

IPC/COMPACGP-1GE

IPC/COMPACGP-3GE

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1 Introduction

1.1. General Remarks

The content and presentation of this document has been carefully checked. No responsibility is accepted for any errors or omissions in the documentation.

Note that the documentation for the products is constantly revised and improved. The right to change this documentation at any time without notice is therefore reserved.

Syslogic is grateful for any help referring to errors or suggestions for improvements.

The following registered trademarks are used:

IBM-PC, PC/AT, PS/2	trademarks of IBM Corporation
CompactFlash	trademark of SanDisk Corporation
STPC	trademark of ST Microelectronics
CAN	trademark of Robert Bosch GmbH
RS422/RS485	EIA standard
RS232	ANSI standard

1.2. Contents of this Documentation

This document addresses to system integrators, programmers and instructed installation and maintenance personal working with the following base boards:

Order Code	Description
IPC/COMPACGP-1GE	COM1: RS232, COM2: RS422/RS485, USB, extended temperature range
IPC/COMPACGP-3GE	COM1: RS232, COM2: RS422/RS485, PS/2, extended temperature range

Tab. 1 Boards included in this documentation

It provides all information needed to configure, setup and program the base board. The detailed installation guidelines and further information can be found in the documentation DOC/COMPACT5-1GE or DOC/COMPACT2-1GE.

1.3. Additional Documents

The following documents are *required* for correct installation and operation of the IPC/COMPACT5-1G(E), IPC/COMPACT2-1G, IPC/COMPACT3-1GE systems:

Order Code	Description	Manufacturer
DOC/IPC_IOCOWSW-E	User documentation for programming examples and utilities	Syslogic AG
DOC/COMPACT5-1GE	User documentation of the system	Syslogic AG
DOC/COMPACT2-1GE	User documentation of the system	Syslogic AG
DOC/IPC_NETIPC-E	User documentation of the IPC/NETIPC	Syslogic AG
DOC/NETIPCFW-E	User documentation of the firmware	Syslogic AG
	ST16C550 datasheet	EXAR

Tab. 2 Related Documents

1.4. Safety Recommendations and Warnings

The products are intended for measurement, control and communications applications in industrial environments. The use of the products in systems in which the life or health of persons is directly dependent (e.g. life support systems, patient monitoring systems, etc.) is not allowed. The use of the products in potentially explosive atmospheres requires additional external protection circuitry which is not provided with the products

In case of uncertainty or of believed errors in the documentation please immediately contact the manufacturer (address see chapter 8). Do not use or install the products if you are in doubt. In any case of misuse of the products, the user is solely liable for the consequences.

The products contain electronic components which will be damaged by electrostatic discharges. The recommendations for handling of sensitive electronic equipment must therefore be strictly followed in all phases of the mounting and installation of the products.

The products are “CE”-certified. The “CE”-conformity, i.e. the compliance to the required standards is only guaranteed if the corresponding mounting, installation, and cabling guidelines are strictly observed (see DOC/COMPACT5-1GE or DOC/COMPACT2-1GE).

The products are operated with electrical power. Before manipulating the products, they must be disconnected from the power source and from the communication signals.

The products require set-up procedures before they can be operated. Before being used in an actual installation, they must be correctly configured. If the products are not or wrongly configured, they may malfunction in the intended application.

The products must be assembled and installed by specially trained people. The strict observation of the assembly and installation guidelines is mandatory.

1.5. Life Cycle Information

1.5.1. Transportation and Storage

During transportation and storage the products must be in their original packing. The original packing contains an antistatic bag and shock-absorbing material. It is recommended, to keep the original packing in case of return of the product to the factory for repair. Note that the packing is recyclable.

1.5.2. Assembly and Installation

Observe the EMI-precautions against static discharge. Carefully read the assembly and installation guidelines in this document before unpacking the products. Make sure that you have all the necessary items ready (including all the small parts).

The installation procedures must be strictly observed. Note that deviations from the installation guidelines may result in degraded operational reliability or in unfavorable EM-radiation or EM-susceptibility.

1.5.3. Operation

The operating environment must guarantee the environmental parameters (temperature, power supply, etc.) specified in the technical specification section of the manuals.

The main functionality of the base board defined by the application programs running on the system. The application programs are not part of the delivery by Syslogic but are defined, developed and tested by the customer or a system-integrator for each specific application. Refer to the respective documentation for more information.

1.5.4. Maintenance and Repair

The base board features error- and malfunction-detection circuitry. Diagnostic information gathered is transferred to the applications software where it can be used. In the rare case of a module hardware-failure or malfunction, the complete module should be exchanged. The faulty module must be returned to the factory for repair. Please use whenever possible the original packing for return of the product (ESD and mechanical protection).

1.5.5. Disposal

At the end of the lifespan the base board must be properly disposed. It contains a multitude of elements and must be disposed like computer parts. The system contains a battery which should be properly disposed.

2 Product Description

2.1. General Information

IPC/COMPACGP-1GE with USB

The IPC/COMPACGP-1GE can be used with the following CPU:

- IPC/NETIPC-5AN(E)

IPC/COMPACGP-3GE with PS/2

The IPC/COMPACGP-3GE can be used with the following CPUs:

- IPC/NETIPC-2AN
- IPC/NETIPC-3ANE

2.2. Features

The base board comes in many different options. The IPC/COMPACT systems provide all necessary support functions to build a standalone network and fieldbus capable industrial control system. Standard desktop PC functions are implemented according to the PC/AT reference platform.

There are several versions of the base board with different features which are listed below.

2.2.1. IPC/COMPACGP-1G(E)

Power Supply

- non isolated switching regulator
- input range: 9Vdc to 30Vdc
- protected against reverse connection of external power source
- protected against overload with replaceable fuse
- optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface

- subset of standard PC/104 bus interface
- DIN41612 bus connector

Non Isolated Serial Port (COM1)

- 1 standard 16C550 compatible UART channel (COM1), implemented on the CPU board
- 16 byte receive and transmit FIFO
- standard non isolated protected RS232 signals on DSUB9 connector
- standard PC/AT address range for COM1
- standard 1.8432 base clock for baudrates up to 115.2kbaud

Isolated RS422/RS485 Interface (COM2)

- 1 standard 16C550 compatible UART channel (COM2), implemented on the CPU board
- 16 byte receive and transmit FIFO
- standard RS422/RS485 signals on DSUB9 connector
- standard PC/AT address range for COM2
- baudrates up to 115.2kbaud
- half- or fullduplex (configurable)
- termination resistor configurable (100E or 120E)
- level resistors configurable (470E)

USB

- two USB V1.1 ports (OHCI-Hostcontroller) on IPC/NETIPC-5A

2.2.2. IPC/COMPACGP-3GE

Power Supply

- non isolated switching regulator
- input range: 9Vdc to 30Vdc
- protected against reverse connection of external power source
- protected against overload with replaceable fuse
- optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface

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Non Isolated Serial Port (COM1)

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- 16 byte receive and transmit FIFO
- standard non isolated protected RS232 signals on DSUB9 connector
- standard PC/AT address range for COM1
- standard 1.8432 base clock for baudrates up to 115.2kbaud

Isolated RS422/RS485 Interface (COM2)

- 1 standard 16C550 compatible UART channel (COM2), implemented on the CPU board
- 16 byte receive and transmit FIFO
- standard RS422/RS485 signals on DSUB9 connector
- standard PC/AT address range for COM2
- baudrates up to 115.2kbaud
- half- or fullduplex (configurable)
- termination resistor configurable (100E or 120E)
- level resistors configurable (470E)

Mouse

- standard PS/2 connector (controller implemented on the CPU board)

2.3. Block Diagram

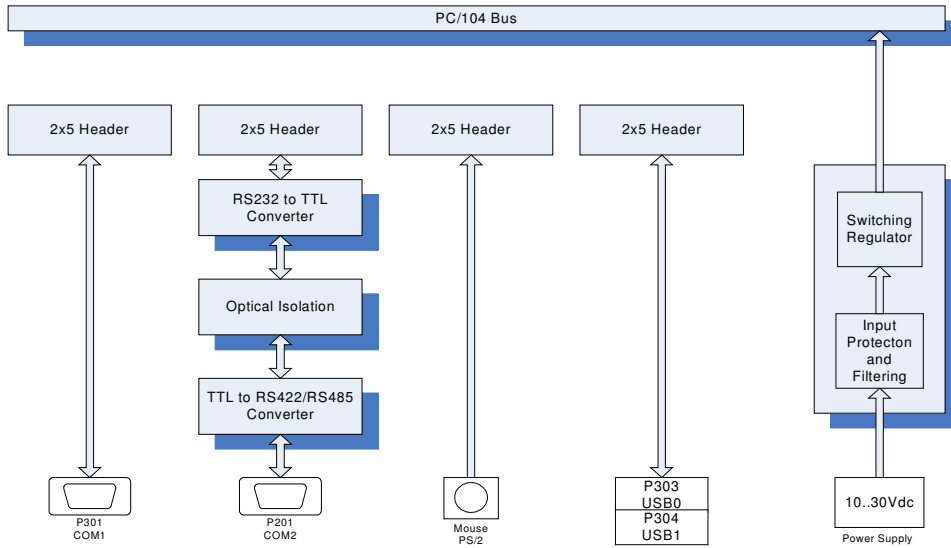


Fig. 1 Basic Block Diagram (IPC/COMPACGP-1GE)

2.4. Other Products

See Tab. 1.

3.2. Memory and I/O Resources

3.2.1. General Memory Layout and Configuration

The base board uses no memory address space.

3.2.2. General I/O Layout

Address	Device / Register	Remarks
0x02F8..0x02FF	COM2 (RS422/RS485)	CPU
0x03F8..0x03FF	COM1 (RS232)	CPU

Tab. 3 I/O Address Space Layout

3.2.3. I/O Base Address Configuration

The I/O base address of the two serial ports cannot be configured.

3.3. Onboard Function Blocks

Block diagrams

3.3.1. Power Supply

Logic power is converted from an external 24Vdc power supply to non isolated +5V. The external 24V input is rectified to prevent any short circuit situation.

Power Supply Device Connection

The input for the external 24Vdc power supply is provided on male connector J101. The order code for the female part is: *Weidmüller BL 3.5/2F*.

The signal layout is compatible with standard PC power supply cabling.

Pin Number	Signal	Remarks
1	GND	
2	+24V	

Tab. 1 Power Supply Connector J101 (2 pin)

3.3.2. USB Interface

The IPC/NETIPC-5A features an OHCI compatible USB Hostcontroller having assigned the base address and IRQ at boot time by the PCI-BIOS.

Device Connection

The USB interface uses two 4pin headers for the two USB channels.

J504	USB channel 0	J506	USB channel 1
Pin Number	Signal	Pin Number	Signal
1	VBUS	1	VBUS
2	D-	2	D-
3	D+	3	D+
4	GND	4	GND

Tab. 4 USB Interface Headers J205/J206

The headers J205 and J206 are not implemented on board.

P503	USB channel 0	P503	USB channel 1
Pin Number	Signal	Pin Number	Signal
1	VBUS	1	VBUS
2	D-	2	D-
3	D+	3	D+
4	GND	4	GND

Tab. 5 USB Interface Connector P202/P203

3.3.3. Mouse

The additional wiring for use with keyboard and mouse is provided on the base board. The signals for the mouse are available on a standard PS/2 connector (P204).

Pin Number	Signal	Remarks
1	-	connected with Pin3, KBDATA
2	-	connected with Pin4, KBCLK
3	-	connected with Pin1, KBDATA
4	-	connected with Pin2, KBCLK
5	MDATA	
6	MCLK	
7	not used	
8	not used	
9	GND	not connected with GND on the base board
10	VCC	not connected with VCC on the base board

Tab. 6 Mouse Header J207 (2x5 pin)

The header J207 is not implemented on the board.

Pin Number	Signal	Remarks
1	MDATA	
2	not used	
3	GND	not connected with GND on the base board
4	VCC	not connected with VCC on the base board
5	MCLK	
6	not used	
7	Shield	
8	Shield	
9	Shield	

Tab. 7 PS/2 Mouse Connector P204 (MiniDIN)

3.3.4. Non isolated RS232 Serial Port (COM1)

The serial ports have fixed base addresses of 0x03F8 (COM1). The UART is implemented on the CPU board but the connectivity is on the base board.

Device Connection

The Serial Port A (COM1) of the UART is available on the standard PC/AT DSUB9 male connector P201.

Pin Number	Signal	Remarks
1	DCD*	
2	RXD	
3	TXD	
4	DTR*	
5	GND	
6	DSR*	
7	RTS*	
8	CTS*	
9	RI*	

Tab. 8 Serial Port A P201

3.3.5. Isolated RS422/RS485 Serial Port (COM2)

The serial ports have fixed base addresses of 0x02F8 (COM2). The UART is implemented on the CPU board but the conversion circuitry and connectivity is on the base board.

The level and termination resistors are connected to the receiver side in full duplex mode. The can be configured according to Tab. 12.

Device Connection Half Duplex

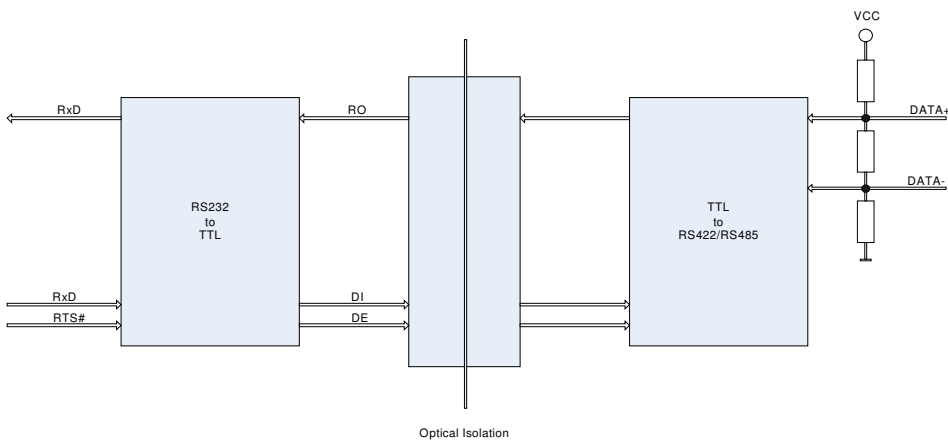


Fig. 3 RS422/RS485 HalfduplexBlockdiagram

The Serial Port B (COM2) of the UART is available on the standard PC/AT DSUB9 male connector P301.

Pin Number	Signal	Remarks
1	-	Do not connect
2	-	Do not connect
3	DATA-	
4	-	Do not connect
5	GND	
6	-	Do not connect
7	-	Do not connect
8	DATA+	
9	-	Do not connect

Tab. 9 Serial Port B (RS422/RS485) on P301, half duplex

Important Note

Do not connect any signal onto the unused pins otherwise the board could be seriously damaged.

Device Connection Full Duplex

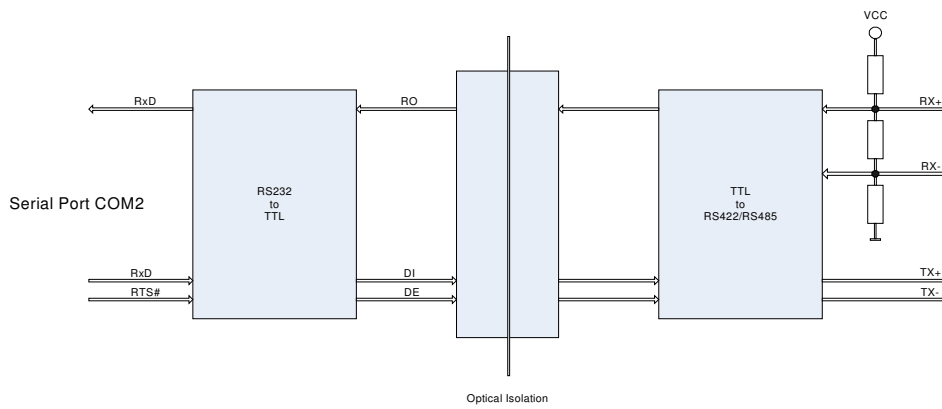


Fig. 4 RS422/RS485 Full Duplex Blockdiagram

The Serial Port B (COM2) of the UART is available on the standard PC/AT DSUB9 male connector P301.

Pin Number	Signal	Remarks
1	TX-	
2	-	Do not connect
3	RX+	
4	TX+	
5	GND	
6	RX-	
7	-	Do not connect
8	-	Do not connect
9	-	Do not connect

Tab. 10 Serial Port B (RS422/RS485) on P301, full duplex

Important Note

Do not connect any signal onto the unused pins otherwise the board could be seriously damaged.

Pin Number	Signal	Pin Number	Signal
1	DCD*	2	DSR*
3	RXD	4	RTS*
5	TXD	6	CTS*
7	DTR*	8	RI*
9	GND	10	+5V (not fused)

Tab. 11 Serial Port B Header (RS232) J302 (2x5pin)

The header J302 is not implemented on the board.

3.3.6. Configurations

SW301:	Configuration	Rem.
1	on = TX+ to RX+	Half/Full duplex
2	on = TX- to RX-	Half/Full duplex
3	on = RX- to DSUB9M:3	Half/Full duplex
4	on = RX+ to DSUB9M:3	Half/Full duplex
5	on = 120E termination	Termination
6	on = 100E termination	Termination
7	on = 470E to VCC	Level resistor
8	on = 470E to GND	Level resistor

Tab. 12 Configuration options

SW301	Configuration				Remark
	1	2	3	4	Mode
	on	on	on	off	Half duplex
	off	off	off	on	Full duplex

Tab. 13 Operation mode selection

Important Note

Switch off the power supply before you change the operation mode. Otherwise the base board may get damaged.

3.3.7. PC/104 Bus Interface

The PC/104 bus interface of the NETIPC allows expansion with a wide range of I/O and communications boards. The bus interface is described in the IEEE 996 and 996.1 standards documentation. The bus connector pinout is shown in Tab. 14.

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
				A1	⊗ IOCHCK#	B1	⊗ GND
P11		P12		A2	⊗ SD7	B2	⊗ RESETDRV
1	⊗ GND	1	⊗ GND	A3	⊗ SD6	B3	⊗ +5V
2	⊗ no connection	2	⊗ +5V	A4	⊗ SD5	B4	⊗ IRQ9
3	⊗ no connection	3	⊗ TRIGGER*	A5	⊗ SD4	B5	⊗ -5V (not used)
4	⊗ Vbatt	4	⊗ STOP*	A6	⊗ SD3	B6	⊗ DRQ2
				A7	⊗ SD2	B7	⊗ -12V (not used)
				A8	⊗ SD1	B8	⊗ 0WS#
D0	⊗ GND	C0	⊗ GND	A9	⊗ SD0	B9	⊗ +12V (not used)
D1	⊗ MEMCS16#	C1	⊗ SBHE#	A10	⊗ IOCHRDY	B10	⊗ (KEY)
D2	⊗ IOCS16#	C2	⊗ LA23	A11	⊗ AEN	B11	⊗ SMEMW#
D3	⊗ IRQ10	C3	⊗ LA22	A12	⊗ SA19	B12	⊗ SMEMR#
D4	⊗ IRQ11	C4	⊗ LA21	A13	⊗ SA18	B13	⊗ IOW#
D5	⊗ IRQ12	C5	⊗ LA20	A14	⊗ SA17	B14	⊗ IOR#
D6	⊗ IRQ15	C6	⊗ LA19	A15	⊗ SA16	B15	⊗ DACK3#
D7	⊗ IRQ14	C7	⊗ LA18	A16	⊗ SA15	B16	⊗ DRQ3
D8	⊗ DACK0#	C8	⊗ LA17	A17	⊗ SA14	B17	⊗ DACK1#
D9	⊗ DRQ0	C9	⊗ MEMR#	A18	⊗ SA13	B18	⊗ DRQ1
D10	⊗ DACK5#	C10	⊗ MEMW#	A19	⊗ SA12	B19	⊗ REFRESH#
D11	⊗ DRQ5	C11	⊗ SD8	A20	⊗ SA11	B20	⊗ SYSCLK
D12	⊗ DACK6#	C12	⊗ SD9	A21	⊗ SA10	B21	⊗ IRQ7
D13	⊗ DRQ6	C13	⊗ SD10	A22	⊗ SA9	B22	⊗ IRQ6
D14	⊗ DACK7#	C14	⊗ SD11	A23	⊗ SA8	B23	⊗ IRQ5
D15	⊗ DRQ7	C15	⊗ SD12	A24	⊗ SA7	B24	⊗ IRQ4
D16	⊗ +5V	C16	⊗ SD13	A25	⊗ SA6	B25	⊗ IRQ3
D17	⊗ MASTER#	C17	⊗ SD14	A26	⊗ SA5	B26	⊗ DACK2#
D18	⊗ GND	C18	⊗ SD15	A27	⊗ SA4	B27	⊗ TC
D19	⊗ GND	C19	⊗ (KEY)	A28	⊗ SA3	B28	⊗ BALE
				A29	⊗ SA2	B29	⊗ +5V
				A30	⊗ SA1	B30	⊗ OSC
				A31	⊗ SA0	B31	⊗ GND
				A32	⊗ GND	B32	⊗ GND

Tab. 14 PC/104 Bus Connectors PA/PB, PC/PD

4 Programming Information

4.1 Overview

The serial port UART (16C550) is implemented on the base board. For further information on how to program the UART please refer to the CPU documentation and the UART datasheet.

5 Technical Data

5.1 General Electrical Data

Important Note

Do not operate the IPC/COMPACTx-1G(E) base board outside of the recommended operating conditions. Otherwise lifetime and performance will degrade.
 Operating the board outside of the absolute maximum ratings may damage the hardware.

Absolute Maximum Ratings (over free-air temperature range)

Parameter	Symbol	min	nom	max	Unit
internal power supply voltage	Vcc	-0.5		5.5	Vdc
isolation external power supply to chassis (AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
isolation logic to chassis (AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
isolation RS422/RS485 to chassis (AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
isolation RS422/RS485 to logic (DC, 1s, 500m a.s.l., Ta=25°C)		1000			Vdc
creepage distance external power supply to chassis and PCB border		1.5			mm
creepage distance logic to chassis and PCB border		1.0			mm
creepage distance RS485 to chassis and PCB border		1.0			mm
creepage distance RS485 to logic		2.0			mm
storage temperature range	Tst	-40		90	°C

Tab. 15 General Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	min	nom	max	
external logic supply voltage	Vdd	9	24	30	Vdc
internal logic supply voltage	Vcc	4.75	5.00	5.25	Vdc
supply current @ PS/2 (5VDC)	Ips2			500	mA
operating free-air temperature range	Ta	-40		85	°C

Tab. 16 General Recommended Operating Conditions

Electrical Characteristics

(over recommended operating range, unless otherwise noted)

Parameter	Symbol	Min	typ	max	Unit
external supply current (Vdd=9V, approx. 1.2A load)	Idd		0.875		A
external supply current (Vdd=19.2V, approx. 1.2A load)	Idd		0.395		A
external supply current (Vdd=24V, approx. 1.2A load)	Idd		0.315		A
external supply current (Vdd=30V, approx. 1.2A load)	Idd		0.255		A
logic supply current (Vcc=5V, no additional modules)	Icc			3	A

Tab. 17 General Electrical Characteristics

5.2. Electrical Data of Peripheral Devices

5.2.1. Serial Ports

Absolute Maximum Ratings (over free-air temperature range)

Parameter	Symbol	Min	nom	max	Unit
see general electrical data					

Tab. 18 Serial Port absolute maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Min	nom	max	Unit
see ANSI RS232 specification					
see EIA RS422/RS485 specification					
Maximum number of nodes on RS422/RS485 bus				32	

Tab. 19 Serial Port recommended operating conditions

Electrical Characteristics

(over recommended operating range, unless otherwise noted)

Parameter	Symbol	min	typ	max	Unit
see ANSI RS232 specification					
see EIA RS422/RS485 specification					

Tab. 20 Serial Port electrical characteristics

Switching Characteristics (nominal conditions)

Parameter	Symbol	min	nom	max	Unit
UART base clock	fclk		1.8432		MHz
baude rate				115.2	kbaud

Tab. 21 Serial Port switching characteristics

5.3. Mechanical Data

Mechanical data depends on the enclosure used for the IPC/COMPACTx-1G(E) system. Please refer to the appropriate documentation or contact the manufacturer for details.

6 Firmware

6.1. Software Structure

The x86 CPU board based IPC system is based on the following software structure:

BIOS (Basic Input/Output System)

- Power On Self Test (POST)
- Initialization of standard peripheral devices
- Boot procedure for the Operating System

Note : Refer to the BIOS documentation for detailed information

OS (Operating System)

- Initialization of additional peripheral devices
- Start procedure for the Application Programs

Note : Refer to the OS documentation for detailed information

Application Programs

- Initialization of IPC/COMPACTx-xG(E) system, communications and external devices
- Start procedure for the Control Tasks

Note : Refer to the Application Programs documentation for detailed information

6.2. Firmware Functions

The base board of the COMPACT System does not contain any firmware. Some standard PC/AT peripheral devices (e.g. Serial and Parallel Ports) are directly supported by most BIOS and Operating Systems. Some peripheral devices (e.g. NE2000-Ethernet) are directly supported by standard communication software (e.g. TCP/IP stacks, TCP packet drivers) others need special programming according to the freely available sample software IPC/IOCOMSW-1A (e.g. CAN). Please refer to the appropriate documentation for detailed information.

6.3. Application Programming Interface (API)

The base board does not contain any special API. Refer to the BIOS and Operating System documentation for API specifications.

7 Product Revision History

7.1. Hardware

This paragraph lists the different hardware revisions of the IPC/COMPACTx-1G(E) base boards delivered beginning with the first production lot. Note that prototyping boards are not included and must be returned to factory for upgrade or replacement. All information listed in this document relies on definitive state hardware. Therefore this information may be incompatible with the prototyping board hardware.

Important Note

This document always covers the newest product revision listed in Tab. 22.
 Please contact the manufacturers technical support for upgrade options.

Board Identification (see product label)	Product Revision	Revision ID Register	Remarks
IPC/COMPACGP-1GE #1	1	-	Original Release
IPC/COMPACGP-1GE #6	6	-	RoHS compliant version
IPC/COMPACGP-3GE #1	1	-	Original Release
IPC/COMPACGP-3GE #6	6	-	RoHS compliant version

Tab. 22 Hardware Revision State

7.2. Firmware

The COMPACT base board does not contain any firmware. Please refer to the appropriate firmware documentation of the IPC/NETIPC for detailed information.

7.3. Software Products

The following software products are useful together with the IPC/COMPACTx-1G(E) base board:

Order Code	Description	Manufacturer
IPC/IOCOMSW-1A	Examples & utilities	Syslogic AG

Tab. 23 Software Products

8 Manufacturer Information

8.1. Contact

Our distributors and system integrators will gladly give you any information about our products and their use. If you want to contact the manufacturer directly, please send a fax or email message containing a short description of your application and your request to the following address or use one of the information or technical support request forms on our website:

Syslogic Datentechnik AG
Bruggerstr. 69
CH-5400 Baden / Switzerland

Email: info@syslogic.ch
www: <http://www.syslogic.ch>
Fax: +41 56 200 90 50

Technical support:
support@syslogic.ch

8.2. Warranty

Our products are covered by a world-wide manufacturers warranty. The warranty period starts at the delivery time from our official distributor to the customer. The duration of the warranty period is specified in the respective product catalogs and the offers. All products carry a date code and a job number for identification. The manufacturing data and deliveries are registered in a high level Quality Management System.

The warranty covers material and manufacturing defects. All products must be returned via the official distributor to the factory for repair or replacement. The warranty expires immediately if the products are damaged or operation outside of the specified recommended operating conditions. The warranty also expires if the date code or job number listed on the product is altered or rendered unintelligible. The warranty does not include damage due to errors in firmware or software delivered with the products.