

# TRM/816



## Hardware Manual

new Version – including TRM/816 Rev B with ADNP/1520



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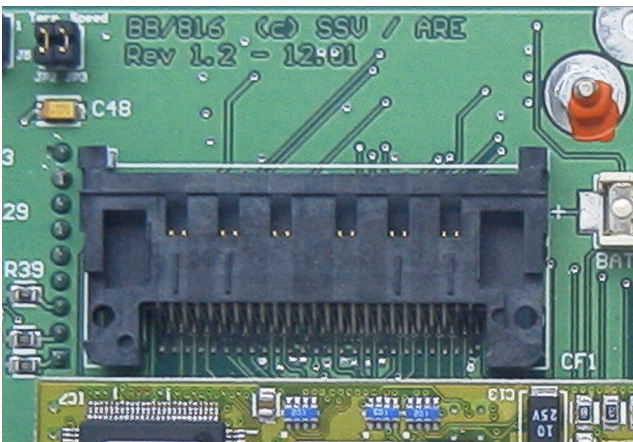
## Important Version Information

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Please check carefully which TRM/816 base board version you are using. Base board versions own different connectors. Following pages include information for the older rev A and for the newer rev B together. The pictures show information about base board BB/816 Rev A and the newer version BB/816B (Rev B). From year 2006 we are offering two versions:

### 1) TRM/816 Rev A - including base board BB/816 Rev A – the older version

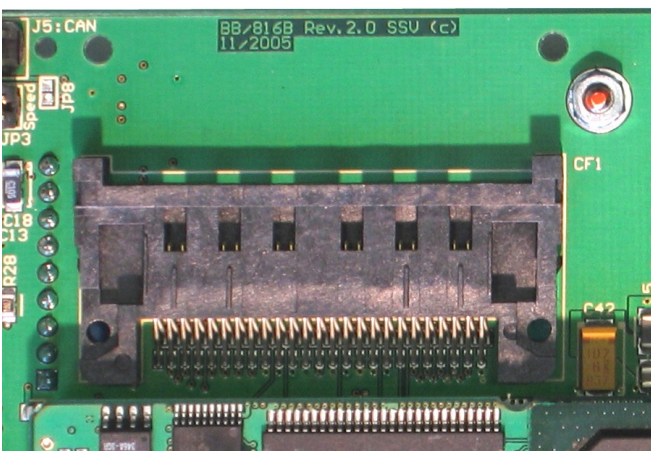
See printed text BB/816 © SSV / ARE Rev. 1.x – 12.01 which means: this base board is hardware version 1.2 from 12/2001.



Picture 1: TRM/816 Rev A

### 2) TRM/816 Rev B - including base board BB/816B – the newer version.

See printed text BB/816B Rev. 2.x, SSV © 11/2005 which means: this base board is hardware version 2.0 from 11/2005. Note: Newer versions are available also!



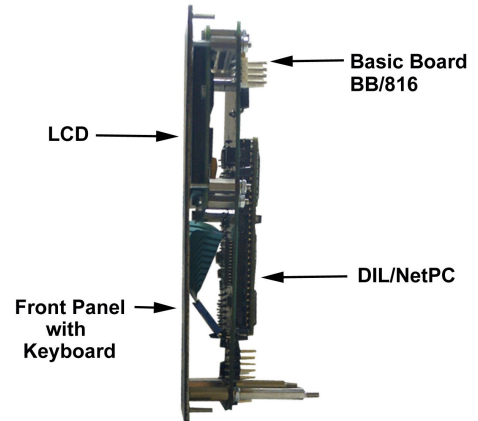
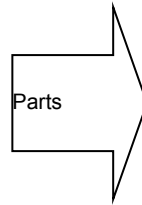
Picture 2: TRM/816 Rev B

## Parts of the TRM/816 – all versions

The TRM/816 including a new and innovative concept for an extremely small PC system – complete for industrial and automation applications.

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/816 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/816 and the popular DIL/NetPC. The right picture shows the details.



Picture 3: TRM/816 Parts

**Note: Current versions from 2009 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!**

## LC-Display

Display Capacity: 128 x 64 Dots, Supertwist LC-Graphic Display, e.g. 8 Lines / 21 Char in Textmode. CFL Backlight.

Driving Method: Controller

Module Size: 78 x 70 x 9,7 mm

Viewing Area: 62 x 44 mm

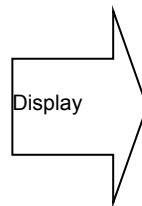
Dot Size: 0,39 x 0,55 mm

Dot Pitch: 0,44 x 0,60 mm

Response Time: 150 ns (accesstime)

Operating Temp.: 0-50°C

Option: Temp.-Range -20...70°C

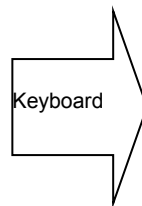


Picture 4: LC-Display

## Front Panel Keyboard

The front panel contains a matrix keyboard with following functions:

- ▣ Numeric keys 1 to 0, and alphanumeric keys – similar with a mobile telephone (cellphone)
- ▣ Function keys F1 - F4
- ▣ Key +/-
- ▣ ENTER Key
- ▣ Two Softkeys S1/S2
- ▣ Cursor UP / DOWN keys for scroll menus.



Picture 5: Front Panel Keyboard

## Front Panel Keyboard: Keycodes

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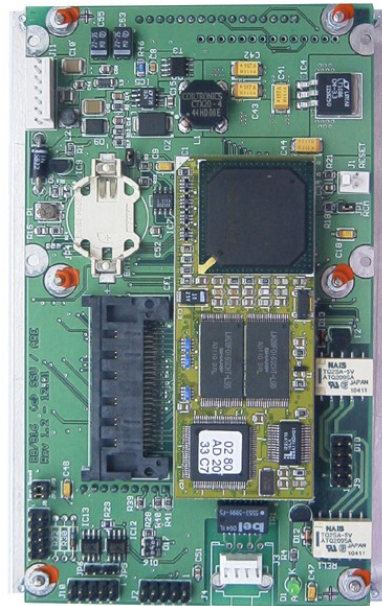
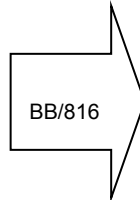
The TRM/816 keyboard is PC compatible – means you will get no difference between the scancodes of the TRM/816 – or your PC keyboard. (This is important for your own application!)

Key:	Primary function	Secondary function
Key S1	ESC	ESC
Key S2	Backspace	Backspace
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 +/-	+	/ - . :
Key ENTER	ENTER	
Key F1	F1	
Key F2	F2	
Key F3	F3	
Key F4	F4	
Key UP	UP	
Key DOWN	DOWN	

## Base Board BB/816 - Rev A

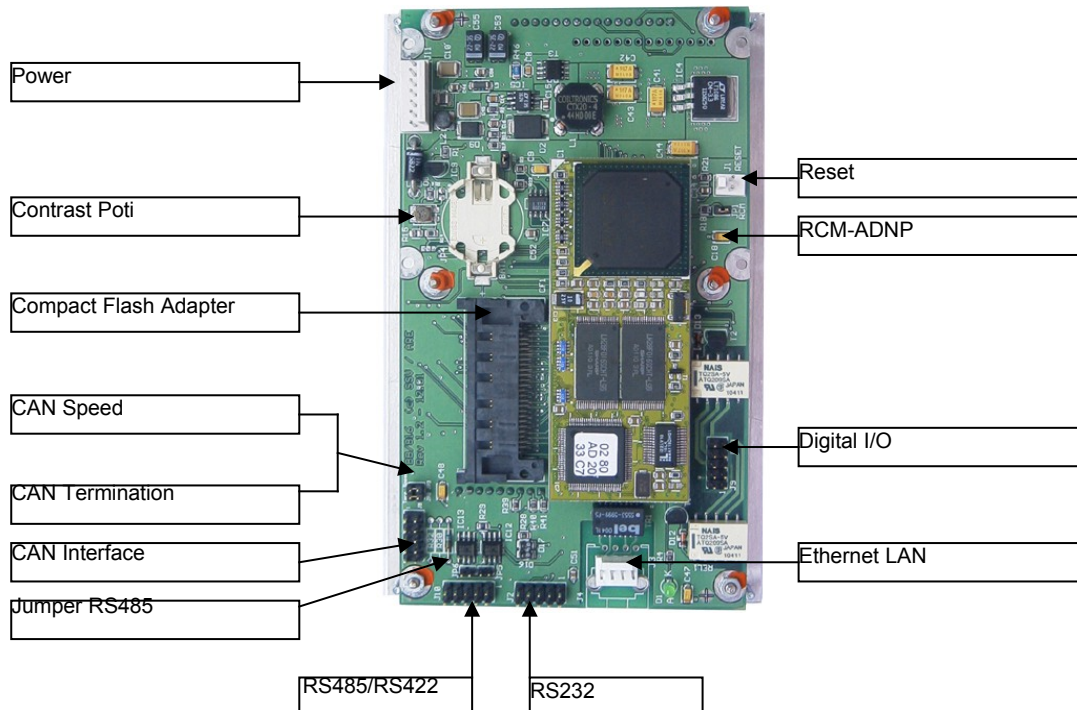
The base board BB/816 contains connectors for the interfaces. The main features of the BB/816:

- ▣ DIL-connector for DIL/NetPC
- ▣ Connector for RESET-key
- ▣ Jumper for Remote Console Modus RCM (useable with ADNP only!)
- ▣ Connector for digital I/O, 2bit inport opto-isolated, 2bit output with relays
- ▣ 10BASE-T Ethernet LAN with RJ45 Connector, 10Mbit/s, Ethernet Controller, TCP/IP Stack
- ▣ COM1 Serial interface, available as RS232/RS422/RS485
- ▣ CAN Interface, Philipps CAN SJA1000 Controller
- ▣ Connector for Compact Flash Cards (useable with ADNP only!)
- ▣ Connector for power, stable 12-24VDC, maximum power tolerancy + - 10%



Picture 6: Base Board BB/816 (old Version A)

## Base Board BB/816 Rev A - Connectors - Picture

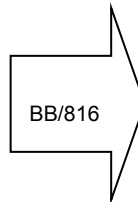




## Base Board BB/816- Rev B

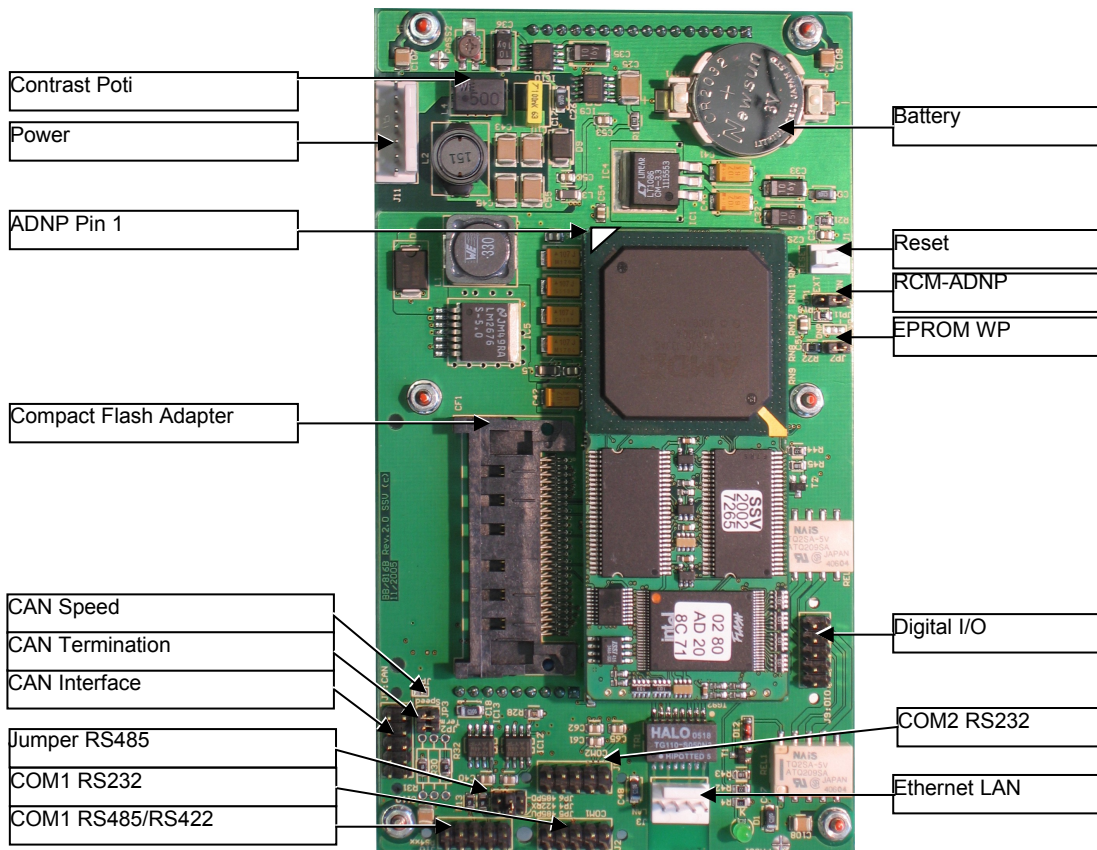
The new one base board BB/816-B contains connectors for the interfaces. The main features of the BB/816-B:

- ▣ DIL-connector for DIL/NetPC
- ▣ Connector for RESET-key
- ▣ Jumper for Remote Console Modus RCM
- ▣ Connector for digital I/O, 2bit inport opto-isolated, 2bit output with relays
- ▣ 10BASE-T Ethernet LAN with RJ45 Connector, 10/100Mbit/s, Ethernet Controller, TCP/IP Stack
- ▣ COM1:RS232/RS422/RS485, COM2:RS232
- ▣ CAN Interface, Philipps CAN SJA1000 Controller
- ▣ Connector for Compact Flash Cards
- ▣ Connector for power, 12-24VDC



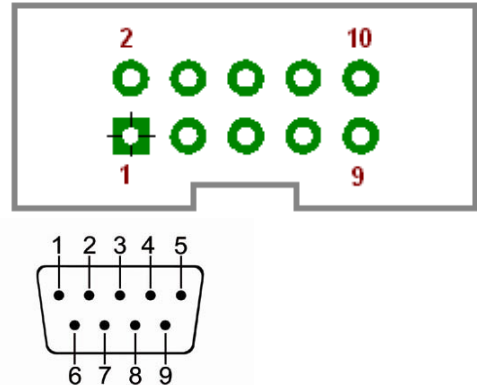
Picture 7: Base Board BB/816-B

## Base Board BB/816- Rev B - Connectors – Picture

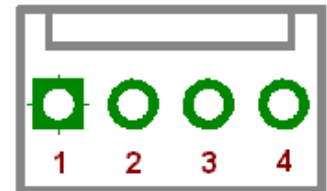


## Connector – Pinouts

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



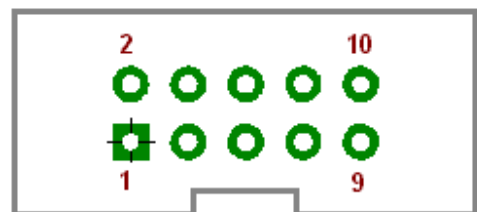
J3 – RJ45 Ethernet		
Board	RJ45 (8)	SIGNAL
1	6	RXD-
2	3	RXD+
3	2	TXD-
4	1	TXD+



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

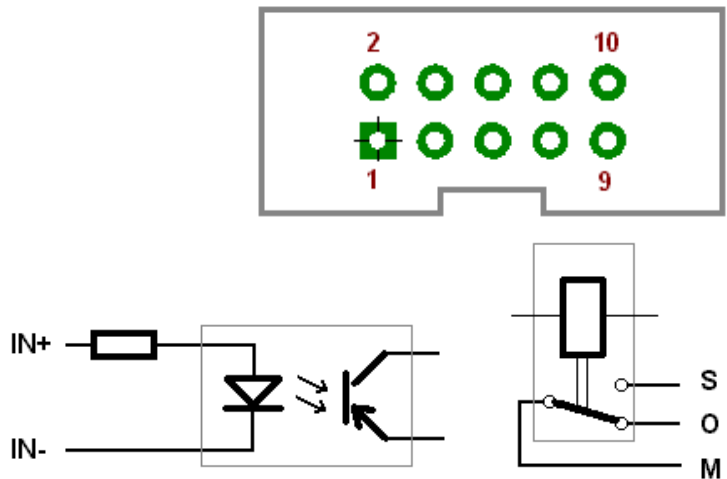


J8 COM2: Is only available with ADNP/1520 and BIOS for TRM/816. This port has limited function set. Not all Handshakes are available.

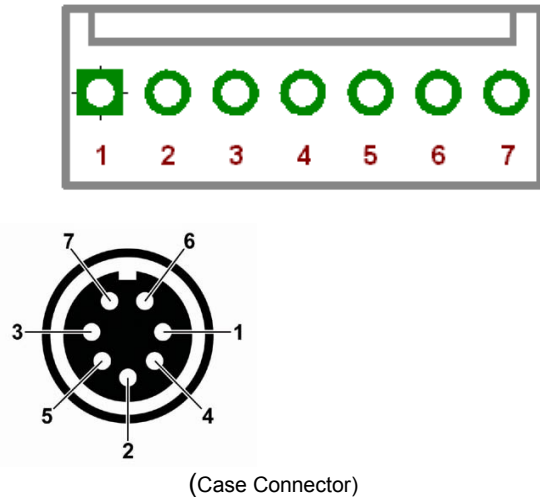
J9 – Digital I/O		
Board	SUB-D	SIGNAL
1	1	IN1-
2	6	IN2-
3	2	IN1+
4	7	IN2+
5	3	OUT1_O
6	8	OUT2_O
7	4	OUT1_M
8	9	OUT2_M
9	5	OUT1_S
10	-	OUT2_S

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		



(\* Important note:

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

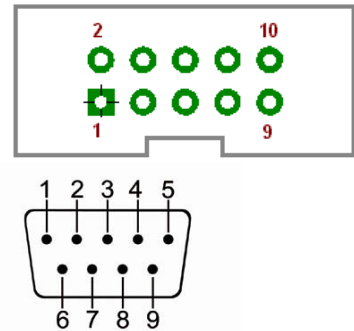
Please use 5VDC as OUTPUT on Pin 6 or Pin 7 only for very small applications with max. 50mA (Not more!).

**For some TRM/816 connectors we offer cable or cable sets. For more details, see the TRM/816 order information.**

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

## Connector – Pinout: RS422/485

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 TRM/816B only: 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

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

ADNP/1486 or ADNP/1520: Position 2-3 is only available on TRM/816B.

DNP/1486: Jumper JP1 is on top of DIL/NetPC, not on Baseboard.

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

JP4 is only available on TRM/816B. All other versions can not disable RS485 echo.

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.

<b>JP7 – WP</b>			
Position	State	Function	Description
1-2	open	OFF	EEPROM is protectable by software.
1-2	close	ON	EEPROM all times read/writable (default)

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

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

JP11 is only available on TRM/816B.

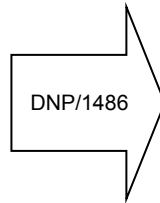
## DIL/NetPC

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The SSV DIL/NetPC is an embedded PC family with different boards. Following DIL/NetPC are available within the TRM/816 at the moment:

### Type 1: DNP/1486:

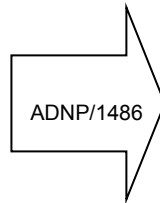
- ▣ AMD SC-410
- ▣ 33 MHz
- ▣ 8MB DRAM
- ▣ 2MB Flash
- ▣ Serial Interface
- ▣ 10BASE-T Ethernet LAN
- ▣ Watchdog Timer



Picture 8: DIL/NetPC DNP/1486

### Type 2: ADNP/1486:

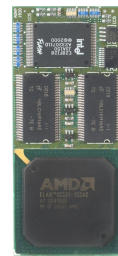
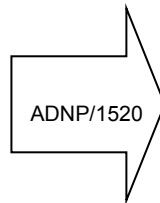
- ▣ AMD SC-410
- ▣ 33/100 MHz
- ▣ 16MB DRAM
- ▣ 4MB Flash
- ▣ Serial Interface
- ▣ 10BASE-T Ethernet LAN
- ▣ Watchdog Timer
- ▣ ISA Signalbus



Picture 9: DIL/NetPC ADNP/1486

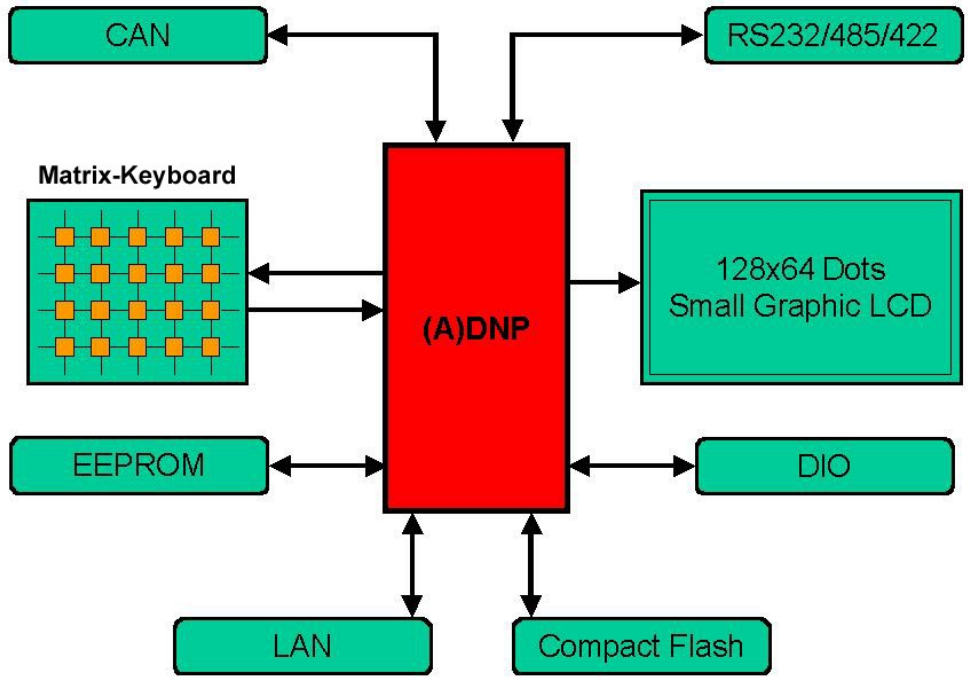
### Type 5: ADNP/1520

- ▣ AMD SC-520
- ▣ 100/133 MHz
- ▣ 64MB DRAM
- ▣ 16MB Flash
- ▣ Serial Interface
- ▣ Ethernet LAN, 10 / 100 Mbps
- ▣ Watchdog Timer
- ▣ ISA Signalbus



Picture 10: DIL/NetPC ADNP/1520

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





## Additional Information

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<b>Compact Flash Card:</b>	The TRM/816 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.
<b>Power:</b>	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!
<b>CAN Interface:</b>	The TRM/816 contains an on-board CAN controller, type Philips SJA1000. Please refer our special add-on documentation for the CAN interface: → user-doc/add-on
<b>Digital I/O:</b>	The TRM/816 contains a digital I/O with 2bit inport and 2bit output. You can address them via PORT A / Port B of the (A)DNP. Please refer our DIO software samples for using.
<b>LCD Contrast:</b>	The TRM/816 contains an on-board contrast switch. In normal applications it is not necessary to change the contrast. If you want to do this, please refer "Picture - Connectors" for the position of the contrast switch.
<b>LCD Backlight:</b>	Depending on production series we deliver the TRM/816 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.
<b>Web Server:</b>	If you want to install a web server for the TRM/816, 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.
<b>RAM Disc, Drive C and D:</b>	The internal flash memory is drive C: We prepared the TRM/816 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.
<b>Case Version – Evaluation System:</b>	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/816, e.g. RCM mode etc.  If you have finished your software development, you can close the system and use the case version again.

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## Ordercodes

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<b>Ethernet Terminal TRM/816</b>	
<b>Article-No.</b>	<b>Description</b>
<b>TRM/816 + DNP/1486</b>	TRM/816 with DIL/NetPC DNP/1486, AMD 33MHz, 8MB DRAM, 2MB Flash, 10 Mbps Ethernet, Embedded Linux version
<b>TRM/816 + ADNP/1486</b>	TRM/816 with DIL/NetPC ADNP/1486, AMD 33/100MHz, 16MB DRAM, 4MB Flash, 10 Mbps Ethernet, Compact Flash Adapter, Embedded Linux version
<b>TRM/816B + ADNP/1520</b>	TRM/816B new version Rev B with DIL/NetPC ADNP/1520, AMD 133MHz, 64MB DRAM, 16MB Flash, 10/100 Mbps Ethernet, Compact Flash Adapter, Embedded Linux version

<b>Cables</b>	
<b>Article-No.</b>	<b>Description</b>
<b>KK1-TRM (*)</b>	Cable Kit: 1*COMPORT (SUB-D9), 1*Reset Key, 1*Ethernet LAN
<b>KK2-TRM</b>	Cable: 1*COMPORT (SUB-D9), usable for serial COM1, COM2, DIO or CAN
<b>KK3-PWR-TRM</b>	Power Cable: Power Connector for TRM/816, 7 pol.
<b>KK-NM-TRM (*)</b>	Nullmodem Cable, serial for RCM Mode and serial File Transfer

<b>Power Supply</b>	
<b>Article-No.</b>	<b>Description</b>
<b>PWR1-TRM (*)</b>	External Power Supply, Input 230 VAC, Output 1.5-12V
<b>PWR2-TRM</b>	External DIN-Rail Power Supply, Input 60-260 VAC, Output 24V, M-3 Case
<b>PWR3-TRM</b>	External Power Supply, Input 100-240 VAC, Output 3-12V

(\* Note: This accessories are included in the Startup Package!

<b>Others</b>	
<b>Article-No.</b>	<b>Description</b>
<b>Embedded LINUX</b>	Embedded LINUX Developers Version with 2.2 and 2.4 Kernel, glib 2.2, TCP/IP Protocolstack, embedded Webserver httpd, Telnet, FTP and samples for automatic start, PPP/SLIP, Software drivers for display and keyboard, sample software for serial use. <b>Note:</b> This application package is already included in the TRM!
<b>RDOS-AT-E</b>	ROM-DOS 6.22 OEM License with Flash File System, TCP/IP Stack, Web Server and FTP. Preinstalled in Flash.
<b>VT100-Serial</b>	VT100 Firmware for serial port. Preinstalled in Flash.
<b>VT100-LAN</b>	Telnet Client with VT100 Firmware for Ethernet LAN Interface. Preinstalled in Flash. Supports serial port for barcode readers or other input devices.
<b>BAT-TRM</b>	RTC Backup Battery CR2032 – for die security of the internal Real Time Clock of the TRM/816.
<b>Screw-TRM</b>	Screw Set: 5 Screws M2.5, for the mounting.

(\* Note: This accessories are included in the Startup Package!

### Keycodes

## Pictures

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## Contact

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Manufacturer: <b>SSV Software Systems GmbH</b> Dünenweg 5 D-30419 Hannover / Germany <a href="http://www.ssv-industrial.de">www.ssv-industrial.de</a>	General Distributor: <b>AE SYSTEME <a href="http://www.terminal-systems">www.terminal-systems</a></b> Am Güterbahnhof 15 D-31303 Burgdorf / Germany <a href="http://www.terminal-systems.de">www.terminal-systems.de</a>
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## Notes to this document

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Revision	Date		Name
1.00	05.07.02	First version	hjlw/smu
1.01	15.01.03	Ordercodes/Pinout	smu
1.02	03.06.03	Some updates for ADNP/1520	are
1.03	21.01.04	More Pinout	hne/smu
1.04	29.03.05	Pinout DUB-D and DIN for Case version	hne
1.05	19.09.05	Power supply for DIO	hne
1.06	09.03.06	Additional for ADNP/1520, Jumpers	hne
1.07	13.06.06	Case Connectors	smu
1.08	15.11.06	RS422/485 typical usages	hne
1.09	28.03.07	RevA/B short docs changed. DIO voltages	hne
	11.07.07	LAN 10/100 for 1520	Hne
	26.03.10	Updated adress information - some bugfixes	hjlw

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