jumpers 1 to 4 allows increased baud rates of 2400, 4800, 9600 oder 19200 Baud. Solder jumpers are described on last page.

RS-232C connector J2			
Pin	Symbol	In/Out	Function
1	VDD	-	+5V Supply
2	DCD	-	Via LB5 to DTR
3	DSR	-	Via LB6 to DTR
4	TxD	Out	Transmit Data
5	CTS	In	Clear To Send
6	RxD	In	Receive Data
7	RTS	Out	Request To Send
8	DTR	-	See Pin 2, Pin 3
9	NC	-	No Connect
10	GND	-	0V Ground

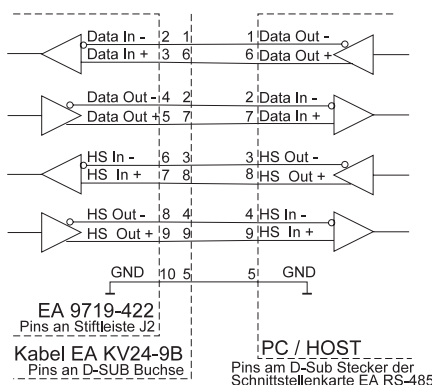
CMOS-level connector J5		
Pin	Symbol	Function
1	VDD	+5V Supply
2	GND	0V Ground
3	TxD	Transmit Data
4	RxD	Receive Data
5	RTS	Request To Send
6	CTS	Clear To Send

Note: Only one solder jumper at a time may be closed. Never close two solder jumpers at a time! On 6-pin solder socket J5 the CMOS level of serial interface can be used for direct connection to micro processor. **Note:** The RS-232 level-converter SP232 (or equivalent) must be removed in this case! Current consumption is 45 mA typically, and typ.300 mA with LED illumination on.

CONNECTING EA KIT128-422(TP)



Back view



On board RS-422 drivers generate differential voltages with approximate $\pm 5V$ amplitudes. This guarantees an extremely safe transmission up to 19200 Baud even on very long lines (up to 1200 meters). Communication parameters are factory set on 8 data bits, 1 stop bit and 1200 baud. Shortening solder bridges 1 to 4 increases baudrate to 2400, 4800, 9600 or 19200 baud. Solder bridges are described on last page.

Caution: One solder bridge only may be shortened at a time. Never close 2 solder bridges at the same time! Data input takes connector J2 of EA KIT128-422(TP). Pinning is shown in table nearby. Typical current consumption is 160mA, with LED-illumination on typically 400mA.

Note: Solder bridges 5 + 6 must be open.

RS-422 Connector J2		
Pin	Symbol	Function
1	VDD	+5V, Supply
2	Data In -	Receive Data
3	Data In +	Receive Data
4	Data Out -	Transmit Data
5	Data Out +	Transmit Data
6	HS In -	Handshake
7	HS In +	Handshake
8	HS Out -	Handshake
9	HS Out +	Handshake
10	GND	0V, Ground

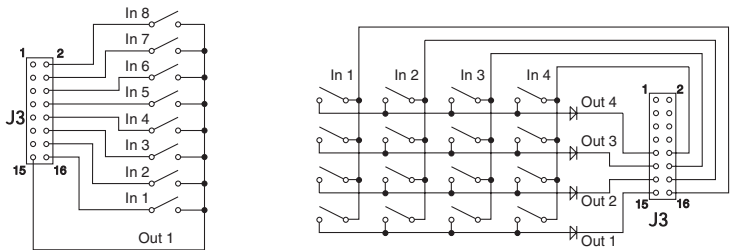
KEYPAD OPERATION (EA KIT128-V24 AND EA KIT128-422 ONLY)

A keypad (single push buttons up to 8x8 matrix) can be connected to J3. Contact bounce is eliminated software. Please note, that keypad functions are supported by versions V.24 and RS-422 only.

Keys are connected to input- and output ports where each input port is shunted by a 100kΩ pullup resistor. Up to 8 keys may be connected to each output port. In order to recognize double key strokes, the output ports have to be decoupled. Best way for elimination is use of Schottky diodes (i.e.BAT 43). On multiple keystrokes (>2) each key must be decoupled by a separate diode.

Matrix - keypad connector J3					
Pin	Symbol	Function	Pin	Symbol	Function
1	OUT 8	Output column 8	2	IN 8	Input column 8
3	OUT 7	Output column 7	3	IN 7	Input column 7
5	OUT 6	Output column 6	4	IN 6	Input column 6
7	OUT 5	Output column 5	6	IN 5	Input column 5
9	OUT 4	Output column 4	8	IN 4	Input column 4
11	OUT 3	Output column 3	10	IN 3	Input column 3
13	OUT 2	Output column 2	12	IN 2	Input column 2
15	OUT 1	Output column 1	14	IN 1	Input column 1
			16	IN 1	Input column 1

Mode 0: Command "ESC M 0" switches off the automatic keyboard request. Keystrokes won't be sent now automatically. Command "ESC M 3" queries the keys. After that command the actual keyboard status will be transmitted like in Mode 2.



Mode 1: Command "ESC M 1" activates the automatic query of keys. Each keypress. sends the corresponding key number (1..64). Key releasing is not sent (presetted).

Mode 2: Command "ESC M 2" activates the automatic query for the total status of all keys. On each key -press and - release all pressed keys are transmitted. Transmitting sequence is as follows: code letter "T" (\$54), followed by numbers of all pressed keys (1..64), ending code is "NUL" (\$00).

Number of key can be calculated as follows: **number of key = (output -1) * 8 + input** (output/ input must be a number between 1 and 8) **Note !** If handshake line (i.e. CTS) does not allow transmitting, some key strokes may be lost.

TOUCH-PANEL 8x4 (EA KIT128-V24TP AND -422TP ONLY)

The versions EA KIT128-V24TP and -422TP have got instead of an external 8x8 keypad a transparent touch key pad with 32 fields. The controller supports this touch panel with comfortable commands. It also allows to combine several keys to one big master key, or display a key image with centered text('s). Its also possible to assign a return code (1..255) to the key. If return-code 0 is assigned, the key will be deactivated and won't be recognized when stroked.

Touching the keyfield also can be automatically inverted or a buzz will signal the touch. The defined return code will be sent then simultaneously to serial interface or an internal SCRIPT with the number of the return code can be executed (dummy command 'ESC : ' must lead the script).

Example:

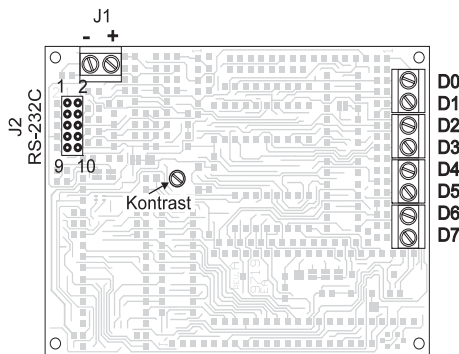
Define a key from field 11 to 21, with return-code 65='A' and the text "STOP"

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32

Exampel	Transmitted codes											Remarks	
for Compiler	#* 11, 21, 'A', 2, "STOP"											Number of texts will be not noted here !	
ASCII	ESC	*	.	.	A	.	.	S	T	O	P	.	Point '.' stands for not displayable ASCII-characters
Hex	\$1B	\$2A	\$0B	\$15	\$41	\$02	\$01	\$53	\$54	\$4F	\$50	\$00	
Decimal	27	42	11	21	65	2	1	83	84	79	80	0	
	Command for Touch	Touch field	Touch field top left corner	Touch field bottom right corner	Return Code	Draw Frame	1-line-text						Text terminator



PERMANENT TEXT-/GRAPH VERSION EA KIT128-GXT



Bottom view

Display module EA KIT128-GXT is driven by 8 digital inputs. Each change on one of the inputs starts a script which is programmed into an EPROM. Inputs can be accessed by an 8 screw terminal block. Normal switches (closer) can be here connected as well as voltages between 0V and +50V. For creating a script you need a PC, the disc EA DISK9719 and an EPROMer or the option FLASH-128 for on board programming.

Auswahl J6		
Pin	Symbol	Funktion
D0	LSB	Bit 0
D1		Bit 1
D2		Bit 2
D3		Bit 3
D4		Bit 4
D5		Bit 5
D6		Bit 6
D7	MSB	Bit 7

1.) Connect to 8 switches

Each switch is connected to positive supply voltage and the input terminal block. An open input resp. an open switch represents a 0, this means, if no switches are connected or all switches are open, the script No. 0 will be executed. When all 8 switches are closed ("1"), script No. 255 will be executed.

2.) Connect to PLC/SPS or to CMOS-level

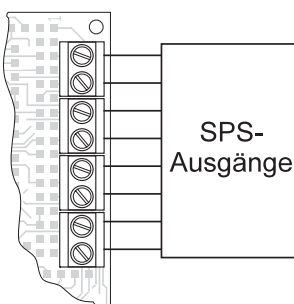
All 8 inputs will be connected to the corresponding voltage source. A common ground (minus) is necessary. When no voltage is applied, script No. 0 will be executed, when each gate is on min. +4 V script No. 255 will be executed.

Additional commands can be given by serial RS-232C interface connection see "V.24/RS-232C VERSION" on page 8. Typical current consumption is 45mA, with LED-illumination on typ. 300mA

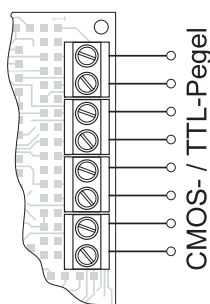
RS-232C connector J2			
Pin	Symbol	In/Out	Function
1	VDD	-	+ 5V Supply
2	DCD	-	Via LB5 to DTR
3	DSR	-	Via LB6 to DTR
4	TxD	Out	Transmit Data
5	CTS	In	Clear To Send
6	RxD	In	Receive Data
7	RTS	Out	Request To Send
8	DTR	-	See Pin 2, Pin 3
9	NC	-	No Connect
10	GND	-	0V Ground

APPLICATION EXAMPLES

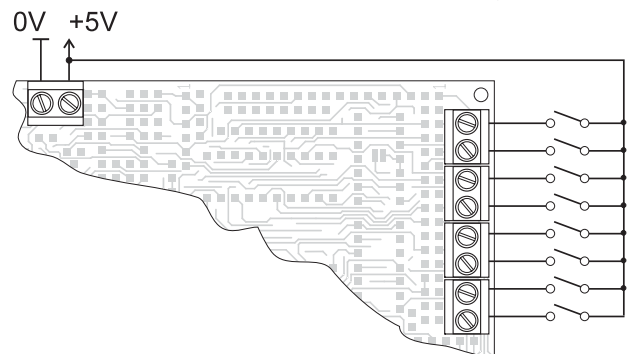
3 most frequent used connection variations, for PLC/SPS- controls, for direct connection to logic levels and connection of simple switches is shown below.



Connecting to PLC/SPS



Driving with CMOS-levels



Connecting to 8 switches

CREATE MACROS (ALL VERSIONS)

Single or several command sequences can be combined in form of macros or scripts and stored permanently in EPROM/FLASH. These can be started by the commands *Run Macro / Run Script*. Version EA KIT128-GXT allows starting of scripts by the 8 input gates and sequence will be shown on the LCD-display. Following tools are needed for creating your own special macros:

- Disc EA DISK9719; containing the compiler, examples and fonts
- a PC with serial COM1 port, preferable 386/486 with approx. 1MB free memory on hard disk
- an EPROMer for EPROM type 27C512 (DIL, 28-pins, V_{PP} 12,5V)

In case that no EPROMer is available, you can perform the test's with an EA KIT128-GXT / OPT-FLASH128 modul and send to us with your next order your final compiled EPROM-file on disc.

CREATING AN EPROM-FILE WITH INDIVIDUAL MACROS

In order to get a script from a sequence of commands, all commands will be written into a file on a PC. The script- number is defined by the file extension (*.000 up to *.255).

When all script files are created, program COMPILE.EXE must be started. It makes an EPROM-file *.EPR, which must be burned with an EPROMer into the EPROM or loaded with BIN2FLASH.EXE into FLASH-EPROM on display. When writing macro files it's possible to test individual scripts by connecting the display EA KIT128-GXT (or -V24 or -422) to serial port of PCs without burning repeatedly the EPROM new.

DEFINITIONS

Macro

A macro contains a sequence of commands which are stored in an EPROM/FLASH permanent. The macro can be activated by command *Run Macro*. The macro allows automatization of repeating command sequences, i.e. clear display, draw a frame or display the company logo. Within a macro may be activated another macro, however this macro cannot start a further one. Up to 100 macros may be created (extension *.N00 up to *.N99). The sequence of numbers may have gaps of unused numbers. Macro *.N00 has a special function: it's carried out automatically after power on, but can be activated also by command (power-on macro).

Script

A script is structured like a macro. Version EA KIT128-GXT allows in addition start of a script by an external digital level. According to status of input ports E0..7 the related script will be executed.

EA TOUCH8X4- equipped versions allow script activation by touch panel. Up to 256 scripts may be created (extension *.000 up to *.255). The sequence of numbers may have gaps of unused numbers.

Project name

A project name may have up to 8 characters (DOS-standard). If a project is named i.e. "DEMO", the related script files are named DEMO.000 to DEMO.255 and all macros must be named DEMO.N00 to DEMO.N99. Each project must have an own related initialising file which is named according to the project, i.e. DEMO.INI. Compiled EPROM-file will be named i.e. DEMO.EPR.

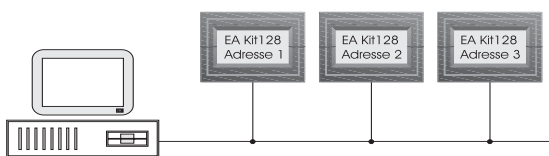
ADDITIONAL OUTPUT PORTS

The unused output ports for the keyboard query (J3, OUT1..OUT8) from versions EA KIT128-BUS, -SYNC and -GXT may be used as additional output ports (C-MOS level). Versions EA KIT128-422 and EA KIT128-V24 allow additional output ports only if individual outputs are relieved from keyboard query (command "ESC M 4 n1").

Command "ESC Y" activates 8 output lines (see command table on page 4). Each output port supplies a current of 0.25mA on H-level (typ.load 20k Ω) and 20mA on L-level. Note: The solder bridges LB1..LB4 to set baud rates for versions EA KIT128-GXT, -422 and -V24 are located at output ports OUT1..OUT4. If one solder bridge is closed (at 2400, 4800, 9600 or 19200 baud) the related output cannot be used.

ADDRESSING SEVERAL EA KIT128 ON A SINGLE INTERFACE

Commands "select / deselect" allow to address and operate several EA KIT128 on a single interface. The



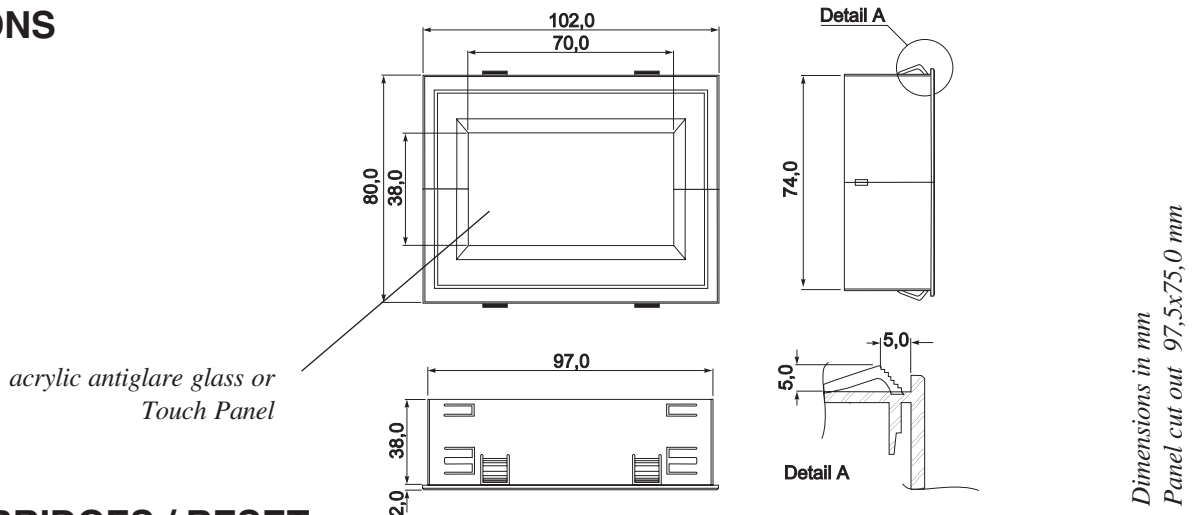
individual controller address is stored in EPROM (27C512) at address \$0046. EPROM value \$FF (factory setting) can be reprogrammed to other values any time. Another way for setting the controller address is to use the Power-On Macro with command "ESC K A n1".

NOTE: Output signal BUSY of versions EA KIT128-BUS and -SYNC must be connected with an gate and activated to prevent loss of data in case of simultaneous writing.

NOTE: Output signals (TXD, RTS of EA KIT128-V24(TP) and EA KIT128-GXT resp. DataOut+, DataOut-, HsOut+ and HsOut- of EA KIT128-422(TP)) are not to be switched in parallel. When still needed (handshake, keyboard query), the signals must be connected to an external logic circuit.

EA KIT128

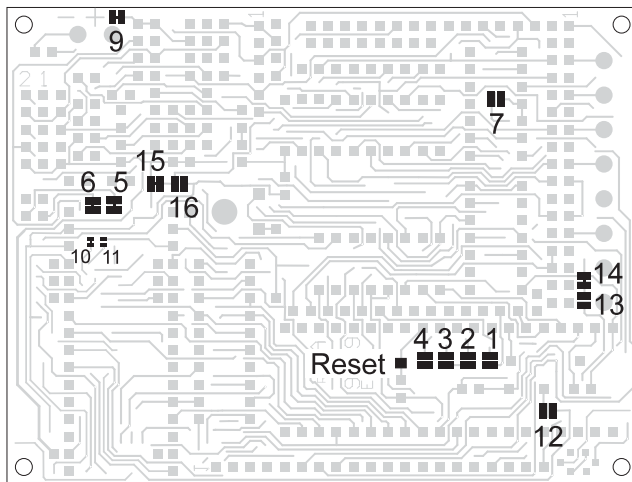
DIMENSIONS



Dimensions in mm
Panel cut out 97,5x75,0 mm

SOLDER BRIDGES / RESET

Several bridging strips are placed on the backside for adapting EA KIT128 to special requirements. This solder bridges are presetted from factory and need not to be changed, only Baud rate of versions -V24(TP), -422(TP) and -GXT may be adapted to need (LB1-4 is presetted to 1200 Baud).



Bridge	Denomin.	Description	BAUD			
			LB1	LB2	LB3	LB4
1-4	Baud rate	Baud rate for EA KIT128-V24, -422, and -GXT	1200	off	off	off
		One solder bridge only may be set!	2400	on	off	off
		On all other versions the solder bridges must be always open!	4800	off	on	off
			9600	off	off	on
5	DTR - DCD	For versions EA KIT128-V24 and -GXT only: Often required connections on RS-232C interface are made here with solder bridges				
6	DTR - DSR	This solder bridge must be closed at EA KIT128-V24, -422 and -GXT, but must be open with EA KIT128-BUS and -SYNC!				
7	STROBE	This solder bridge has to be closed with 5V version and must be open with 24V version (option 18/36V)!				
9	DC / DC	Possibility to adapt various EPROMs				
10,11	EPROM	Opening of LB 12 of flash version EA KIT128-GXT prevents a reprogramming by mistake.				
12	Prg. disable	EA KIT128-GXT only: Z-diodes relate to 0V (LB 14 closed) or to +5V (LB 13 closed, change polarity of Z-diodes !)				
13,14	Z-diodes	Input resistor network relates to 0V (LB 15 closed) or to +5V (LB 16 closed)				
15,16	Pullup/down	This pin allows a hardware reset on EA KIT128 (high-active)				
-	Reset					

Display checks should be made regularly with command 'ESC ? C n1' which inverts an output port n1. When the appropriate output port n1 inverts the display a proper function can be assumed. If output n1 does not react than a high level (>2µs) on terminal "Reset" will initiate a restart and the display must be written new. A software reset with commands 'ESC & F 0 0 0 0 J' will do it in some cases as well.

HINTS FOR HANDLING AND OPERATING

- The module can be destroyed electrically by mispoled or overvoltage power supply, wrong polarity, overvoltage or static discharge on inputs or shortened outputs.
- Before disassembling the module, the power supply must be switched off. Also all inputs must not carry any current.
- Display, touch screen and cover glass are scratch-sensitive plastic materials and should not be touched with hard objects.
- Surfaces should be cleaned with soft fabric without using of chemical solvents.
- The module is designed for indoor use only. For operating in outside environment adequate precautions must be undertaken. Maximum operating temperature range from 0..+50°C should be not exceeded. In humid atmosphere or in condensing situations the module functions may drop out. Direct sun exposure to the display should be avoided. Storage temperature range is -20..+70°C.

