MB3 01
Mother Board ABACO® 3 slot

TECHNICAL MANUAL
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Size 160x65x30 mm for 3 HE racks; slots pitch 4 TE; double row of holes for mounting pitch 3 TE; Mother Boards featuring 3 ABACO® BUS slots for Eurocard standard 100x160 mm size boards with DIN 41612 A+C type C connectors; 3 LEDs for showing status of power supplies; noise filters on supply lines; termination resistors on BUS lines to warrant correct working in case of lines not connected or driven by CMOS; low profile connector for remote connection of LEDs and RESET key; AMP connector for power supply voltages +5 Vdc, +12 Vdc and -12 Vdc remote connection.
IMPORTANT

Although all the information contained herein have been carefully verified, grifo® assumes no responsibility for errors that might appear in this document, or for damage to things or persons resulting from technical errors, omission and improper use of this manual and of the related software and hardware. grifo® reserves the right to change the contents and form of this document, as well as the features and specification of its products at any time, without prior notice, to obtain always the best product.

For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

SYMBOLS DESCRIPTION

In the manual could appear the following symbols:

- ![Attention Symbol] Attention: Generic danger
- ![Attention Symbol] Attention: High voltage

Trade Marks

GPC®, grifo®: are trade marks of grifo®.

Other Product and Company names listed, are trade marks of their respective companies.
GENERAL INDEX

INTRODUCTION ................................................................................................................... 1
CARD VERSION ................................................................................................................... 1
GENERAL FEATURES ........................................................................................................... 2
TECHNICAL FEATURES OF MB3 01 ..................................................................................... 4
  GENERAL FEATURES OF MB3 01 ..................................................................................... 4
  PHYSICAL FEATURES OF MB3 01 ................................................................................... 4
  ELECTRIC FEATURES OF MB3 01 ................................................................................... 4
INSTALLATION ................................................................................................................... 6
  CONNECTIONS ................................................................................................................. 6
    J1 - REMOTE CONNECTION OF RESET KEY AND LEDS ........................................ 6
    J2 - POWER SUPPLY CONNECTOR ......................................................................... 8
    TERMINATION RESISTORS ....................................................................................... 9
    CN1+CN3 - ABACO® BUS CONNECTORS ................................................................. 10
VISUAL SIGNALATIONS ................................................................................................... 12
EXTERNAL CARDS ............................................................................................................... 13
APPENDIX A: ALPHABETICAL INDEX ......................................................................... A-1
FIGURE INDEX

FIGURE 1: BLOCK DIAGRAM ............................................................................................................. 3
FIGURE 2: CARD PHOTO .................................................................................................................. 5
FIGURE 3: J1 - CONNECTOR FOR REMOTE RESET KEY AND LEDS ..................................................... 6
FIGURE 4: CONNECTORS AND LEDS LOCATION ............................................................................. 7
FIGURE 5: J2 - POWER SUPPLY CONNECTOR .................................................................................. 8
FIGURE 6: COMPONENTS MAP ...................................................................................................... 9
FIGURE 7: CN1+CN3 - ABACO® BUS CONNECTORS ...................................................................... 10
FIGURE 8: VISUAL SIGNALATIONS TABLE .................................................................................... 12
FIGURE 9: LEDS CONNECTION DIAGRAM ..................................................................................... 12
FIGURE 10: POSSIBLE CONNECTIONS DIAGRAM ........................................................................ 15
INTRODUCTION

The use of these devices has turned - IN EXCLUSIVE WAY - to specialized personnel.

The purpose of this handbook is to give the necessary information to the cognizant and sure use of the products. They are the result of a continual and systematic elaboration of data and technical tests saved and validated from the manufacturer, related to the inside modes of certainty and quality of the information.

The reported data are destined- IN EXCLUSIVE WAY- to specialized users, that can interact with the devices in safety conditions for the persons, for the machine and for the enviroment, impersonating an elementary diagnostic of breakdowns and of malfunction conditions by performing simple functional verify operations , in the height respect of the actual safety and health norms.

The information for the installation, the assemblage, the dismantlement, the handling, the adjustment, the reparation and the contingent accessories, devices etc. installation are destined - and then executable - always and in exclusive way from specialized warned and educated personnel, or directly from the TECHNICAL AUTHORIZED ASSISTANCE, in the height respect of the manufacturer recommendations and the actual safety and health norms.

The devices can't be used outside a box. The user must always insert the cards in a container that respect the actual safety normative. The protection of this container is not threshold to the only atmospheric agents, but specially to mechanic, electric, magnetic, etc. ones.

To be on good terms with the products, is necessary guarantee legibility and conservation of the manual, also for future references. In case of deterioration or more easily for technical updates, consult the AUTHORIZED TECHNICAL ASSISTANCE directly.

To prevent problems during card utilization, it is a good practice to read carefully all the information of this manual. After this reading, the user can use the general index and the alphabetical index, respectly at the begining and at the end of the manual, to find information in a faster and more easy way.

CARD VERSION

The present handbook is reported to MB3 01 module release 260196 and later. The validity of the bring information is subordinate to the number of the module release. The user must always verify the correct correspondence among the two denotations. On the module the release number is present in more points both board printed diagram (serigraph) and printed circuit (for example between CN1 and CN2 on both the sides).
GENERAL FEATURES

Back panel MB3 01 has been designed in order to provide the user supports for interfacement to BUS ABACO® cards. They feature all the fastening for mounting on every rack for three units (3 HE) and three slots for interfacement to BUS ABACO® cards. MB3 01 is suitable for applications that require up to three BUS ABACO® cards in a reduced room and with optimization of total system costs. Should the modules be too few or too many for the application, any other model of back panel from grifo® listing can be used. Mother board is provided with a connector to remote the reset key and the LEDs that indicate the presence of supply voltages. This feature allows to install LEDs and reset key also at distance from the electronic cards, for example in the front panel of a rack. Overall features are:

- Size 160x65x30 mm for 3 HE racks
- Slots pitch 4 TE
- Double row of holes for mounting pitch 3 TE
- Mother Boards featuring 3 ABACO® BUS slots for Eurocard standard 100x160 mm size boards with DIN 41612 A+C type C connectors
- 3 LEDs for showing status of power supplies
- Noise filters on supply lines
- Termination resistors on BUS lines to warrant correct working in case of lines not connected or driven by CMOS
- Low profile connector for remote connection of LEDs and RESET key
- AMP connector for power supply voltages +5 Vdc, +12 Vdc and -12 Vdc remote connection

Here follow the block diagrams of the cards.
FIGURE 1: BLOCK DIAGRAM
TECHNICAL FEATURES OF MB3 01

GENERAL FEATURES OF MB3 01

BUS type: BUS ABACO®

Devices:
- 3 slots for BUS ABACO®
- 1 local reset key
- 1 connectors for remote reset key and LEDs
- 3 LEDs to visualize power supply status

BUS line type: termination by resistors

Power supply: provided with noise reduction filters

PHYSICAL FEATURES OF MB3 01

Size: 130 x 65 x 80 mm, for rack 3 HE

Slots pitch: 4 TE

Mounting: double row of holes pitch 3 TE, diameter 2.5 mm

Weight: 90 g

Connectors:
- J1: 5 pins, male, vertical, low profile connector
- J2: 4 pins AMP MATE N LOK, male vertical
- CN1+CN3: 64 pins DIN 41612 A+C type C, vertical,female

Temperature range: 0° to 70 °C

Relative humidity: 20% to 90% (without condense)

ELECTRIC FEATURES OF MB3 01

Power supply:
- +5 Vdc 15 mA
- +12 Vdc 15 mA
- -12 Vdc 15 mA
Figure 2: Card Photo
INSTALLATION

In this chapter there are the information for a right installation and correct use of the card. The user can find the location and functions of each connectors and LEDs and some explanatory diagrams.

CONNECTIONS

The MB3 01 module is provided respectively with 5 connectors that can be linkeded to control system cards or directly to the field, according to system requirements. In this paragraph there are connectors pin out, a short signals description (including the signals direction) and connectors location (please refer to figure 4).

Following figures show the frontal view of connectors; they can be easily recognized because they reproduce exactly the shape of the connectors and also thanks to the serigraph on the board.

J1 - REMOTE CONNECTION OF RESET KEY AND LEDS

J1 is a 5 pins, vertical, low profile, male connector, pthc 2.54 mm.
It allows to connect remotely a reset key and up to three LEDs that indicate the presence of power supplies. For further information please see the specific paragraphs and the electric diagrams in the following pages.

Female connector can be made using the separated sets of pieces orderable from grifo®: code CS5 AUX (5 pins female connector) and code CSF Cable (set of crimped cables, one meter long).

As shown in figure 9, LEDs can be connected directly to mother board, which has its drop resistors.

![Figure 3: J1 - Connector for remote reset key and LEDs](image)
Figure 4: Connectors and LEDs location
**J2 - POWER SUPPLY CONNECTOR**

J2 is a 4pins AMP MATE N LOK connector, vertical, male, pitch 6.35 mm. Any external power source, like for example a power supply, can provide standard supply voltages to ABACO® slots through J2. Pin out of this connector is standard, so replacing present mother board with another one provided with a greater number of slots is not a problem.

Female connector can be made using the kit orderable from grifo® with codes CS4 POWER (set of 4 pins plug containers) and CSP Pins (set of pins to crimp to wire and insert in the container) or, purchasing directly from AMP catalog, part numbers 350779-1 (connector plug AMP MATE N LOK 4 pns) and 350536-1 (socket contacts to crimp).

**Figure 5: J2 - Power supply connector**

Signals description:

+12Vdc = I - Supply voltage +12 Vdc for BUS ABACO®.
-12Vdc = I - Supply voltage -12 Vdc for BUS ABACO®.
+5Vdc = I - Supply voltage +5 Vdc for BUS ABACO®.
GND = - Ground.

Please remember that only the boards to install can determine which supply voltages should be provided, in fact mother board does not require any supply, it just indicates presence of voltages. Also power to provide must be calculated summing the power required by the boards to install, considering that on-board visualization requires additional 15 mA and eventual remote visualization would require another additional 15 mA.

Please remark also that MB'01 is provided with noise reduction filters on all the supply lines, made by tracks shielding and several capacitors. These capacitors will have to be loaded during power on, this produces an peak of current that the generator must be able to provide.
TERMINATION RESISTORS

A very important feature of MB3 01 mother boards is that all the signals of ABACO® BUS are provided with a termination resistor. This feature minimizes the eventual effects due to signals that otherwise would remain floating and in the meantime it warrants the functionality and the perfect interfacing to all the grifo® industrial boards listing. Thanks to the termination resistors in fact, also boards provided with CMOS BUS interfaces can be connected, obtaining an overall reduction of the power consumption for the application system.

**Figure 6: Components map**
CN1+CN3 - ABACO® BUS CONNECTORS

CN1+CN3 are 64 pins DIN 41612 A+C type C female connectors, to interface with the industrial ABACO® BUS. Here follows the standard 8 bits and 16 bits ABACO® BUS pin-out. Please remark that all the signals here described are TTL, except for the power supplies.

<table>
<thead>
<tr>
<th>A 16 bit BUS</th>
<th>A 8 bit BUS</th>
<th>PIN</th>
<th>C 8 bit BUS</th>
<th>C 16 bit BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>GND</td>
<td>1</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>+5 Vdc</td>
<td>+5 Vdc</td>
<td>2</td>
<td>+5 Vdc</td>
<td>+5 Vdc</td>
</tr>
<tr>
<td>D0</td>
<td>D0</td>
<td>3</td>
<td>-</td>
<td>D8</td>
</tr>
<tr>
<td>D1</td>
<td>D1</td>
<td>4</td>
<td>-</td>
<td>D9</td>
</tr>
<tr>
<td>D2</td>
<td>D2</td>
<td>5</td>
<td>-</td>
<td>D10</td>
</tr>
<tr>
<td>D3</td>
<td>D3</td>
<td>6</td>
<td>/INT</td>
<td>/INT</td>
</tr>
<tr>
<td>D4</td>
<td>D4</td>
<td>7</td>
<td>/NMI</td>
<td>/NMI</td>
</tr>
<tr>
<td>D5</td>
<td>D5</td>
<td>8</td>
<td>/HALT</td>
<td>D11</td>
</tr>
<tr>
<td>D6</td>
<td>D6</td>
<td>9</td>
<td>/MREQ</td>
<td>/MREQ</td>
</tr>
<tr>
<td>D7</td>
<td>D7</td>
<td>10</td>
<td>/IORQ</td>
<td>/IORQ</td>
</tr>
<tr>
<td>A0</td>
<td>A0</td>
<td>11</td>
<td>/RD</td>
<td>/RDLDS</td>
</tr>
<tr>
<td>A1</td>
<td>A1</td>
<td>12</td>
<td>/WR</td>
<td>/WRLDS</td>
</tr>
<tr>
<td>A2</td>
<td>A2</td>
<td>13</td>
<td>/BUSAK</td>
<td>D12</td>
</tr>
<tr>
<td>A3</td>
<td>A3</td>
<td>14</td>
<td>/WAIT</td>
<td>/WAIT</td>
</tr>
<tr>
<td>A4</td>
<td>A4</td>
<td>15</td>
<td>/BUSRQ</td>
<td>D13</td>
</tr>
<tr>
<td>A5</td>
<td>A5</td>
<td>16</td>
<td>/RESET</td>
<td>/RESET</td>
</tr>
<tr>
<td>A6</td>
<td>A6</td>
<td>17</td>
<td>/M1</td>
<td>/IACK</td>
</tr>
<tr>
<td>A7</td>
<td>A7</td>
<td>18</td>
<td>/RFSH</td>
<td>D14</td>
</tr>
<tr>
<td>A8</td>
<td>A8</td>
<td>19</td>
<td>/MEMDIS</td>
<td>/MEMDIS</td>
</tr>
<tr>
<td>A9</td>
<td>A9</td>
<td>20</td>
<td>VDUSEL</td>
<td>A22</td>
</tr>
<tr>
<td>A10</td>
<td>A10</td>
<td>21</td>
<td>/IEI</td>
<td>D15</td>
</tr>
<tr>
<td>A11</td>
<td>A11</td>
<td>22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A12</td>
<td>A12</td>
<td>23</td>
<td>CLK</td>
<td>CLK</td>
</tr>
<tr>
<td>A13</td>
<td>A13</td>
<td>24</td>
<td>-</td>
<td>/RDUDS</td>
</tr>
<tr>
<td>A14</td>
<td>A14</td>
<td>25</td>
<td>-</td>
<td>/WRUDS</td>
</tr>
<tr>
<td>A15</td>
<td>A15</td>
<td>26</td>
<td>-</td>
<td>A21</td>
</tr>
<tr>
<td>A16</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>A20</td>
</tr>
<tr>
<td>A17</td>
<td>-</td>
<td>28</td>
<td>-</td>
<td>A19</td>
</tr>
<tr>
<td>A18</td>
<td>-</td>
<td>29</td>
<td>/R.T.</td>
<td>/R.T.</td>
</tr>
<tr>
<td>+12 Vdc</td>
<td>+12 Vdc</td>
<td>30</td>
<td>-12 Vdc</td>
<td>-12 Vdc</td>
</tr>
<tr>
<td>+5 Vdc</td>
<td>+5 Vdc</td>
<td>31</td>
<td>+5 Vdc</td>
<td>+5 Vdc</td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
<td>32</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>

**FIGURE 7: CN1+CN3 - ABACO® BUS CONNECTORS**
Signals description:

8 bits CPU

A0-A15 = O - Address BUS
D0-D7 = I/O - Data BUS
/INT = I - Interrupt request
/NMI = I - Non Maskable Interrupt
/HALT = O - Halt state
/MREQ = O - Memory Request
/IORQ = O - Input Output Request
/RD = O - Read cycle status
/WR = O - Write cycle status
/BUSAK = O - BUS Acknowledge
/WAIT = I - Wait
/BUSRQ = I - BUS Request
/RESET = O - Reset
/M1 = O - Machine cycle one
/RFSH = O - Refresh for dynamic RAM
/MEMDIS = I - Memory Display
/VDUSEL = O - VDU Selection
/IEI = I - Interrupt Enable Input
CLK = O - System clock
/R.T. = I - Reset button
+5 Vdc = I - Power supply at +5 Vdc
+12 Vdc = I - Power supply at +12 Vdc
-12 Vdc = I - Power supply at -12 Vdc
GND = - Ground signal

16 bits CPU

A16-A22 = O - Address BUS
D8-D15 = I/O - Data BUS
/RD UDS = O - Read Upper Data Strobe
/WR UDS = O - Write Upper Data Strobe
/IACK = O - Interrupt Acknowledge
/RD LDS = O - Read Lower Data Strobe
/WR LDS = O - Write Lower Data Strobe

NOTE
Directionality indications as above stated are referred to a master (GPC®) board and have been kept untouched to avoid ambiguity in case of multi-boards systems.
ABACO® BUS is not multimaster. Please remark that only one CPU intelligent control board can be installed in the ABACO® BUS chain.
VISUAL SIGNALATIONS

MB3 01 module is provided with three LEDs for visual signalations as described here:

<table>
<thead>
<tr>
<th>LED</th>
<th>COLOUR</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD1</td>
<td>Red</td>
<td>When lit, indicates the presence of +5 Vdc power supply.</td>
</tr>
<tr>
<td>LD2</td>
<td>Green</td>
<td>When lit, indicates the presence of -12 Vdc power supply.</td>
</tr>
<tr>
<td>LD3</td>
<td>Yellow</td>
<td>When lit, indicates the presence of +12 Vdc power supply.</td>
</tr>
</tbody>
</table>

**FIGURE 8: VISUAL SIGNALATIONS TABLE**

The main purpose of these LEDs is to provide a visual indication of supply normalized voltages, making easier to verify the working status of the system. In addition, connector J1 allows to remote these signalations and install them, for example, on an indicator board, etc. LEDs can be connected directly from the boards, in fact this latter features also the drop resistors.

To easily locate the visual signalations, please refer to figure 4.

![LEDs Connection Diagram](image-url)
EXTERNAL CARDS

MB3 01 mother board can interface to most of grifo® industrial boards. Their main purpose is to perform a digital Inpu/Output interfacement between CPU (GPC®) cards in EUROCARD format installed on an electric rack provided with Ω rails and the external world. Please remark that ABACO® BUS is not multimaster, so there must be only one GPC® card installed on the BUS.

Here is reported an illustrative list of cards capable to interact with MB3 01 mother board with a short description of their features; for further information please request the specific documentation.

EXA 01
Extension Card ABACO®
Rigid zxtension for industrial BUS Abaco®. Keeps the card to examine out of the rack and connected; jumpers to dock the strumentation and to segment the signals to be examined; LEDs to visualize power supply.

SPB 04-SPB 08
Switch Power BUS 4-8 slots
Motherboard featuring 4-8 slots of ABACO® industrial BUS; pitch 4 TE; standard power supply connectors; termination resistances; connector type F for SPC xxx supply; holes for rack docking.

SBP 02-xx
Switch BLOCK Power xx version
Low cost switching power supply able to generate voltage from +5 to +40 Vdc and current up to 2.5 A; Input from 12 to 24 Vac; Connection for DIN C Type and Ω rails.

JMS 34
Jumbo Multifunction Support for Axis control
Generic peripheral axis control card. 3 optocoupled acquisition channels, with 16 bits bidirectional counter, for incremental encoder. 4 12bits ±10Vdc D/A channels. 8 Opto-in; 8 NPN Opto-output 40Vdc 500 mA. All I/O lines displayed with LEDs.

IPC 52
Intelligent Peripheral Controller, 24 analogic input
This intelligent peripheral card acquires 24 indipendent analogic input lines: 8 PT 100 or PT 1000 sensors, 8 J,K,S,T termocouples, 8 analog input ±2Vdc or 4÷20mA; 16 bits + sign A/D section; 0.1 °C resolution; 32K RAM for local data logging; buzzer; 16 TTL I/O lines; 5 or 8 conversion per second; facility of networking up to 127 IPC 52 cards using serial line. BUS interfacing or through RS 232, RS 422, RS 485 or current loop line. Only 5Vdc power supply.

GPC® 188F
General Purpose Controller 80C188
80C188 µP 20MHz; 1 RS 232 line; 1 RS 232, RS 422÷485 or Current Loop line; 24 TTL I/O lines; 1M EPROM or 512K FLASH; 1M RAM Lithium battery backed; 8K serial EEPROM; RTC; Watch Dog; 8 Dip switch; 3 Timer Counter; 8 13 bit A/D lines; Power failure; activity LEDs; single power supply +5Vdc.
GPC® 150
General Purpose Controller 84C15
Microprocessor Z80 at 16 MHz; implementation completely CMOS; 512K EPROM or FLASH; 512K SRAM; RTC; Back-Up through external Lithium battery; 4M serial FLASH; 1 serial line RS 232 or RS 422-485 or current loop; 40 I/O TTL; 2 timer/counter; 2 watch dog; dip switch; EEPROM; A/D converter with resolution 12 bit; activity LED.

GPC® 15R
General Purpose Controller 84C15
84C15 µP, 10÷16 MHz; 1 RS 232 line; 1 RS 232 or RS 422-485 or C. L. line; 16÷48 TTL I/O lines; 16 Opto-in; 8 Relays; 4 Opto Coupled Timers Counters; 512K EPROM or FLASH; 512K RAM andRTC backed; 8K serial EEPROM; 8K Backed RAM modul; Buzzer; 1 Activity LED; Watch dog; 4÷12 readable DIPs; LCD Interface.

GPC® 15A
General Purpose Controller 84C15
Full CMOS card, 10÷20 MHz 84C15 CPU; 512K EPROM or FLASH; 128K RAM; 8K RAM andRTC backed; 8K serial EEPROM; 1 RS 232 line; 1 RS 232 line or RS 422-485 or Current Loop line; 32 or 40 TTL I/O lines; CTC; Watch dog; 2 Dip switches; Buzzer.

GPC® 550
General Purpose Controller 80C552
Microprocessor 80C552 at 22 MHz. 32K EPROM; 32 K SRAM; 32 K EEPROM or SRAM; RTC; serial EEPROM; 1 line RS 232 + 1 RS 232 or RS 422-485 or current loop; 40 I/O TTL; 2 PWM lines; 16 bits timer/counter; watch dog; dip switch; 8 A/D lines with resolution 10 bit; interface for BUS ABACO®; galvanucally isolated CAN serial line. Unique power supply +5 Vdc; EUROCARD format.

LDA 01
Low cost Digital to Analog converter 12 bits
2 D/A converter resolution 12 bit; 8 open collector da 45 Vdc transistor outputs, 500 mA, optocoupled; data view by LED; selectable analog output: 0÷5, 0÷10, ±5 and ±10 Vdc; gain and offset regulation; 8 or 16 bit BUS; extended addressing.

LAD 12
Low cost Analog to Digital conv. 12 bits
Dual slope 16 lines A/D converter; 12 bit + sign conversion; 12,5 conversions per second rate; range ±2,048 Vdc or 0÷20 mA; automatic running mode; 1 LED, 2 TTL input lines; 8 bit Bus; front panel.

LAD 15
Low cost Analog to Digital conv. 15 bits
Dual slope 16 lines A/D converter; 15 bit + sign conversion; 2,5 conversions per second rate; range ±3,2768 Vdc or 0÷20 mA; automatic running mode; 2 LEDs; 2 TTL input lines; 8 bit Bus; front panel.

CI/O R16
16 Coupled Input Output Relé
16 optocoupled input with pi-filter; input voltage 24 Vdc. 16 micro-relays 1 A with disturb suppression by MOV 24 Vac. I/O visualized through LEDs; 8 bit BUS; standard addressing.
**Mother Board MB3 01**

**PCI 01**
32 Peripheral Coupled Input
16 optocoupled input with $\pi$-filter; input voltage 24 Vdc; I/O visualized through LEDs; 8 or 16 bit BUS; standard addressing.

**PIO 01**
Peripheral Input/Output
96 I/O TTL signals grouped in 12 ports 8 bit wide; 6 standard 20 pins I/O connectors; 4 PPI 82C55 drive the signals; Watch dog with intervention time and modality selectable.

**UCC 08**
UART Communication Card 8 linee
8 independant serial lines RS 232 or RS 422-485. Each line: 4 chars buffer; asynchronous communication; Baud rate (50 up to 38.4K baud), parity, stop bit and data bit are software selectable; 3 Dip Switch; 8 bit BUS; extended addressing.
SPC 03.5S
Switch Power Card +5 Vdc
Europe format switching power supply capable to provide +5 Vdc to a load of 4 A; input voltage 12÷24 Vac; power-failure; connector for back-up battery; standard connector for mother board SPB 0x.

SPC 512
Switch Power Card +5 Vdc +12 Vdc
Europe format switching power supply capable to provide +5 Vdc 5A and +12 Vdc 2.5 A; input voltage 12÷24 Vac; power-failure; connector for back-up battery; standard connector for mother board SPB 0x.
APPENDIX A: ALPHABETICAL INDEX

SYMBOLS
+12VDC  8
+5VDC   8
-12VDC  8
/R.T.  6

A
ABACO® BUS  4, 10

C
CONNECTORS  4
  CN1+CN3  10
  J1  6
  J2  8

D
DEVICES  4

E
EXTERNAL CARDS  13

L
LEDs  6, 12

M
MOUNTING  4

P
POWER SUPPLY  4, 8

R
RELATIVE HUMIDITY  4
RESET  6
RESISTORS  4, 9

S
SIZE  4
SLOTS PITCH  4
T
TEMPERATURE RANGE  4
TERMINATION  4, 9

W
WEIGHT  4