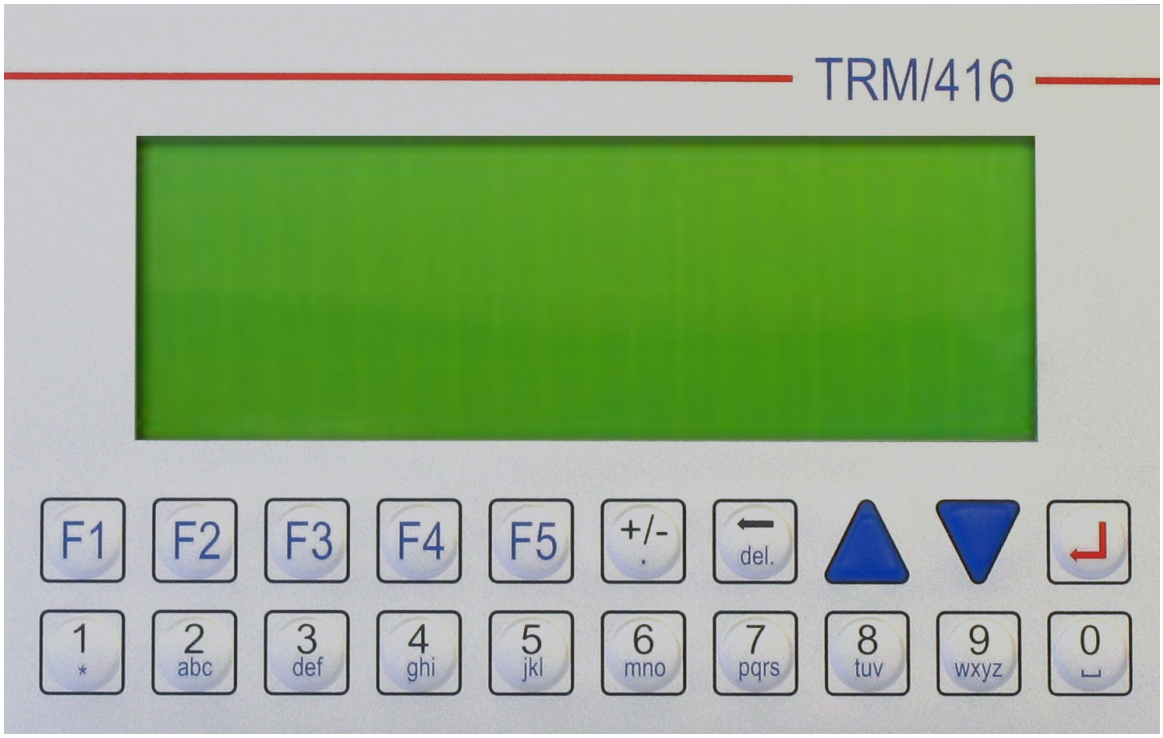
TRM/416



Hardware Manual

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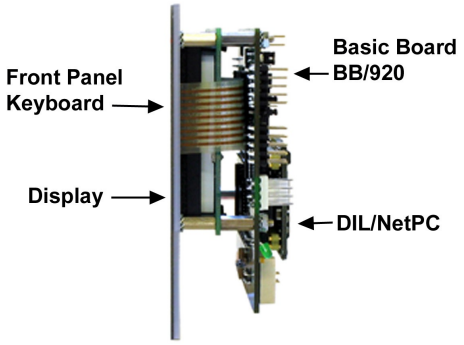
Parts of the TRM/416

The TRM/416 including a new and innovative concept for an extremely small embedded PC system – complete for industrial IT environments.

It is PC compatible, free programmable and available with different embedded operating systems. This small information gives you some more details about the system itself.

The TRM/416 is an open frame Ethernet PC system. The backside (behind the front panel matrix keyboard and the high resolution LC-Display) consists of the base board BB/416 and the well-known DIL/NetPC ADNP/1520. The right picture shows the details.

Parts



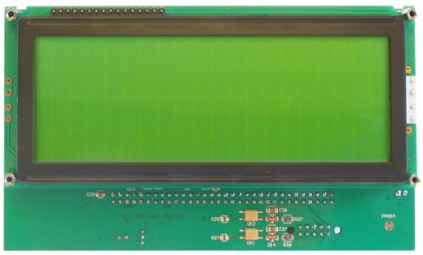
Picture 1: TRM/416 Parts

Note: These versions does not contain mounting bolts at the backside of the front panel. Please use the new mounting frame (option) for easy mounting the open frame system!

Display

Display Capacity:	Supertwist LC-Display, 4 Lines x 20 Characters CFL Backlight
Driving Method:	Controller
View Area:	121 x 40 mm
Dot Pitch:	0,92 x 1,1 mm
Character Size:	4,82 x 9,22 mm
Response Time:	150ms
Operating Temp.:	-20...+70°C

Display



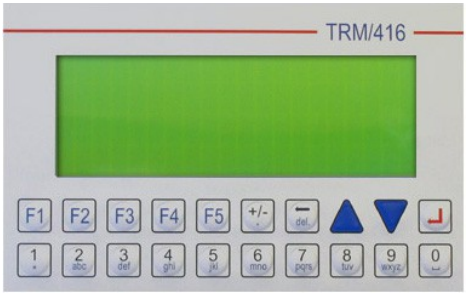
Picture 2: LC-Display

Front Panel Keyboard

The front panel contains a matrix keyboard with following functions:

- ⊡ Numeric keys 1 to 0, and alphanumeric keys A to Z, similar with a mobile telephone (cellphone)
- ⊡ Function keys F1 – F5
- ⊡ Key +/-
- ⊡ ENTER Key
- ⊡ Cursor UP/DOWN keys for scroll menus

Keyboard



Picture 3: Front Panel Keyboard

Front Panel Keyboard: Keycodes

The TRM/416 keyboard is PC compatible – means you will get no difference between the scancodes of the TRM/416 – or your PC keyboard. (This is important for your own application!)

Key:	Primary function	Secondary function
Key 1	1	*
Key 2	2	**a b c**
Key 3	3	d e f
Key 4	4	g h i
Key 5	5	j k l
Key 6	6	m n o
Key 7	7	p q r s
Key 8	8	t u v
Key 9	9	w x y z
Key 0	0	Space
Key F1	F1	
Key F2	F2	
Key F3	F3	
Key F4	F4	
Key F5	F5	
Key +/-	.	: + - _
Key · del	Backspace	Contrast-Function *)
Key UP	UP	Contrast up *)
Key DOWN	DOWN	Contrast down *)
Key ENTER	ENTER	

*) Software drivers for TRM/416 supports contrast adjustment by keys in combination Backspace and Up, or Backspace and Down. Please press and hold down key Backspace, additional press and hold down the key Down. Contrast goes lighter in small steps. Release both keys, if LCD is good readable for you. For darkness use the keys Backspace and Up in same way.

Basic Board BB/416

The basic board BB/416 contains connectors for the interfaces. The main features of the BB/416 with the standard DIL/NetPC ADNP/1520:

- DIL-connector for DIL/NetPC
- Connector for RESET-Key
- Jumper for Remote Console Modus RCM
- 10/100Mbps Ethernet LAN with RJ45 Connector, CS8900 Ethernet Controller, TCP/IP Stack
- Serial Interface: 1*RS232/RS422/RS485 (COM1) 1*RS232 (COM2)
- CAN Interface, Philips CAN SJA1000 Controller
- Connector for CompactFlash Cards
- Connector for Power, stable 12-24VDC, maximum power tolerancy + - 10%

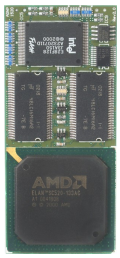
BB/416

Picture 4: Basic Board BB/416

DIL/NetPC

The SSV DIL/NetPC is an embedded PC family with different boards. Following DIL/NetPC are available within the TRM/416 at present:

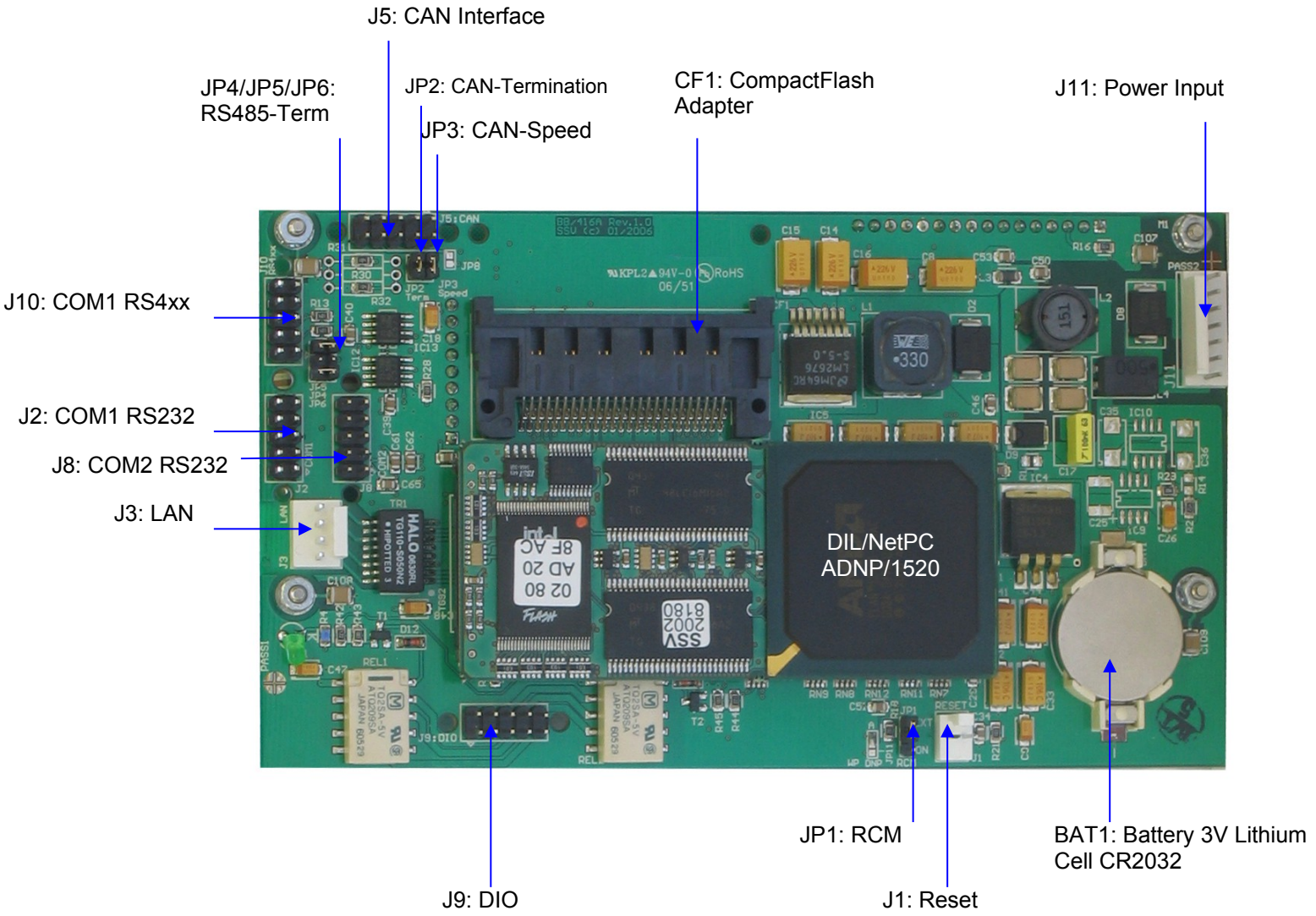
ADNP/1520 (Standard):
- AMD SC-520
- 133 MHz
- 64MB DRAM
- 16MB Flash
- Serial Interface COM1, COM2
- Ethernet LAN, 10/100Mbps
- Watchdog Timer
- ISA Signalbus



Picture 5: DIL/NetPC ADNP/1520

Please note: The complete DIL/NetPC documentation is part of the Startup Package. Please use the DIL/NetPC CD-ROM for exact and detailed information about Getting-Started with the DIL/NetPC family.

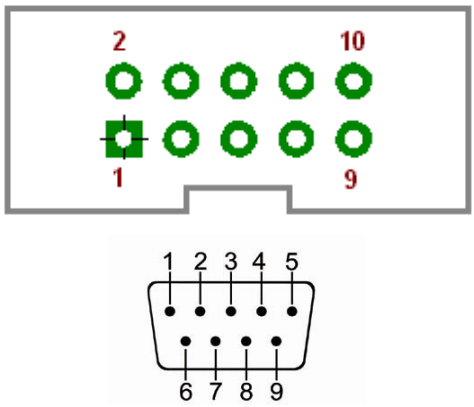
Basic Board BB/416 Connectors - Picture



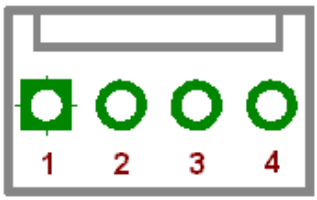
➔ **Additional: All components and jumpers are named directly on the base board**

Connector – Pinouts

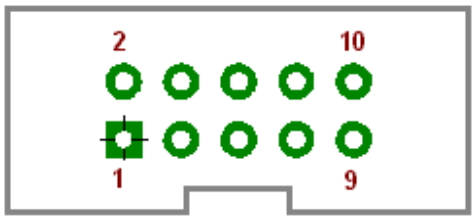
J2 – COM1 RS232		
Board	SUB-D	SIGNAL
1	1	DCD
2	6	DSR
3	2	RXD
4	7	RTS
5	3	TXD
6	8	CTS
7	4	DTR
8	9	RI
9	5	GND
10	-	Nc



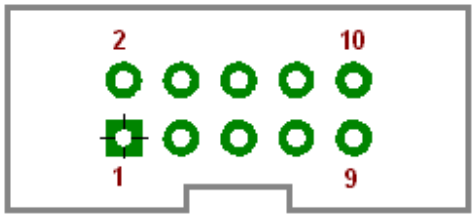
J3 – RJ45 Ethernet		
Board	RJ45 (8)	SIGNAL
1	6	RXD-
2	3	RXD+
3	2	TXD-
4	1	TXD+



J5 – CAN		
Board	SUB-D	SIGNAL
1	1	nc
2	6	GND
3	2	CAN_L
4	7	CAN_H
5	3	GND
6	8	nc
7	4	nc
8	9	nc
9	5	nc
10	-	nc



J8 – COM2 RS232		
Board	SUB-D	SIGNAL
1	1	DCD
2	6	nc
3	2	RXD
4	7	RTS
5	3	TXD
6	8	CTS
7	4	DTR
8	9	Nc
9	5	GND
10	-	Nc

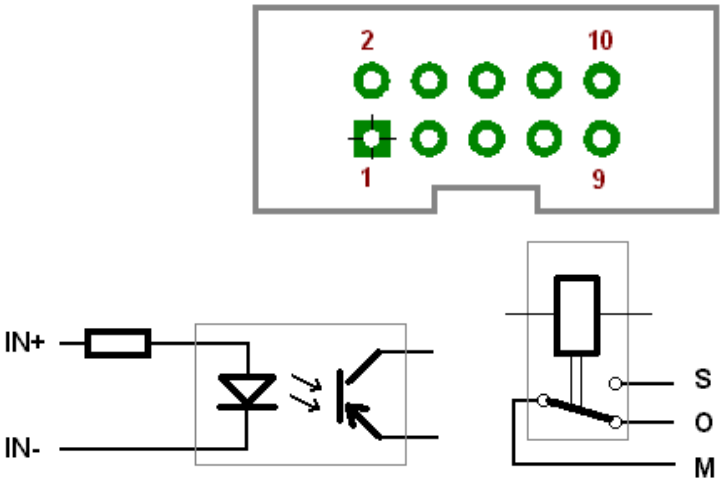


This port has limited function set. Not all Handshakes are available.

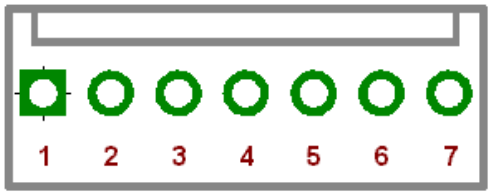
J9 – Digital I/O		
Board	SUB-D	SIGNAL
1	1	IN1-
2	6	IN2-
3	2	IN1+
4	7	IN2+
5	3	OUT1_O
6	8	OUT2_O
7	4	OUT1_M
8	9	OUT2_M
9	5	OUT1_S
10	-	OUT2_S

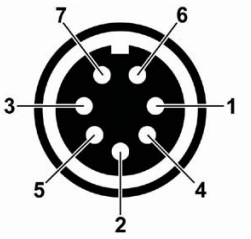
Output relays drive max. 42V/1A.

Inputs need a Power supply 12..24V (or 2..10mA) for high signal.



J11-Power			
Board	DIN (7)	IN/OUT	SIGNAL
1	3	INPUT	GND
2	7		
3	5	-	nc
4	2	INPUT	12-24VDC
5	4	-	nc
6 (*	6	OUTPUT	5VDC, max. 50mA
7	1		





(Case Connector)

(* Important note:

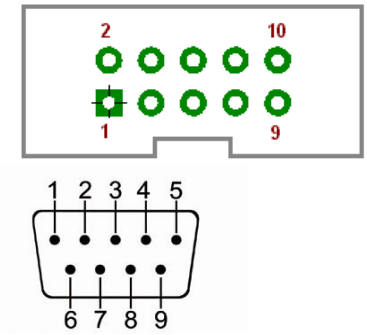
Do not use 5VDC (Stabile +-10%) as INPUT! It can damage your system. There is no specification and ESD-protection on this pin!

Please use 5VDC as OUTPUT on Pin 6 or Pin 7 only for very small applications with max. 50mA (Not more!).

For some TRM/416 connectors we offer cable or cable sets. For more details, see the TRM/416 order information.

The typical input power depends on DIL/NetPC-Type and operating systems.

J10 – COM1 RS422/485			
board	SUB-D	RS422	RS485
1	1	nc	nc
2	6	RX+	PullUP+
3	2	TX+	TX/RX+
4	7	RX-	PullDown-
5	3	TX-	TX/RX-
6	8	nc	nc
7	4	nc	nc
8	9	nc	nc
9	5	nc	nc
10	-	nc	nc



Most RS422/RS485 devices work perfect with this board assignment on short distance. Resistors are an option and not included in the standard accessory.

If there is a long distance, the signal is better if you have smaller line impedance. In addition it activates the detection “line open”. For that you have to close JP5 and JP6 and to equip this three resistors:

R31 = 620 Ohm PullUp to Vcc 5V
R30 = 120 Ohm middle
R32 = 620 Ohm PullDown to GND (Rev A only: Default on board 100KOhm, needed for RS232)

(That are sample values only! Resistors are not placed by factory default.)

Please regard:

- ⊡ Handshake: RTS = ON for Transmit, RTS = OFF to Receive (Samples on CD-ROM)
- ⊡ RS422: Resistors are active always. Do not set Jumper JP5 and JP6 (full duplex)
- ⊡ RS485: Resistors can be set by Jumper JP5 and JP6, but you will receive your self sending ECHO Remove JP4 to disable Echo.
- ⊡ Do not use RS232 and RS422 in the same time on ttyS0 in Linux (COM1 in DOS).
- ⊡ Do not set RCM-Jumper JP1 (or on DNP board), if JP4, JP5 and JP6 are set (RS485 with resistors enabled), because the boot-process stops.

Typical usages:

- ⊡ RS232: JP4 open, JP1: selects RCM-Mode, J2: all Signals usable
- ⊡ RS485: JP4 open, J10: 2-Wire-Signals, Pins 3/5.
  JP5/JP6 close to enable optional Pullup/Pulldown resistors.
  JP1: open or position "EXT".
  RTS switches transceivers on and off.
- ⊡ RS422: JP4 close, JP5/JP6 open, J10: 4-Wire-Signals, Pins 2/4 inputs, Pins 3/5 outs.
  Optional Pullup/Pulldown resistors are enabled any time on inputs.
  RTS must set ON permanently.

Jumpers on TRM/416

JP1 – RCM			
Position	State	Function	Description
1-2-3	open	OFF	RCM disabled
1-2	close	ON	RCM enabled
2-3	close	EXT	RCM from external signal DSR on COM1. RCM enabled, if DSR is ON in booting process. (default)

JP2 – Term			
Position	State	Function	Description
1-2	open	OFF	CAN not terminated
1-2	close	ON	CAN terminated with 120 Ohm (default)

JP3 – Speed			
Position	State	Function	Description
1-2	open	OFF	CAN slow speed
1-2	close	ON	CAN high speed (default)

JP4 – 422RX			
Position	State	Function	Description
1-2	open	OFF	COM1 RS422 RX disabled, no echo in mode RS485.
1-2	close	ON	COM1 RS422 RX enabled

JP5 – 485PU			
Position	State	Function	Description
1-2	open	OFF	COM1 RS485 Pull-Up disabled
1-2	close	ON	COM1 RS485 Pull-Up enabled with R31. Mode RS422 (full duplex) not usable.

Mode RS422: Resistors R30, R31, R32 are always active, but not mounted by factory default.

JP6 – 485PD			
Position	State	Function	Description
1-2	open	OFF	COM1 RS485 Pull-Down disabled
1-2	close	ON	COM1 RS485 Pull-Down enabled with R32. Mode RS422 (full duplex) not usable.

Mode RS422: Resistors R30, R31, R32 are always active, but not mounted by factory default.

JP8 – CAN-Vcc			
Position	State	Function	Description
1-2	open	OFF	J5 Pin8 is not connected (default)
1-2	close	ON	Vcc (5V) on connector J5 Pin8.

JP11 – CPU Selection			
Position	State	Function	Description
1-2	close	DNP	DNP/1486
2-3	close	ADNP	ADNP/1486, ADNP/1520 (Factory default)
1-2-3	open	-	Don't allowed

Reserved / not available I/O-Addresses on TRM/416

Reserved I/O – Addresses	
I/O - Address	Device
1F0h - 1F7h	CF/IDE
240h - 243h	LCD
280h - 281h	CAN
2F8h - 2FFh	COM2
300h - 30Fh	LAN
3F6h - 3F6h	CF/IDE
3F8h - 3FFh	COM1

Reserved Interrupts		
IRQ	ADNP	Device
IRQ0		Timer
IRQ1	INT7	n.c.
IRQ2		Slave
IRQ3	INT1	Keyboard
IRQ4		COM1
IRQ5		LAN
IRQ6	INT4	CAN
IRQ7	INT5	n.c.
IRQ8		CMOS/RTC
IRQ9		-
IRQ10	INT3	DIO-IN2
IRQ11		COM2
IRQ12	INT2	DIO-IN1
IRQ13		FPU
IRQ14	INT6	IDE/CF
IRQ15		-

Electrical characteristic TRM/416

Modul	I / mA				P / W			
	min	Linux	DOS	max	Min	Linux	DOS	max
ADNP/1520	270	280	510	610	3,2	3,4	6,2	7,3

12VDC

Modul	I / mA				P / W			
	min	Linux	DOS	max	min	Linux	DOS	max
ADNP/1520	140	155	250	300	3,6	3,7	6,0	7,2

24VDC

Test conditions:

ADNP/1520 with 133MHz

min: Power-Save mode for CPU and do nothing on LCD (Cursor non blink)
Linux: Typical with hlt-mode enabled (default) and demo on LCD. Or DOS PowerSave driver.
DOS: Typical with demo application, or DOS-Prompt, no power savings enabled.
max: Maximal power for Linux and DOS, CPU full in action on LCD.

Additional Information

Compact Flash Card:	The TRM/416 Starter Kit II with ADNP can use compact flash cards for memory upgrade. The DNP version does not allow the using of compact flash cards.
Power:	Use 12...24 VDC in stable version for power! Max tolerancy is + / - 10% of this value. Exceeding this value for long term use or in power peeks will damage the system!
CAN Interface:	The TRM/416 contains an on-board CAN controller, type Philips SJA1000. Please refer our special add-on documentation for the CAN interface: → user-doc/add-on
Digital I/O:	The TRM/416 contains a digital I/O with 2bit inport and 2bit outport. You can address them via PORT A / Port B of the (A)DNP. Please refer our DIO software samples for using.
LCD Contrast:	Some TRM/416 contains an adjustable contrast via software, useable with a keyboard combination. Refer software drivers for more information.
LCD Backlight:	Depending on production series we deliver the TRM/416 with a standard LCD or with a backlighted LCD. If you have got a version with backlighted LCD, the backlight is always on. It is not possible to turn to backlight on or off.
Web Server:	If you want to install a web server for the TRM/416, please explore the DIL/NetPC CD. The web server is a part of the DIL/NetPC. We put the web server httpd on the CD (and the documentation for using) too.
RAM Disc, Drive C and D:	The internal flash memory is drive C: We prepared the TRM/416 with a RAM disc, you can use this as drive D: – or if you are using a compact flash card E: We recommend to use the RAM disc for exploring our samples. This is the faster way (for downloads) and you save the flash life with using the RAM disc.
Case Version – Evaluation System:	We recommend to use the starter kit as open frame system. It is easier to use on a table for the programming and software development phase. If you want to begin with a case version, you have to open the TRM/816 case to use all the evaluation features of the TRM/416, e.g. RCM mode etc. If you have finished your software development, you can close the system and use the case version again.

Pictures

Contact

Manufacturer:	General Distributor:
SSV Software Systems GmbH	**AE SYSTEME www.terminal-systems**
Dünenweg 5	Am Güterbahnhof 15
D-30419 Hannover / Germany	D-31303 Burgdorf / Germany
www.ssv-industrial.de	www.terminal-systems.de

Notes to this document

Revision	Date		Name
1.00	15.05.2007	First version	hne/smu
1.01	17.07.2007	Changes on IO-Map, IRQ-Map, Contrast Hotkeys	hne
	26.03.10	Updated adress information and bugfixes	hjw

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