IPC/COMPACTA1-1E(E), -1F(E), -1G(E), -2E(E)

DOC/COMPACTA1_XYE

Revision	Date	Author	Modification
1.0	03.07.2007	Stefan Wyss	Original
1.1	07.09.2007	Stefan Wyss	added electrical characteristics
1.2	14.09.2007	Stefan Wyss	more el. characteristics

Contents

List of Tables

List of Figures

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 trademarks are used:

IBM-PC, PC/AT, PS/2	trademarks of IBM Corporation
Windows CE	trademarks of Microsoft Corporation
Linux	trademark of Linus Torvalds

1.2.   Contents of this Documentation

This document addresses to system integrators, programmers and instructed installation and
maintenance personal working with systems mentioned in chapter 1.3.

In the following chapters the different systems will be called IPC/COMPACTA1-xy(E). Where
the "x" stands for the system case (2-Slot "XS" or 3-Slot "S" case type), the "y" for the base
plate communication features and the "(E)" expresses the extended temperature range.

This documentation provides all information concerning the assembly, cabling, installation,
grounding and EMI-issues of the IPC/COMPACTA1-xy(E). To learn more about the
programming details please use the technical documentation of the CPU and the base board
(see chapter 1.4.2).

1.3.   Items delivered

1.3.1.   IPC/COMPACTA1-1E(E)
– IPC/COMPACGP-2ESE
– IPC/NETARM-1AN(E)
– 2 Slot Enclosure
– 3V Lithium Battery

1.3.2.   IPC/COMPACTA1-1F(E)
– IPC/COMPACGP-1FE
– IPC/NETARM-1AN(E)
– 2 Slot Enclosure
– 3V Lithium Battery

1.3.3.   IPC/COMPACTA1-1G(E)
– IPC/COMPACGP-1GE

- IPC/NETARM-1AN(E)
- 2 Slot Enclosure
- 3V Lithium Battery

1.3.4.   IPC/COMPACTA1-2E(E)
- IPC/COMPACGP-2EE
- IPC/NETARM-1AN(E)
- 3 Slot Enclosure (1 slot free for PC/104 expansion)
- 3V Lithium Battery
- cover plate for spare PC/104 slot

1.4.   Additional Products and Literature
The boot plug for firmware download can be ordered seperately. The order code is
CUB/BOOTPLUG-1A.

1.4.1.   Software
The following software products are used together with the NETARM CPU:
- IPC/WINCE-50A: Windows CE 5.0 Operating System with license.
- SCU/LINUX-3D: Embedded Linux Operating System.

1.4.2.   Documents
Additional documents to the hardware and software described above:

Ordercode	Document	Manufacturer
DOC/COMPACGP-1FE	Documentation of the base board	Syslogic AG
DOC/COMPACGP-1GE	Documentation of the base board	Syslogic AG
DOC/IPC_NETARM-E	User documentation of the IPC/NETARM	Syslogic AG
SCU/LINUX-3D	User documentation of the ARM Linux Distribution	Syslogic AG

Tab. 1 - Additional Documents

1.5.   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 7). 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.

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.

1.6.   Life Cycle Information

1.6.1.   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.

1.6.2.   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.

1.6.3.   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 IPC/COMPACTA1-xy(E) is 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.

⬢ syslogic

1.6.4. Maintenance and Repair

The IPC/COMPACTA1-xy(E) 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 returning the product (ESD and mechanical protection).

1.6.5. Disposal

At the end of the lifespan the IPC/COMPACTA1-xy(E) must be properly disposed. IPC/COMPACTA1-xy(E) contains a multitude of elements and must be disposed like computer parts. The system contains a battery which should be properly disposed.

1.7. Electromagnetic Interference Standards

The IPC/COMPACTA1-xy(E) complies to the following electromagnetic interference standards and are certified according to European Union "CE"-requirements:

- EN 55022   Information technology equipment-
Radio disturbance characteristics-
Limits and methods of measurement

- EN 55024   Information technology equipment-
Immunity characteristics-
Limits and methods of measurement

- EN61000-2-2 Generic standard - immunity Standard for industrial
environments.

- EN61000-2-4 Generic standard - emmission standard for industrial
environments.

2   Basic Information and First Steps

2.1.   Firmware

The IPC/COMPACTA1-xy(E) allows the user to select and load his own operating system (OS). Many well known OS's – e.g. Windows CE, Embedded Linux, ECOS, etc. are supported either by Syslogic or by its respective manufacturer or distributor.

The default firmware installed on the IPC/COMPACTA1-xy(E) is

- RedBoot bootloader
- Embedded Linux Kernel Version 2.6.8.1

Programming of the bootloader and the OS is described in detail in the "ARM Linux User Documentation [4]".

A Windows CE 5.0 release is also available together with the necessary documentation [5].

2.2.   PC/104 Bus

The base board is connected to the CPU module via the PC/104 bus. Access to the PC/104 bus is provided through a special memory region mapped into the ARM CPU's address space. For detailed information please look at the DOC/IPC_NETARM-E user's guide.

3   Enclosure, Assembly and Mounting

3.1.   Introduction

The enclosure can house a complete industrial control system with many basic functions. The enclosure with its internal electronic system meets EMI/RFI electromagnetic standards according to the European "CE"- requirements (see paragraph 1.5).

Important Notes

Before assembling the whole enclosure with the electronic modules please read through the following paragraphs containing information about the assembling of the system.

3.2.   XS and S Case Types

This document covers 2 different case types, the

IPC/COMPACTA1-**1**y(E)   Compact **XS** case hosting 2 boards (2-slot)
IPC/COMPACTA1-**2**y(E)   Compact **S** case hosting 3 boards (3-slot)

Throughout the following sections, we will refer to the "XS" and "S" case types as a shortcut for the IPC/COMPACTA1-1y(E) and IPC/COMPACTA1-2y(E) product housings.

3.3. Compact XS Case (2-Slot)

3.3.1. Compact XS dimensions

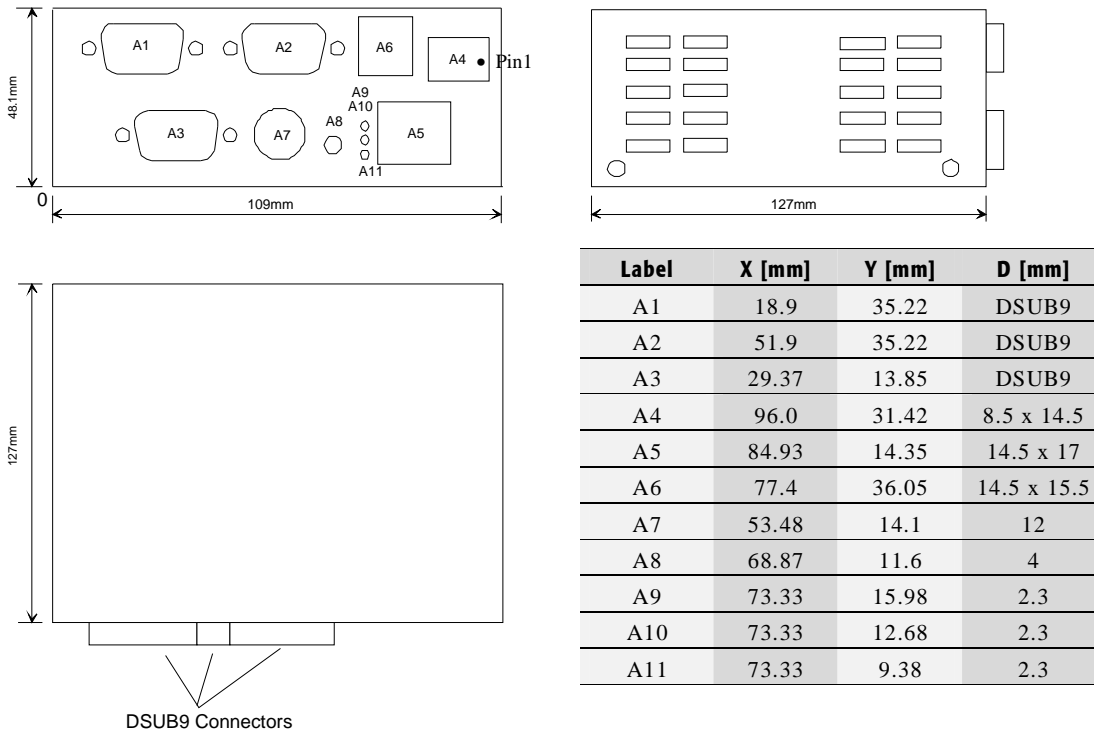| Label	X [mm]	Y [mm]	D [mm]
A1	18.9	35.22	DSUB9
A2	51.9	35.22	DSUB9
A3	29.37	13.85	DSUB9
A4	96.0	31.42	8.5 x 14.5
A5	84.93	14.35	14.5 x 17
A6	77.4	36.05	14.5 x 15.5
A7	53.48	14.1	12
A8	68.87	11.6	4
A9	73.33	15.98	2.3
A10	73.33	12.68	2.3
A11	73.33	9.38	2.3

Fig. 1 - Three side view of the XS enclosure

3.3.2. Compact XS Module Assembly
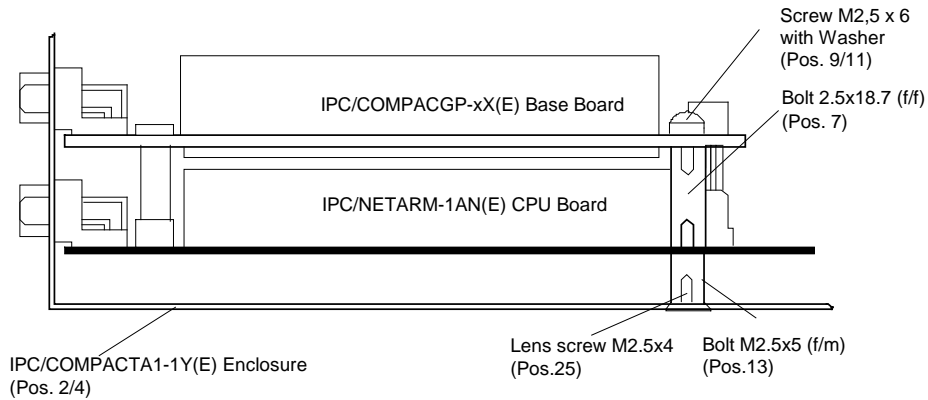
Fig. 2 - IPC/COMPACTA1-1Y(E) module assembly

3.4. Compact S Case (3-Slot)

3.4.1. Compact S dimensions

Front IPC/COMPACTA1-2Y(E)

Label	X [mm]	Y [mm]	D [mm]
A1	18.9	35.22	DSUB9
A2	51.9	35.22	DSUB9
A3	26.87	13.85	DSUB9
A4	96.0	31.42	10x14.5
A5	84.93	14.35	14.5x17
A6	77.4	36.2	14.5x15.8
A7	53.48	14.1	12
A8	65.87	11.6	4
A9	73.33	15.98	2.3
A10	73.33	12.68	2.3
A11	73.33	9.38	2.3
A12	20.5	55.5	DSUB9
A13	53.5	55.5	DSUB9
A14	86.5	55.5	DSUB9

DSUB9 Connectors

Fig. 3 - Three side view of the S enclosure

3.4.2. Compact S Module Assembly

Fig. 4 - IPC/COMPACTA1-2Y(E) module assembly

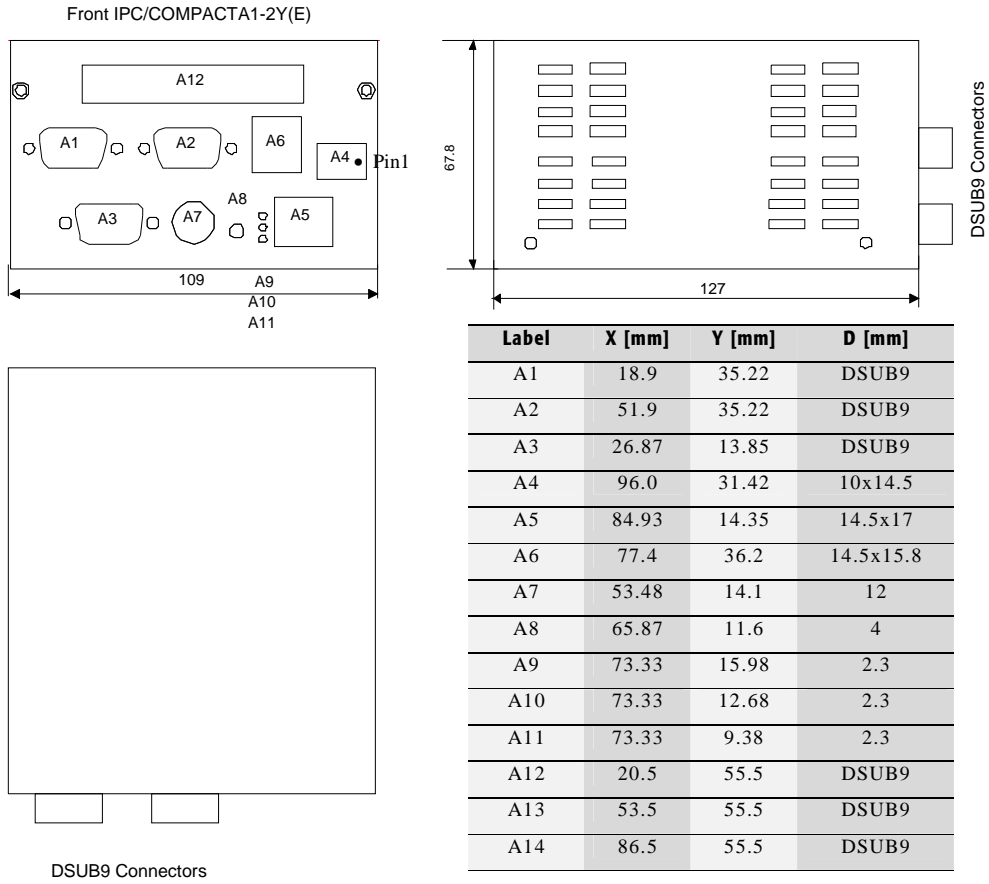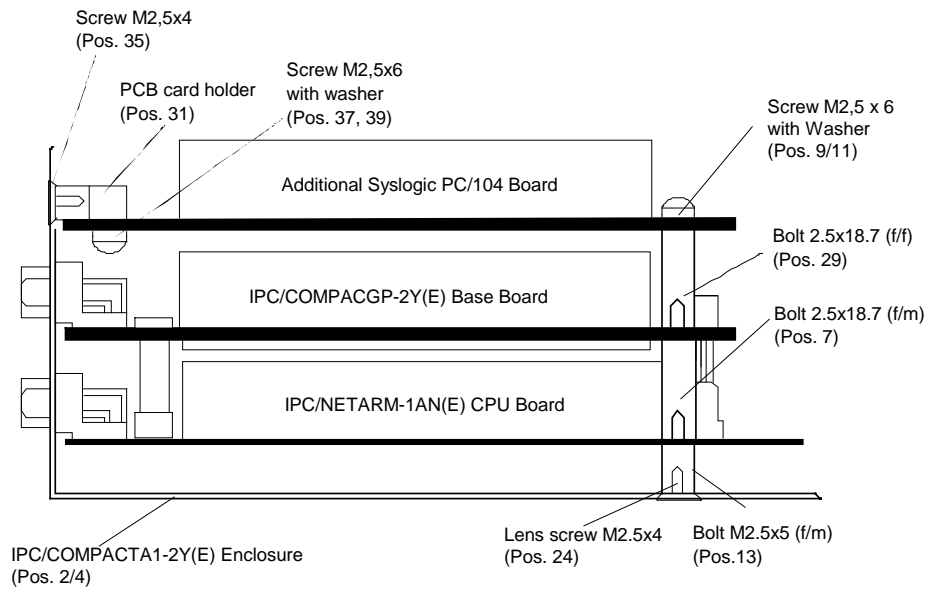## 3.5. Internal Cabling

No internal cabling has to be done.

⬡ syslog**ic**

3.6.   Serviceable Parts inside IPC/COMPACTA1-xy(E)

Two parts inside IPC/COMPACTA1-xy(E) may be exchanged from time to time:
- Backup-Battery
- Compact Flash memory module (has to be ordered separately)

In order to exchange these parts, you must remove the cover by executing steps 1 and 2 of the following instructions.

Important Notes
- The battery socket is coded, no wrong insertion of the backup battery is possible.
- Handle the flash memory module with care. A small screwdriver can help to unlock the memory from its socket.

[1] Remove 4 screws on the side of the case with a Pozidriv screwdriver.
[2] Slide back the cover part of the case.
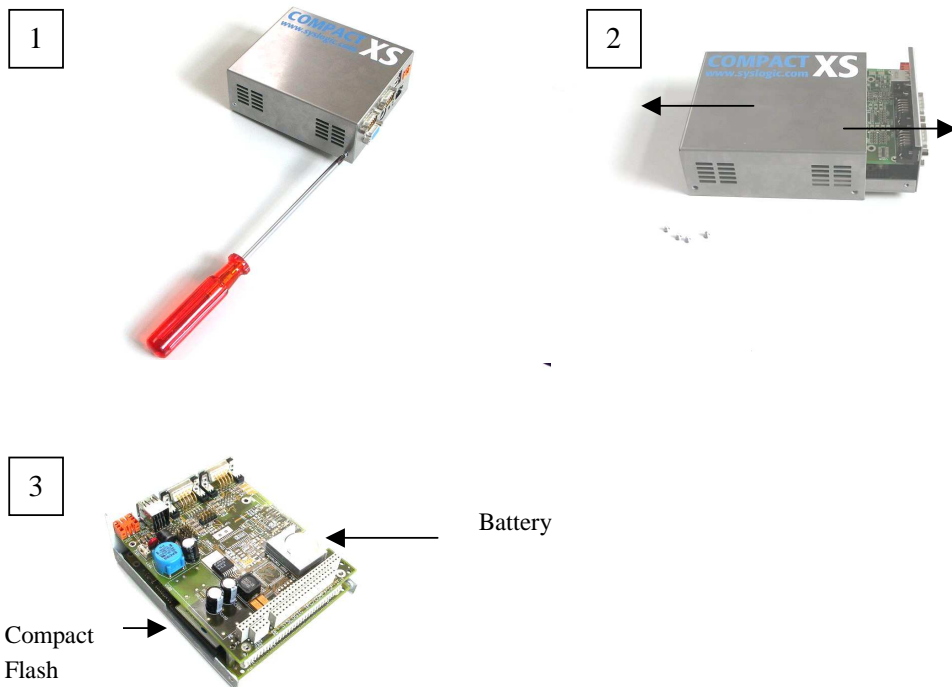[3] Exchange the battery or the Compact Flash card.

Fig. 5 – service of battery or Compact Flash card

If you need to exchange an electronic board you must disassemble the case completely as shown in step 4 and 5 of the following figure:

[4] Remove 2 screws on the bottom side of the case.
[5] Remove 6 Hexagonal screws on the front side of the case.
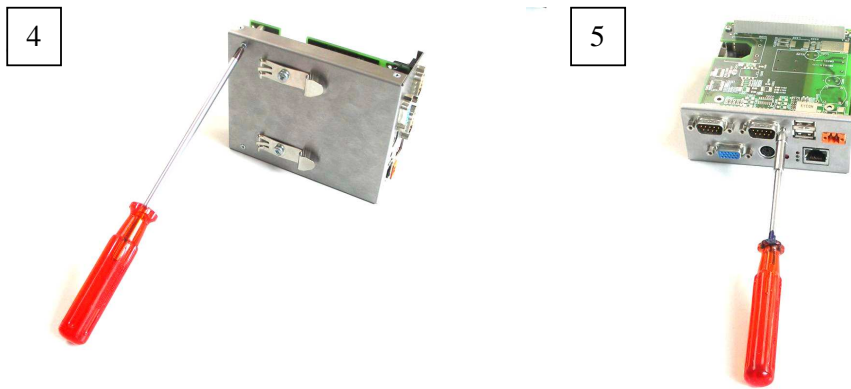
Fig. 6 – exchanging an electronic board

3.7.   DIN-Rail Mounting of the Enclosure

There are two possible ways to mount the system onto a DIN-Rail. DIN-Rail clamps can be mounted according to Fig. 7. There are two versions of DIN-Rails available: flat C-Rails (h=7.5mm) and normal C-Rails (h=15mm).

Important Notes

Be sure to use the correct screws; screws which are too long can damage the boards inside of the enclosure.

Screw (Pos. 22)
Washer (Pos. 20)
Clamp (Pos. 18)
DIN-Rail
Cabinet-Wall
Connectors

Fig. 7 - One possible way of mounting the IPC/COMPACTA1-xy(E) onto the DIN-Rail

4   Installation and Cabling

4.1.   Introduction

Installation and cabling of the IPC/COMPACTA1-xy(E) system has to be done with great care; the correct cabling is essential for high operational reliability and the correct grounding is necessary for protection. To meet the requirements of "CE"-certification all cables have to be shielded. The enclosure has to be connected to ground via the DIN-rail.
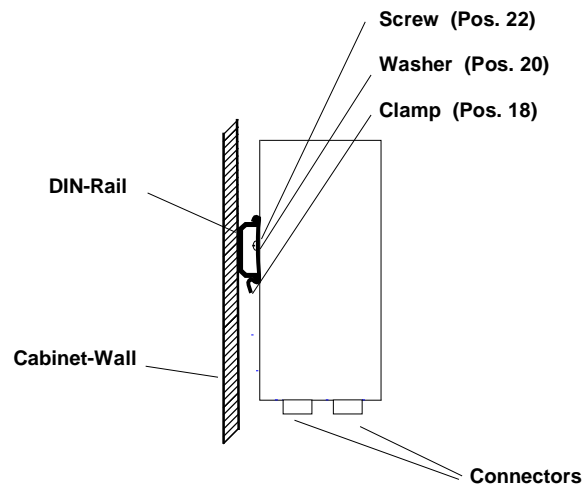

Important Notes

To meet the requirements of RFI "CE"-cerification, correct mounting, installation and cabling of the IPC/COMPACTA1-xy(E) system according to these guidelines is absolutely necessary.

Important Note

Please make sure that the **ambient temperature does not exceed 55°C for IPC/COMPACTA1-xy**. Otherwise the a overheating of the electronic devices inside the enclosure may occur.

Important Note

Please make sure that the **ambient temperature does not exceed 65°C for IPC/COMPACTA1-xyE**. Otherwise the a overheating of the electronic devices inside the enclosure may occur.

4.2.   Powering the IPC/COMPACTA1-xy(E) System

The "logic voltage", i.e. the power driving the electronic circuits (CPU and base board) is applied from a 24VDC power supply (10VDC...30VDC). The internal power supply converts the input voltage into the logic voltage. The input voltage is applied with a 2pin Weidmüller connector (Pin 1 orientation is shown in 3.3.1 and 3.4.1):

- Pin 1 : Ground
- Pin 2 : +VDC

The connector can be ordered directly at your Weidmüller distributor (order code: *BL3.5/2F*).

Important Notes

Please make sure that the input voltage does not exceed 30V otherwise the base board could get damaged. If the input voltage drops below 10V the system doesn't work properly, correct functioning cannot be guaranteed.

4.3.   Grounding

In some cases it is recommended to connect the shields of the cables to chassis potential at the entry point into the housing cabinet as shown in Fig. 8. If the cables enter a hermetically closed cabinet, use special 360 degree metal clamps (RFI protected types which contact to the cable shield).

Important Notes

Grounding of the cables shields using "pig-tail wires" are not recommended because of their high impedance at high frequencies. It is better to clamp the shields onto a grounded copper rail.
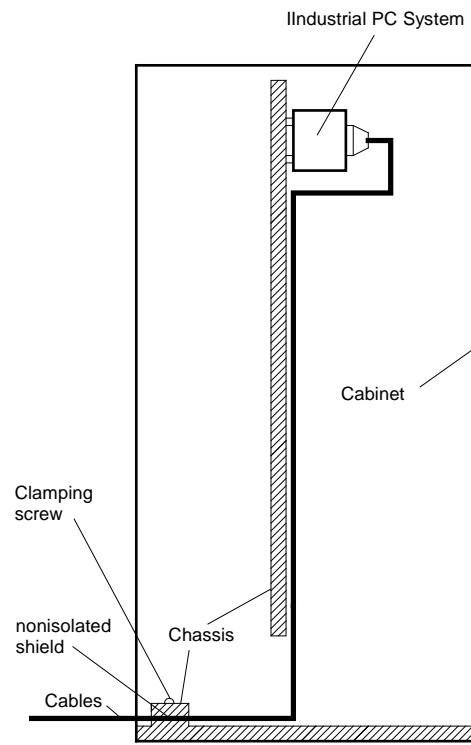
Fig. 8 - Additional grounding of the cable shields at the entry point of a cabinet.

4.4. Cabling of Communication Links

If the communication ports are unisolated ports, cable shields have to be connected to chassis potential on both sides of the interconnection cable. If the cable is very long, a thick copper wire (10 mm^2) for potential adjustment is highly recommended. Fig. 9 shows an non isolated system with common chassis ground.

Some of the communication ports are galvanically isolated ports (for more information please refer to the documentation of the base board and the CPU board): in such cases the shield of the interconnection cable must be wired to chassis potential only on one side of the cable. Fig. 10 shows an isolated system with independent grounds.

Important Notes

Grounding of cable shields using "pig-tails wires" are not recommended because of their high impedance at high frequencies. It is recommended to clamp the shields onto a grounded copper-rail.

syslogic

FBCube System Nr. 1 **FBCube System Nr. 2**

I/O I/O

24 VDC 24 VDC
0 VDC 0 VDC

Opto

Communication Link

100E 100E

Isolated Node **Unisolated Node**

Abschirmung/Shield

Achtung: keine Verbindung
des Kabelmantels mit dem Chassis

Do not connect cable-shield with
chassis, floating operation

Zentraler Erdpunkt am Chassis Zentraler Erdpunkt am Chassi
Central Grounding Point Central Grounding Point

Fig. 9 - Non isolated communication link with common chassis potential

FBCube System Nr. 1 **FBCube System Nr. 2**

I/O I/O

24 VDC 24 VDC
0 VDC 0 VDC

Communication Link

100E 100E

Unisolated Node **Unisolated Node**

Abschirmung/Shield

Potential-Ausgleichsleitung min. 10 mm² Kupfer
Copper-wire for Potential Adjustment, min. 10²mm

Zentraler Erdpunkt am Chassis Zentraler Erdpunkt am Chassi
Central Grounding Point Central Grounding Point

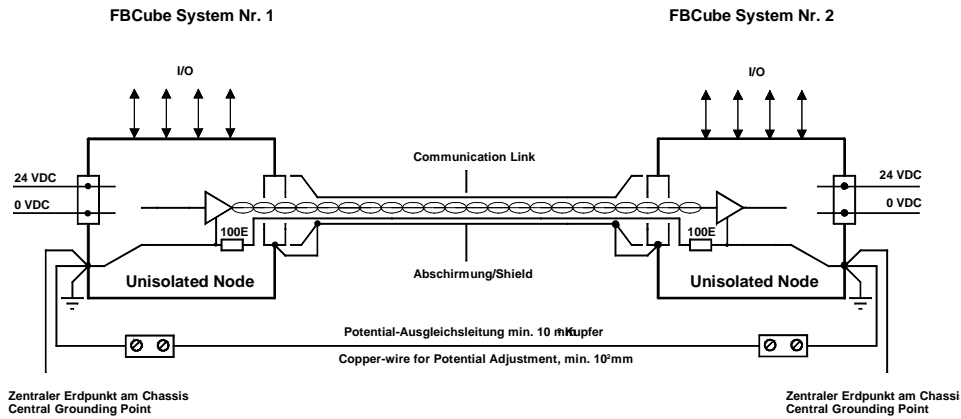Fig. 10 - Isolated communication link

5 Electrical Characteristics

5.1.1. absolute maximum ratings (over operating free air temperature range)

Parameter	Symbol	min.	nom.	max.	unit
external supply voltage	Vdd	-0.5		36	VDC
internal logic supply voltage	Vcc	-0.5		5.5	VDC
Isolation:					
- logic and pwr. supply to chassis (AC, 60s, 500m a.s.l, Ta=25 °C)		500			Vrms
- RJ45 to logic and pwr supply (AC, 60s, 500m a.s.l., Ta=25 °C)		1500			Vrms
- RJ45 to chassis (AC, 60s, 500m a.s.l., Ta=25 °C)		1000			Vrms
creepage distance:					
- logic and pwr. supply to chassis and PCB border		1.0			mm
- RJ45 to logic and pwr. supply		1.5			mm
- RJ45 to chassis and PCB border		1.5			mm
temperature range					
- storage temperature	Tstor	-40		+90	°C

Tab. 2 – absolute maximum ratings

5.1.2. recommended operating conditions

Parameter	Symbol	min.	nom.	max.	unit
operating free air ambient temperature IPC/COMPACTA1-xy	Ta	0	+25	+55	°C
operating free air ambient temperature IPC/COMPACTA1-xyE (extended)	Ta	-40	+25	+70	°C
external supply voltage	Vdd	10	24	30	VDC
max. power dissipation PC/104 submodule (@5V bus voltage)				5	W

Tab. 3 – recommended operating conditions

5.1.3. electrical characteristics

(over recommended temperature range)

Parameter	Symbol	min.	nom.	max.	unit
power dissipation					
IPC/COMPACTA1-1E(E)[1]	Pd	-	5	8	W
IPC/COMPACTA1-1F(E)[1]	Pd	-	6	9	W
IPC/COMPACTA1-1G(E)[1]	Pd	-	5	8	W
IPC/COMPACTA1-2E(E)[1,2]	Pd	-	5	8	W
max. external supply current (@9V external supply)	Imax			2	A

Tab. 4 – electrical characteristics

1) USB bus excluded.
2) no submodule mounted.

 syslogic

6   Product Revision History

6.1.   Hardware

This paragraph lists the different hardware revisions of the IPC/COMPACTA1-xy(E) systems 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 hardware state. Therefore this information may be incompatible with the prototyping board hardware.

Important Note

This document always covers the newest product revision listed in Tab. 5.
Please contact the manufacturers technical support for upgrade options.

Board Identification (see product label)	Product Revision	Remarks
IPC/COMPACTA1-1E	#1	Original release
IPC/COMPACTA1-1EE	#1	Original release
IPC/COMPACTA1-1F	#1	Original release
IPC/COMPACTA1-1FE	#1	Original release
IPC/COMPACTA1-1G	#1	Original release
IPC/COMPACTA1-1GE	#1	Original release
IPC/COMPACTA1-2E	#1	Original release
IPC/COMPACTA1-2EE	#1	Original release

Tab. 5 - Hardware Revision State

6.2.   Firmware

Please refer to the appropriate firmware documentation of the IPC/NETARM-1AN(E) for detailed information.

⬡ syslogic

7 References

[1] **EP9315 User's Guide**
http://www.cirrus.com/en/pubs/manual/EP9315_Users_Guide.pdf

[2] **EP9315 Datasheet**
http://www.cirrus.com/en/pubs/proDatasheet/EP9315_PP4.pdf

[3] **IPC/NETARM-1A User Documentation**
Syslogic order code DOC/IPC_NETARM-1A

[4] **ARM Linux User Documentation**
Syslogic order code SCU/LINUX-3D

[5] **Windows CE 5.0 User Documentation**
Syslogic order code IPC/WINCE-50A

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 internet homepage:

Syslogic Datentechnik AG
Täfernstrasse 28
CH-5405 Baden-Dättwil / Switzerland

Email: info@syslogic.ch
www: http://www.syslogic.ch
Tel: +41 (0)56 200 90 40
Fax: +41 (0)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 of 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.