PERFECTION IN AUTOMATION
www.br-automation.com

# Debian GNU/Linux 8
## User's manual

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# I   Version information

| Version | Date | Comment | Responsible |
|---|---|---|---|
| 1.00 | 2015-07-14 | First edition | NIF |
| | 2015-07-29 | Review | HOH |
| 1.10 | 2015-11-04 | APC2100 and PPC2100 added.<br>Touch Click added. | NIF |
| | 2015-11-05 | Review | HOH |
| 1.11 | 2016-01-12 | Real-time support updated. | HOH |
| 1.20 | 2016-04-07 | First boot added.<br>USB 3.0 workaround.<br>Correction in Touch Click chapter. | NIF, HOH |
| 1.21 | 2016-11-24 | Remarks added: login for downloads is required. | HOH |
| 1.30 | 2017-04-03 | Added APC910 (QM170, HM170, CM236). | NIF |
| 1.40 | 2017-05-02 | UPS Control added.<br>Installation packages updated.<br>Appendix added.<br>Information added to Touch Click and Touch Screen<br>Added known problems for Skylake DP | MUT |

**Table 1: Version information**

# II   Organization of safety notices

Safety notices in this document are organized as follows:

| Safety notice | Description |
|---|---|
| Danger! | Disregarding these safety guidelines and notices can be life-threatening. |
| Warning! | Disregarding these safety guidelines and notices can result in severe injury or substantial damage to equipment. |
| Caution! | Disregarding these safety guidelines and notices can result in injury or damage to equipment. |
| Information: | This information is important for preventing errors. |

**Table 2: Organization of safety notices**

# III Table of contents

# 1 Introduction

B&R supports Linux in the form of the Debian GNU/Linux 8.1 distribution ("Jessie") on the following devices:

- B&R Automation PC 910 (APC910)
- B&R Automation PC 2100 (APC2100)
- B&R Panel PC 900 (PPC900)
- B&R Panel PC 2100 (PPC2100)

Debian can be ordered together with a device and preinstalled on a storage medium with all B&R-specific modifications ("B&R Debian"), or it can be installed separately with the help of the B&R Installation Guide and packages.

Reasons for using Debian:

- High degree of stability [1]
- Wide selection of packages

For more information about Debian, see www.debian.org.

# 2 General information

A Linux or GNU/Linux system is an open, Unix-like multiuser operating system based on the Linux kernel and GNU software. Widespread use and commercial applications were made possible starting in 1992 with the licensing of the Linux kernel under the GPL.

Development of this modular operating system continues to be advanced by software developers working on various projects all around the world. These developers work in companies, non-profit organizations and as hobbyists. In practice, Linux distributions containing a collection of software applications are generally used. The distributions are built on top of the Linux kernel; however, many distributors and experienced users adapt the operating system kernel to their needs.

Linux is used extensively and in a wide range of applications on desktop PCs, mobile phones, routers, netbooks, multimedia devices and supercomputers. The prevalence of Linux in each of these areas varies greatly: For example, Linux has established a strong foothold in the server and mobile device markets, with only marginal use on desktop PCs. Regional economic and geographic factors also play an important role. Currently, the strongest trend toward increased use of Linux is seen in the South American emerging markets.

[Source: de.wikipedia.org/wiki/Linux]

# 3 Model numbers

| Model number | Short description | Figure |
|---|---|---|
| 5SWLIN.0540-MUL | Debian 8 - 32-bit, multilingual, for APC910 QM77/HM76 | |
| 5SWLIN.0541-MUL | Debian 8 - 32-bit, multilingual, for PPC900 QM77/HM76 | |
| 5SWLIN.0542 -MUL | Debian 8 - 32-Bit, multilingual, for APC2100 BYT | |
| 5SWLIN.0543 -MUL | Debian 8 - 32-Bit, multilingual, for PPC2100 BYT | |
| 5SWLIN.0640-MUL | Debian 8 - 64-bit, multilingual, for APC910 QM77/HM76 | |
| 5SWLIN.0641-MUL | Debian 8 - 64-bit, multilingual, for PPC900 QM77/HM76 | |
| 5SWLIN.0642 -MUL | Debian 8 - 64-Bit, multilingual, for APC2100 BYT | |
| 5SWLIN.0643 -MUL | Debian 8 - 64-Bit, multilingual, for PPC2100 BYT | |
| 5SWLIN.0649-MUL | Debian 8 - 64-Bit, multilingual, for APC910 QM170/HM170/CM236 | |

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[1] However, this high stability comes at the cost of longer release cycles and conservative implementation of new functions.

**Table 3: B&R Debian model numbers**

# 4 System requirements

The following requirements must be met in order to run Debian on a B&R device:

| Model number | Target system | Chipset | Architecture | Language | Minimum disk size[2] | Minimum RAM required |
|---|---|---|---|---|---|---|
| 5SWLIN.0540-MUL | APC910 | QM77 HM76 | 32-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0541-MUL | PPC900 | QM77 HM76 | 64-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0542-MUL | APC2100 | BYT | 32-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0543-MUL | PPC2100 | BYT | 32-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0640-MUL | APC910 | QM77 HM76 | 32-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0641-MUL | PPC900 | QM77 HM76 | 64-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0642-MUL | APC2100 | BYT | 64-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0643-MUL | PPC2100 | BYT | 64-bit | Multilingual | 4 GB | 1 GB |
| 5SWLIN.0649-MUL | APC910 | QM170 HM170 CM236 | 64-Bit | Multilingual | 4 GByte | 1 GByte |

**Table 4: B&R Debian system requirements**

Additional requirements in order to use certain functions:
- Internet access (may incur charges)
- A compatible optical drive is required in order to burn a DVD/CD.
- An audio output device is needed in order to play music and sound.

Product information and graphics may vary depending on the system configuration. Some functions may require more powerful or additional hardware.

## Information:

**With Linux, the RAM and hard drive requirements depend on many components that may be installed. Linux provides a large number of possible graphical working environments and GUIs. Especially the larger and more fully-featured ones, such as KDE and Gnome, require more resources to ensure smooth operation.**

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[2] According to https://www.debian.org/releases/jessie/i386/ch03s04.html.de, the recommended disk size is 10 GB.

# 5 Installation

## 5.1 Preinstalled B&R Debian

Upon request, Debian 8 can be preinstalled by B&R on a suitable CFast card or hard drive (minimum 4 GB).

## 5.2 Standard Debian installation

Debian can also be downloaded from the Debian website (www.debian.org) and installed separately. The Debian website provides more detailed instructions.

Notes regarding installation on B&R devices are included in a separate document that can be downloaded from the B&R website (www.br-automation.com) (see page 38).

Installation packages for the necessary B&R adjustments are also available on the B&R website (see page 38).

## 5.3 Installation of additional components

Other Debian software packages can also be installed at any time – also in B&R Debian. A list of available packages can be found on the Debian website under www.debian.org/distrib/packages.

## 5.4 Adjusting the partition

By default, approximately [3] 4 GB are used on a CFast card or hard drive. The advantage for the user here is that additional partitions can be set up on larger CFast cards or hard drives for an extra HOME partition or the SWAP partition, for example.
GParted-LIVE can be used to increase or decrease the size of the partition as well as to set up additional partitions.

http://gparted.sourceforge.net/liveusb.php

GParted is a partition editor; GParted-LIVE is a Linux distribution that can be installed on a CD or USB flash drive. The ISO file can be downloaded from the GParted website. Instructions for installing to a CD or USB flash drive are available from the following link.

http://tuxboot.org/installation-screenshots.php

After the USB flash drive has been set up, it must be set as the boot device. The boot order may have to be adjusted for this. For more information, see the user documentation for the PC being used.

The following images illustrate how you can change the size of the first partition.

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[3] To remain compatible with different CFast card or hard drive generations (and their various capacities), the actual size of the system partition is a bit less than 4 GB.

**Figure 1: GParted - Boot screen**

After booting from the USB flash drive, the first thing that appears is the GRUB boot manager. The option selected by default is correct and will be loaded automatically after 60 seconds. The boot procedure can also be started immediately by pressing Enter.
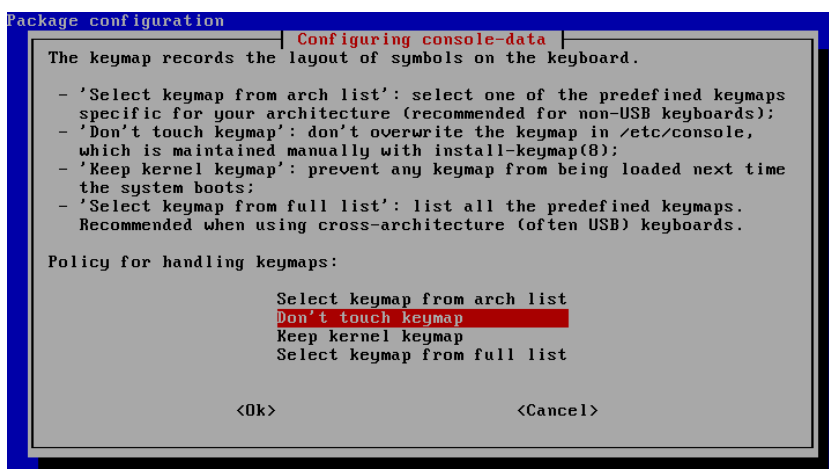


**Figure 2: GParted - "Policy for handling keymaps" selection**

You will then be asked whether the keyboard layout should be changed. The following steps are an example of how to change it to German. First, select "Select keymap from arch list".

**Figure 3: GParted - "Keyboard layout family" selection**

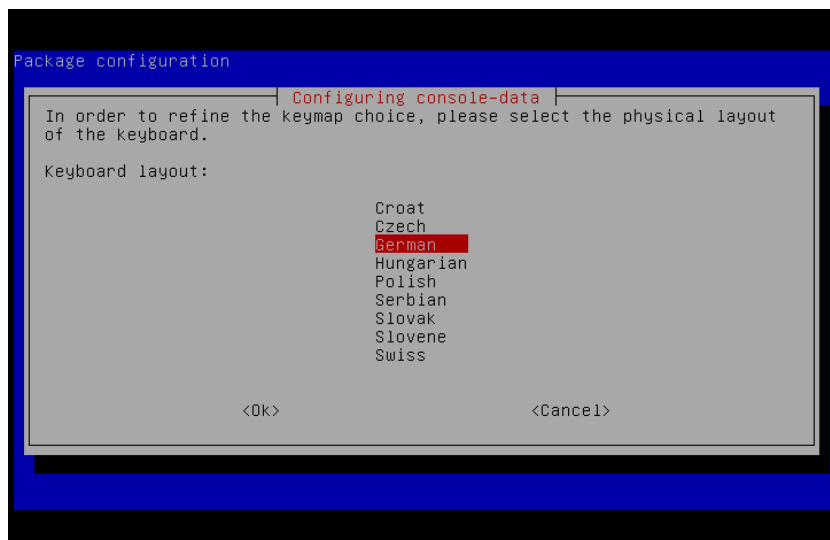The most frequent variant for German keyboards – "qwertz" – is selected here.



**Figure 4: GParted - "Keyboard layout" selection**

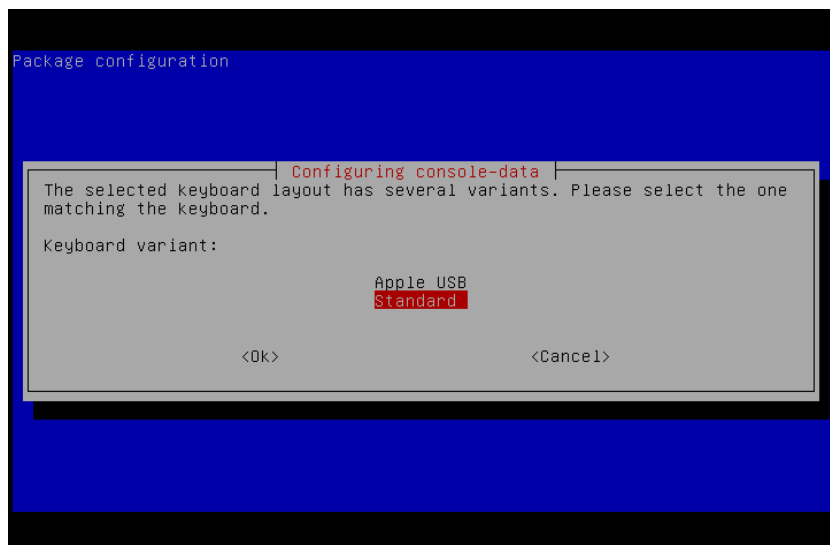Now select "German" as the language.

**Figure 5: GParted - "Keyboard variant" selection**
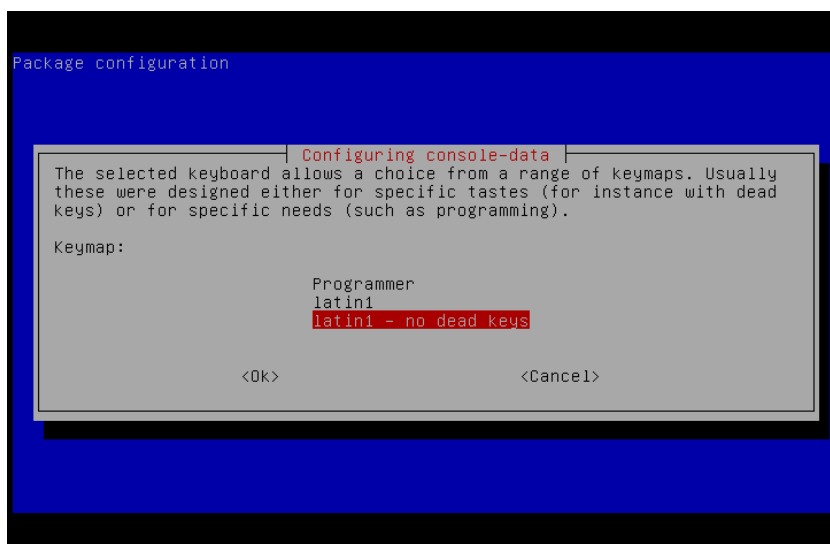
The "Standard" variant should be used in most cases.



**Figure 6: GParted - "Keymap" selection**

"Dead keys" are not used here.

**Figure 7: GParted - "Keymap language" selection**

A list of possible keyboard layouts is shown in the image above. Simply select the desired layout and confirm by pressing Enter.



**Figure 8: GParted - "Boot mode" selection**

Now select boot mode 0 here to continue.

**Figure 9: GParted - View after booting**

After the boot procedure is completed, you will not have to enter a username or password. The GParted application starts automatically.



**Figure 10: GParted - View of a partition with an available area**

The image above shows the view of a 4 GB CFast card or hard drive. Just over 100 MB are not partitioned. Clicking on the "Resize/Move" button opens the dialog box for changing the partition.



**Figure 11: GParted - "Resize/Move" dialog box**

The image above shows the dialog box for changing the partition.

**Figure 12: GParted - Adjusting the partition**

The "Free space following" value simply has to be set to "0".



**Figure 13: GParted - Preview of adjusted partition**

The image above shows a preview. Up to this point, the partition has not been changed; this will only happen when you click the "Apply" button.



**Figure 14: GParted - Confirming the adjusted partition**

The change to the partition must be confirmed.



**Figure 15: GParted - Progress indicator for adjusting the partition**

The image above shows the progress indicator for adjusting the partition.

**Figure 16: GParted - Progress indicator for adjusting the partition (with details)**

The image above shows the progress indicator with details open.



**Figure 17: GParted - Completing the partition adjustment**

The image shows that the partitioning procedure has been completed; this window can be closed with "Close".

**Figure 18: GParted - View of partition after adjustments**

The image above shows the partition view without an unpartitioned section.

## 5.5 Copying an installed version of Debian (cloning)

You can clone an existing version of Debian using the **B&R Embedded OS Installer** under Windows, or using a program such as Linux **Clonezilla**.

The **B&R Embedded OS Installer** can be downloaded from the B&R website (www.br-automation.com).
In order to clone Debian, you must have access to the storage medium where Debian is installed from your Windows PC (e.g. with a CFast reader).
Since the B&R Embedded OS Installer doesn't support Linux file systems, the image can only be handled as a 1:1 copy.
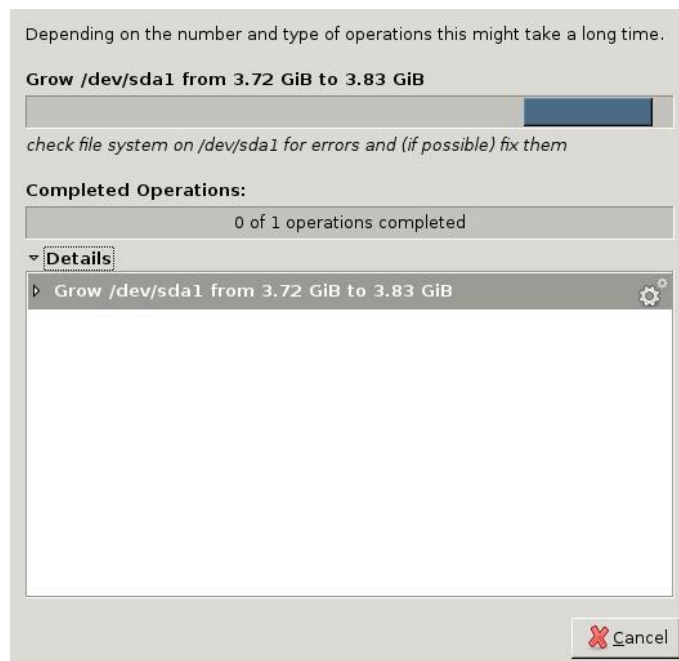
**Clonezillla** can be downloaded from http://clonezilla.org/ and run from a bootable CD/DVD, USB flash drive or USB hard drive ("Clonezilla Live" version).
Comprehensive step-by-step instructions are available at http://clonezilla.org/clonezilla-live-doc.php.
For information on disk-to-disk cloning, see http://clonezilla.org/show-live-doc-content.php?topic=clonezilla-live/doc/03_Disk_to_disk_clone.

# 6 Startup / Logging in

When started for the first time, B&R Debian executes an automated configuration (see also page 18). For this, the device executes one automatic reboot. Furthermore it is necessary to unplug every USB device on Automation and Panel PC 2100 before starting the PC, otherwise the system may not shutdown properly.

## Information:

**The first boot run must not be canceled because this can lead to a non-bootable image.**

After the reboot B&R Debian is ready for operation and displays the login screen:



**Figure 19: Debian login screen (Lightdm)**

**Note:** Two user accounts are set up in B&R Debian by default. We recommend changing the passwords for these accounts. It is also important to note that the "root" account is not intended for general use; it should only be used for administrator tasks such as installing programs.

| User | Password | Usage |
|------|----------|-------|
| root | root | Administrator tasks |
| user | user | General tasks |

**Table 5: User accounts in B&R Debian**

# 7 Debian features

Debian provides software in the form of predefined groups of packages. In most cases, this standard selection provides a sufficient foundation.



**Figure 20: Groups of software packages in Debian**

Additional packages can be added to an installed image at any time as long as there is an Internet connection.

**Tip:** To display a list of installed packages, enter `dpkg -l` in the console window (keep in mind that B&R Debian already contains more than 1000 packages as standard).

The **LXDE** desktop is used by default.
By default **Chromium** is used as the default browser.



**Figure 21: Debian desktop (LXDE)**

# 8 B&R-specific modifications

B&R has made some modifications of Debian in order to use it on APC910 and PPC900 devices.

All of these modifications are already included in B&R Debian or available as separate installation packages that can be downloaded from the B&R website (www.br-automation.com) (see page 38).

## 8.1 B&R First Boot

B&R First Boot executes an automated configuration on the first boot. On Panel PCs the first resistive touch found is enabled for the internal display. On Automation and Panel PC 2100 devices a USB configuration will be done.

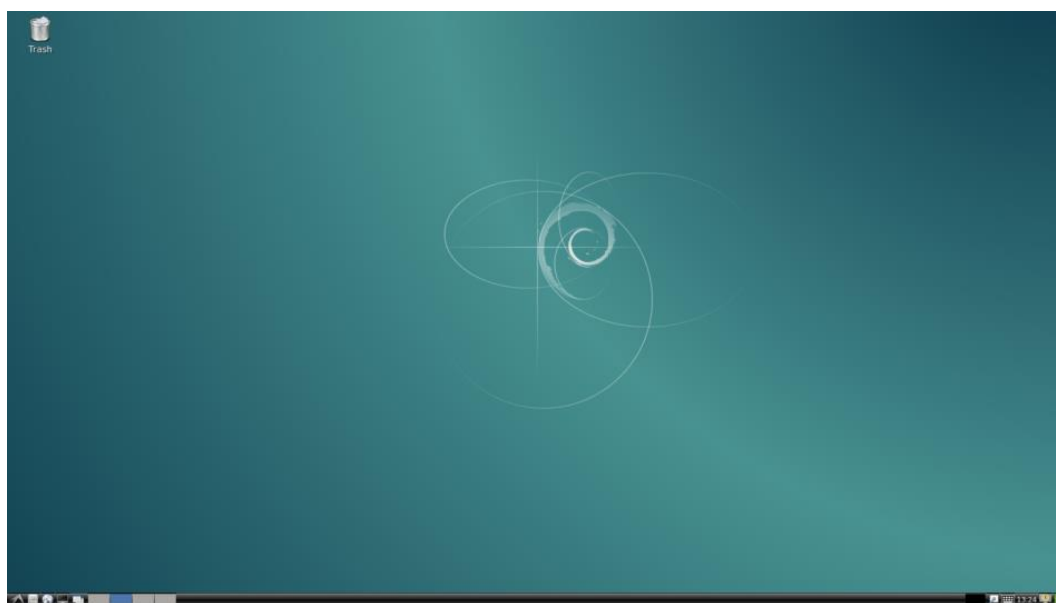## 8.2 B&R Touch Screen

The B&R Debian system uses the **evdev** driver included in Debian to communicate with the touch screen on a Panel PC display or a connected Automation Panel. The evdev driver is used by mice, keyboards and all other input devices.

## Information:

**To use Touch Screen it is necessary for the user account to be a part of the touch-screen group. This is already configured for the user account in B&R Debian. See page 41.**

The **B&R Touch Screen** program can be used to set up (calibrate and configure) resistive and capacitive touch screens. It can be opened from the **System tools** menu.
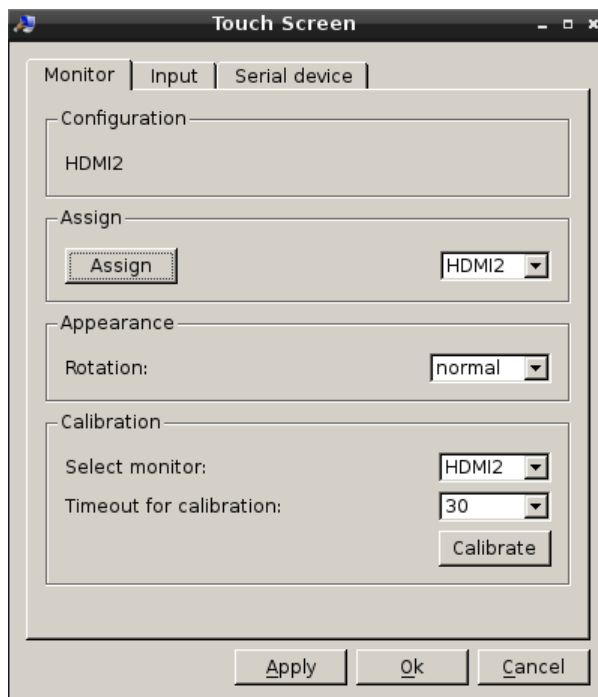


**Figure 22: B&R Touch Screen program**

The arrangement of multiple display panels can be set up under "Configuration" on the "Monitor" property page. Two panels are supported and can be arranged either horizontally or vertically with respect to each other. Display cloning is also possible.

A touch screen can be assigned to the respective panel or monitor under "Assignment" (see Figure 23). Clicking on the **Assign** button opens the following window; you can make the assignment by touching the screen.
A touch screen can be calibrated "Calibration". During calibration, a full-screen window opens with four calibration points that must be touched (see Figure 24).

# Information:

**The touch screen must be assigned to the monitor here regardless (even in single-display mode).**



This is the screenHDMI2
Click on this screen to assign it.
This Widget is closed after timeout or by pressing ESC.
Seconds left:29

**Figure 23: Assigning a touch screen**

The image above will only be seen on one monitor even in multi-display mode (i.e. using a second monitor on a different graphics line). Simply touching the panel (and triggering the touch screen) will assign the touch screen to the respective panel or monitor.
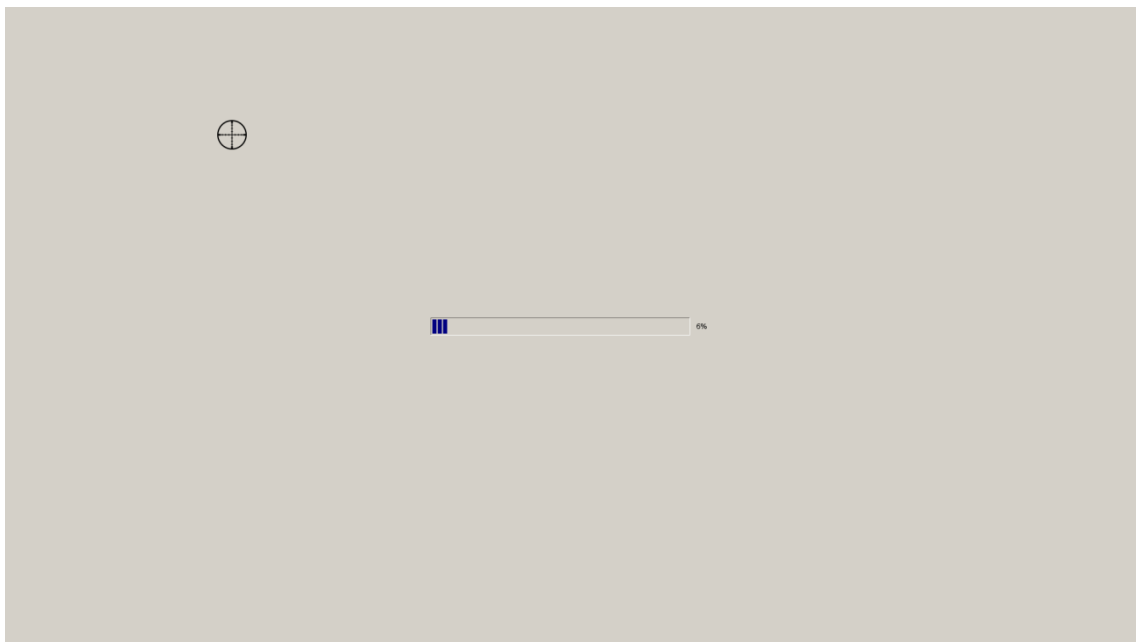
**Figure 24: Calibrating a touch screen**

Calibration is done using four touch points that you should touch as closely as possible.



**Figure 25: B&R touch screen input options**

The virtual keyboard can be enabled on the "Input" property page.
It is also possible to enable the right click option for touch screens; here, a right click will be triggered if you press longer on the screen.

## Information:

**Right click support is only available with resistive touch screens. To perform a right click on capacitive touch screens, you can use the B&R Touch Click program.**

# Information:

**If right click is enabled, the touch behavior is changed. Even on long press, the click event only will be sent once.**
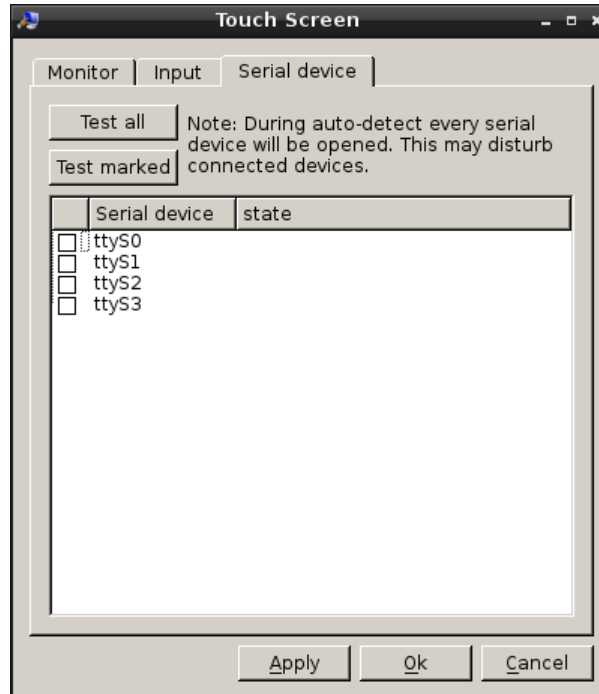


**Figure 26: B&R touch screen detection for a resistive touch screen**

Resistive touch screens can be put into operation from the "Serial interface" property page. The "Test all" button tests all of the displayed serial interfaces for Elo and Elo-compatible resistive touch screens. If one is found, it will be enabled.
The "Test marked" button only tests the interfaces that are currently selected (with a blue background).

# Important:

**This test establishes communication via the serial interfaces. This could affect any devices connected to these interfaces.**

## 8.3 B&R Touch Click

With **B&R Touch Click** a right click can be performed on resistive and capacitive touch screens.

# Information:

**To use Touch Click it is necessary for the user account to be a part of the touch-screen group. This is already configured for the user account in B&R Debian. See page 41.**

B&R HMI Diagnostics can be opened from the start menu: **System Tools**. To configure the right click behavior click on the icon [icon] in the system tray with a right or left mouse click or on the touch. By clicking on "Autostart" you either enable or disable the autostart of Touch Click. This setting is user specific.
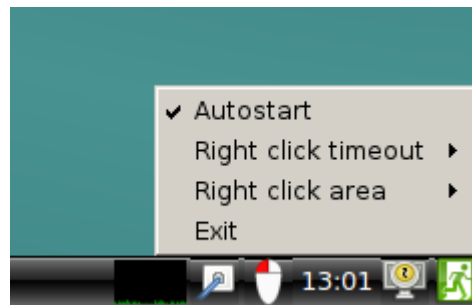
**Figure 27: B&R Touch Click with enabled autostart**

With the 'Right click timeout' settings, you set the timeout for the right click.



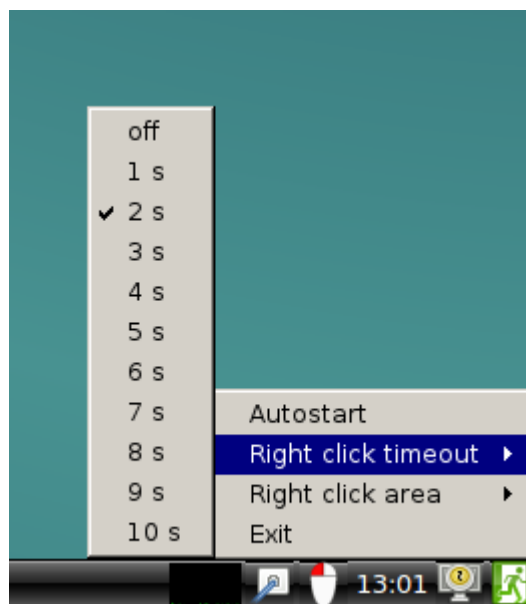**Figure 28: Setting the right click interval**

To prevent unwanted right clicks on moving widgets, right click will be suppressed on long distances. This can be configured under 'Right click area'.

# Information:

**The size of this active area depends on the used touch technology (resolution and geometry) and also on the behavior of the user.**
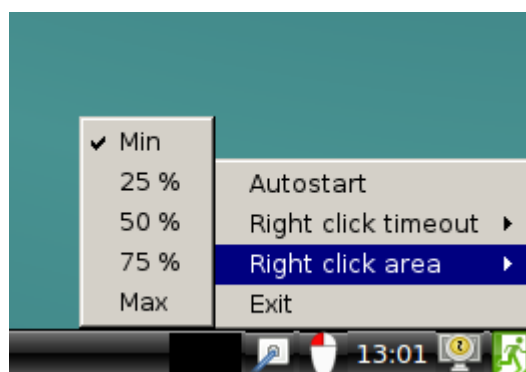


**Figure 29: Setting the right click area**

Touch Click supports resistive and capative touch screens and also mice.

## Information:

**If right click is enabled the click behavior is changed only after an expired timeout. After the timeout is expired one right click will be sent and no further events.**

## 8.4 B&R MTCX driver

The **B&R MTCX driver** communicates with the B&R Maintenance Controller Extended (MTCX) and provides MTCX functionality for ADI.

The MTCX is a standalone processor that provides additional functions that are not found on a "normal" PC but are available on a B&R Industrial PC. The MTCX driver communicates with the B&R Industrial PC via I/O addresses.

## 8.5 B&R ADI library

ADI (Automation Device Interface) provides access to certain functions of B&R devices, such as display brightness settings and temperature readings.

Linux C/C++ programs can access these functions using the **B&R ADI Library**, which is included in B&R Debian. A separate **B&R ADI Development Kit** for Linux is available for download from the B&R website (www.br-automation.com) (see page 38).

## 8.6 B&R HMI Diagnostics

Device-specific functions can be analyzed using the **B&R HMI Diagnostics** program and logged to a file.

B&R HMI Diagnostics can be opened from the start menu: **System Tools**. The report file that is generated is shown automatically in the browser.
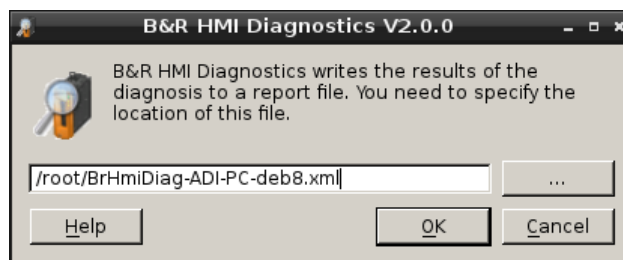


**Figure 30: B&R HMI Diagnostics tool**

## 8.7 B&R Display Brightness

**B&R Display Brightness** can be opened from the start menu: **System Tools**. The brightness of the Panel PC display and any connected Automation Panels can be easily configured with B&R Display

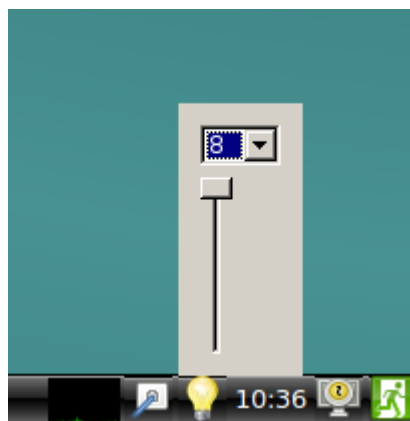Brightness using the 🔆 icon in the tray:

**Figure 31: B&R display brightness control in the system tray**

The numbers for detected displays are shown in a selection list.

## 8.8 B&R License Viewer

**The B&R License Viewer** can be used to look at the licenses for the Debian packages currently in use. It can be opened from the **System tools** menu.
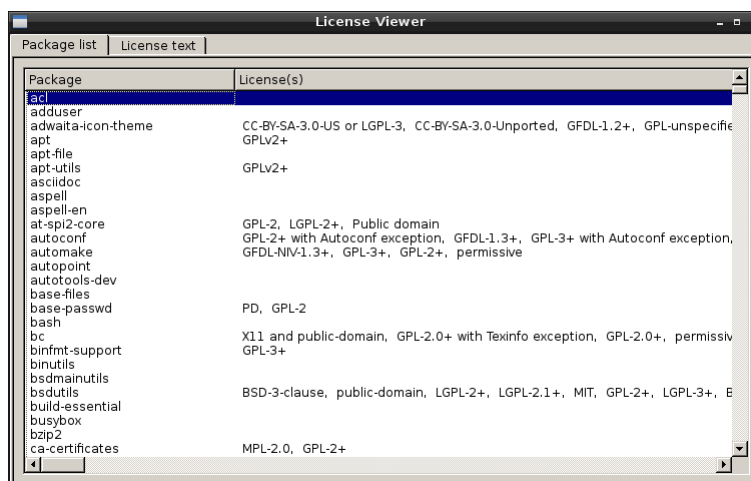


**Figure 32: B&R License Viewer - Viewing the list of packages**

The image above shows the tab with the list of currently installed Debian packages. Selecting a package (blue background) and then clicking on the "License text" tab will show you information about those licenses.
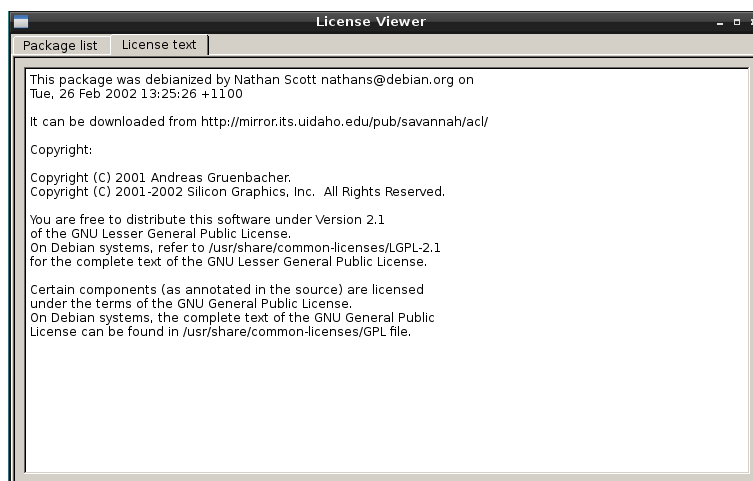
**Figure 33: B&R License Viewer - License information for a package**

# Information:

**Loading licenses can sometimes take a long time. This is especially true for applications with lots of licensing information (e.g. Chromium, IceWeasel, etc.).**

## 8.9 Virtual keyboard

For operation without a keyboard, it is possible to display a virtual keyboard[4]  on the screen.

By default, the virtual keyboard is opened automatically at login. This feature can be disabled using the B&R Touch Screen program (see page 18). It is also possible to open the virtual keyboard manually: **Universal Access > Florence Virtual Keyboard**.



**Figure 34: Virtual keyboard (Florence)**

Clicking on the down arrow  or the tray icon  minimizes the virtual keyboard, and it can be restored at any time using the tray icon. **Note:** On the LXDE desktop, the tray is at the bottom of the screen by default:



**Figure 35: Virtual keyboard in tray**

The keyboard's properties (e.g. appearance of keys) can be configured by right clicking on the tray icon.

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[4] The keyboard used is the **Florence** virtual keyboard. This was not developed by B&R but is a part of Debian. See http://florence.sourceforge.net/english.html.

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## Information:

**When Debian is displaying the lock screen (e.g. after locking manually with *System > Lock Screen*), it is not possible to display a virtual keyboard.**
**In this case you need the appropriate key assignments in order to enter the user password in the lock screen.**

# 9 Additional B&R Packages

These packages are not preinstalled in B&R Debian but can be downloaded from the B&R Homepage (www.br-automation.com).

## 9.1 B&R UPS Control

**B&R UPS Control** has to be used in conjunction with B&R UPS units. The graphical user interface can be launched through the **System tools** menu. This application is only compatible with Debian 8 or later versions. Debian 7 or other operating systems that do not utilize the systemd init system are not supported.

The application is split into two packages: ups-daemon and ups-control.
The **ups-daemon** package provides the system service. Therefore this package can be used without the ups-control package.
Additionally the **ups-control** package can be installed to provide a graphical user interface that enables configuration options, shows information and can be used to display notifications of the current state of operation.

## Information:

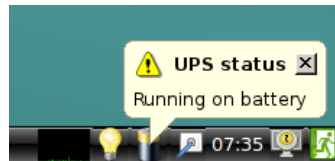**To use UPS Control it is necessary for the user to be a part of the ups-control group. See page 41.**



**Figure 36: UPS Control showing a notification in the system tray**

The system tray icon can display four different states.



| **Figure 37: Plugged in** | **Figure 38: Running on battery** | **Figure 39: No UPS detected** | **Figure 40: UPS warning** |

The UPS Control application launches minimized to the tray by default. A right click on the tray icon reveals a menu which can be used to open the application window.
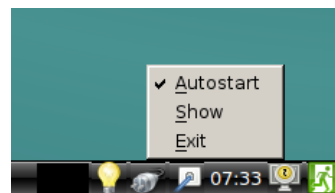


**Figure 41: UPS tray icon menu**

The first tab in the application is the "Overview" tab. It provides information about the current state of operation.
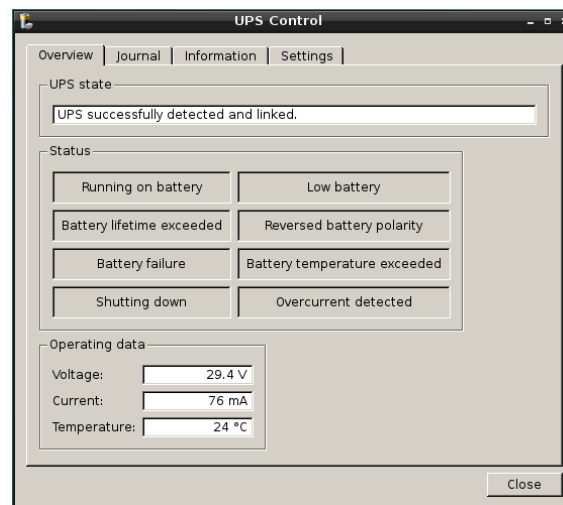
**Figure 42: The UPS overview window**

The UPS Control interface can be used to read messages from the system log. This journal extract can then be exported as a CSV file.

# Information:

**By default Debian only logs to volatile RAM. To keep logs after system restarts it is necessary to configure the journal accordingly.**
**Storing logs requires disk space and results in write cycles to the disk!**

The easiest way to configure persistent logs is to create the directory /var/log/journal. Detailed settings can be made in the configuration file /etc/systemd/journald.conf. Both options require root permissions.

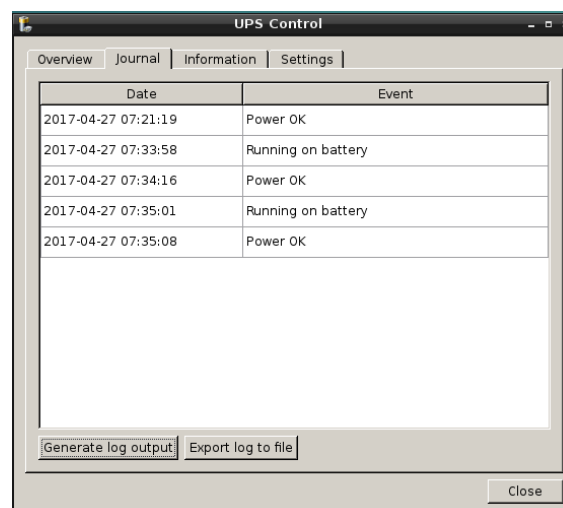More information about the journal configuration can be found at
https://www.freedesktop.org/software/systemd/man/journald.conf.html



**Figure 43: The UPS journal view**

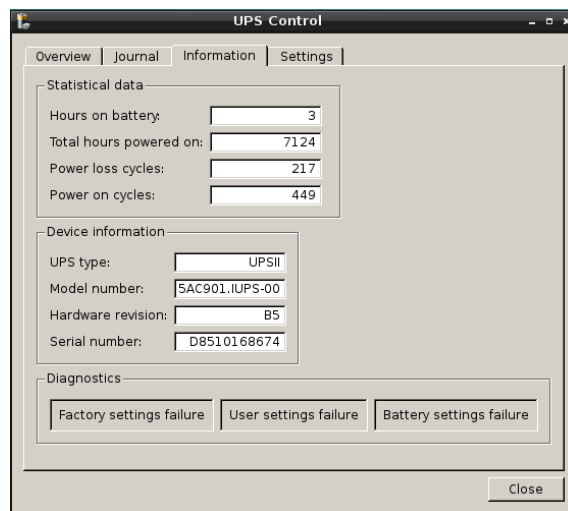The information tab shows data about the current hardware and statistical information.

**Figure 44: UPS information**

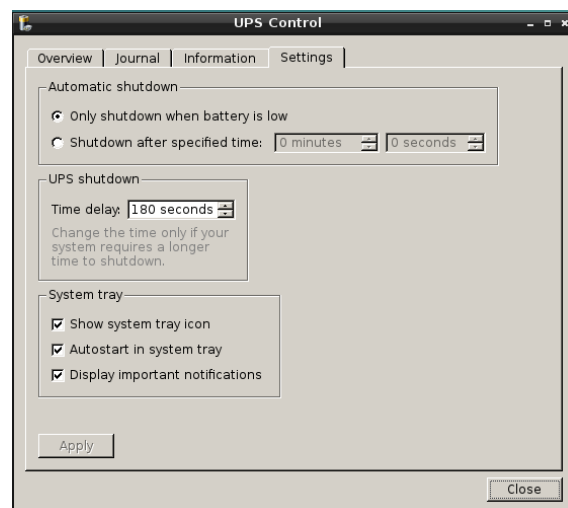The settings tab allows configuration of the service.


**Figure 45: UPS settings**

If the ups-daemon should be used without the graphical user interface the default settings are used automatically. These settings can be adjusted by creating the file /etc/brups.cfg in the following format. max_battery_time=-1 is the default value used by the daemon and declares that the system will only shutdown when running on power and the battery's charge is low.
shutdown_time=180 declares the time in seconds that the system can take to shut down before the UPS will withdraw power from the system.

```
[brupsd]
max_battery_time=-1
shutdown_time=180
```
**Listing 1: Example content of /etc/brups.cfg**

After changing this file it is necessary to tell the service to read the new settings. This command requires root permissions.

```
systemctl reload brupsd.service
```
**Listing 2: Command to apply the UPS configuration**

The ups-daemon can also be used to print a report with all of the available information.

```
brupsd --report
```
**Listing 3: Command to create a UPS report**

Additionally the journal can also be read with the following command, this also requires root permissions.

```
journalctl _SYSTEMD_UNIT=brupsd.service
```
**Listing 4: Command to read all journal messages that were submitted by the ups-daemon**

# 10 Supported interfaces

## 10.1 APC910 and PPC900

Debian supports the following interfaces on APC910 and PPC900 devices.

| Interface | Type | Comment |
|---|---|---|
| **System units (APC910)** | | |
| COM1 | RS232 | in Debian /dev/ttyS0 |
| COM (internal for touch) | resistive | in Debian /dev/ttyS2 |
| USB1 | USB 3.0 | |
| USB2 | USB 3.0 | |
| USB3 | USB 3.0 | |
| USB4 | USB 3.0 | |
| USB5 (APC910 front) | USB 2.0 | |
| ETH1 | 10/100/1000 Mbit/s | in Debian ethx |
| ETH2 | 10/100/1000 Mbit/s | in Debian ethx |
| SDL/DVI/Monitor | | See information below. |
| DisplayPort | | See information below. |
| **CPU boards (PPC900)** | | |
| COM1 | RS232 | in Debian /dev/ttyS0 |
| COM2 | RS232 | in Debian /dev/ttyS1 |
| COM (internal for touch via SDL) | resistive | in Debian /dev/ttyS2 |
| USB1 | USB 3.0 | |
| USB2 | USB 3.0 | |
| USB3 | USB 3.0 | |
| USB4 | USB 3.0 | |
| ETH1 | 10/100/1000 Mbit/s | in Debian ethx |
| ETH2 | 10/100/1000 Mbit/s | in Debian ethx |
| Audio: MIC, Line IN, Line OUT | HDA | See information below. |
| SDL/DVI/Monitor | | See information below. |
| DisplayPort | | See information below. |
| **Interface options** | | |
| COM | RS232/RS422/RS485 | in Debian /dev/ttySx [5] |
| Audio: MIC, Line IN, Line OUT | HDA sound | See information below. |
| **Monitor/Panel options (APC910)** | | |
| DisplayPort | | See information below. |
| USB | USB 2.0 | On DisplayPort option |
| COM (internal for touch via SDL) | resistive | in Debian /dev/ttyS1 |
| SDL/DVI | | See information below. |
| SDL3 | | See information below. |

Table 6: Supported interfaces, APC910 and PPC900

---

[5] Only serial interfaces supported completely as COM, e.g. on 5AC901.I485-00 (see APC910 or PPC900 user's manual)

## Information:

- **Debian supports MIC, Line IN and Line OUT either on the system unit (APC910), the CPU board (PPC900) *or* an interface option. "Dual" sound support on both modules is not possible.**
- **Debian supports output to only two graphic lines simultaneously. For example, if a panel or monitor is being operated on an APC910 using the Monitor/Panel interface, a panel or monitor on the system unit can only be operated on the Monitor/Panel *or* DisplayPort interface.**

### 10.2 APC2100 and PPC2100

Debian supports the following interfaces on APC2100 and PPC2100 devices.

| Interface | Type | Comment |
|---|---|---|
| **System units** | | |
| COM (internal for touch) | resistive | in Debian /dev/ttyS1 |
| USB1 | USB 3.0 | |
| USB2 | USB 2.0 | |
| ETH1 | 10/100/1000 Mbit/s | in Debian ethx |
| ETH2 | 10/100/1000 Mbit/s | in Debian ethx |
| **Interface options** | | |
| COM | RS232 | in Debian /dev/ttySx [6] |
| **Monitor/Panel options (APC2100)** | | |
| COM (internal for touch via SDL) | resistive | in Debian /dev/ttyS2 |
| SDL/DVI/RGB | | |
| SDL3 | | |

**Table 7: Supported interfaces, APC2100 and PPC2100**

---

[6] Only serial interfaces supported completely as COM, e.g. on5ACCIF01.FPLS-000 (see APC2100 or PPC2100 user's manual)

# 11 Guidelines for use

## 11.1 Language switching

B&R Debian (and the LXDE desktop) are set to English by default. To change the language, enter the following command in the console window [7]:

```
dpkg-reconfigure locales
```
**Listing 5: Language switching**

**Note:** You'll need root rights to do this.

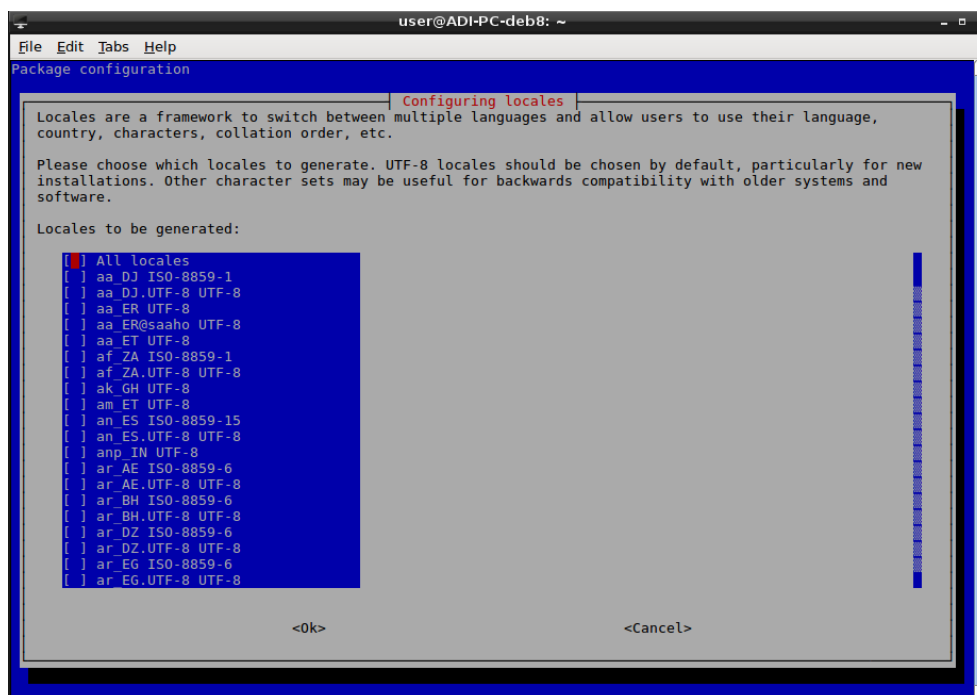In the dialog box that opens, select the desired language(s) and click **OK**.



**Figure 46: Configuring languages**

In the next dialog box you can select the default language for the system.
When you finish the configuration, the selected locales are generated automatically.

Then you need to log out from the system (with **System > Log Out**). The next time you log in, you can select the language in the bottom left corner of the screen.

**Note:** If a component doesn't support the selected language, English is used automatically (this applies to all B&R programs).

## 11.2 Click behavior of the different input devices

The different B&R input devices (single and multitouch devices) have the same behavior as a common mouse.

---

[7] Open the console window from **Accessories > Terminal**.

## 11.3 Touch functionality when monitor is off

The system continues to evaluate touch actions when the monitor is in power saving mode. Touching the screen "wakes up" the monitor but may also perform an operation in a previously hidden dialog box.

## Information:

**This may result in unintended actions!**

## 11.4 Touch functionality with extended desktop

If the desktop is extended, you can use the B&R Touch Screen program (see page 18) to assign the touch screens to the panels.

## 11.5 Using multiple monitor screens

Multihead is only supported while using monitor screens with an equal resolution.

## 11.6 Suspend to RAM (standby)

The system can be put into standby mode with the following command:

```
pm-suspend
```
**Listing 6: Executing pm-suspend**

The system is restarted by pressing the power button. A script is included under /etc/pm/sleep.d to get any connected resistive touch screens up and running again.

```
#! /bin/sh

restart_touch()
{
    for SERVICE in `ls /etc/systemd/system/ | grep elo-inputattach-ttyS`
    do
            # restarting systemd service
            systemctl restart $SERVICE
    done

    # reconfiguring touch devices
    sleep 1
}

case "$1" in
    hibernate|suspend)
    ;;
    thaw|resume)
    restart_touch
    /usr/local/bin/x-config.sh
    ;;
    *)
    echo "unknown"
    ;;
esac
```
**Listing 7: Script for reinitializing the resistive touch screen**

Touch calibration must be carried out once using the B&R Touch Screen program (see page 18) in order for this script to work properly in connection with resistive touch screens.

## 11.7 Accessing Linux files under Windows

If you need to access Linux filesystems under Windows, e.g. to evaluate log files, you can use the **DiskInternals Linux Reader**. This Windows freeware program can be downloaded from http://www.diskinternals.com/linux-reader/; however, it only supports read access.

## 11.8 TRIM support

The B&R image uses the ext3 file system. It supports TRIM, which can be executed cyclically as needed using a cron service. To do so, create a script (here: trim.sh) under /etc/cron.weekly/. The following command applies the fstrim command to all TRIM-supporting partitions.

```
#! /bin/sh

fstrim -a
```
**Listing 8: fstrim command**

chmod can be used to make the script executable.

```
chmod u+x trim.sh
```
**Listing 9: chmod command**

## Information:

**Executing fstrim may temporarily affect performance.**

## 11.9 Real-time support

There are various approaches to providing real-time support for Linux systems.
One of them is the implementation of real-time add-ons directly on the Linux kernel.
This development is driven by the Open Source Automation Development Lab (OSADL).

Information and download links for kernel versions that include run-time patches can be found for example on the OSADL website:
https://www.osadl.org/Realtime-Linux.projects-realtime-linux.0.html
and also on:
https://rt.wiki.kernel.org/index.php/Main_Page

The image provided by B&R does not contain a real-time version of the Linux kernel.
However, it is possible to replace the kernel version in the installed image.

There are a number of real-time kernel versions provided, but the "latest stable" version should preferably be used.

## Information:

**Linux systems with a real-time preempt patch may display a weaker performance, for example with graphics-intensive applications.**
**B&R has not performed any tests with a real-time system.**

# 12 Limitations

## 12.1 Graphics resolutions

The graphics driver included in the image can only use the native resolution of a B&R Panel PC's display unit or connected Automation Panel, which means it is not possible to set any other resolution in Debian.

## 12.2 Suspend-to-disk (hibernate)

Suspend-to-disk is only supported when there is a separate swap partition at least the same size as RAM.

## Information:

**By default, B&R Debian does not support suspend-to-disk. One reason for this is to minimize the size of the required CFast card.**

## 12.3 Cut off dialog boxes on VGA and WVGA displays

Debian works with VGA and WVGA displays, but some system dialog boxes are not shown completely.

## Information:

**As a result, it may not be possible to operate or close some dialog boxes using the touch screen and mouse.**

**Tip:** It may help to set the panel toolbars to auto-hide in order to make more room, or to rotate the screen using the B&R Touch Screen program (see page 18).

# 13 Known problems

## 13.1 Debian cannot boot on older APC2100 or PPC2100

On B&R devices with a CPU stepping older than D0 Debian cannot boot. You can only boot Debian on D0 steppings or younger.

## 13.2 Debian doesn't boot after changing the time in BIOS or when the CMOS battery is empty

**Note:** The following problem is inherent to Debian. It cannot be changed by B&R.

If you reset the time in BIOS or the CMOS battery dies and the CMOS time is lost, the Debian system will no longer boot due to an error when checking the root file system:

```
"/dev/sda1: Superblock last mount time (…) is in the future
"/dev/sda1: UNEXPECTED INCONSISTENCY: RUN fsck MANUALLY"
fsck died with exit status 4
```
**Listing 10: Setting the BIOS clock**

You must then:
a)   Replace the CMOS battery and set the time in BIOS to a sometime after the last time Debian was started.
or
b)   Enter the root password, run fsck manually and then restart Debian.

**Note:** If your device doesn't have the necessary key assignments you need to connect a USB keyboard.

## 13.3 Update of B&R Display Brightness package

After updating the Display Brightness from 2.0 to a higher version, Display Brightness still is in autostart mode and this cannot be changed manually.
So solve this issue, please uninstall Display Brightness completely with the following command (as root):

```
apt-get autoremove --purge display-brightness
```
**Listing 11: Removing Display Brightness completely**

After this install the package again. The autostart behavior can be configured user specific after the next login.

## 13.4 USB Devices are not working under APC2100 or PPC2100

The BIOS settings for XHCI must be set to "Smart Auto" or "enabled".

## 13.5 DisplayPort on APC910 with Skylake chipset

APCs with Skylake chipsets (QMI170/HM170/CM236) do not reliably output on DisplayPort in every configuration.

# 14 Downloads

The B&R website provides the following downloads for Debian.[8]

## 14.1 Documentation

The following documentation is available in addition to this manual:

**B&R Debian 8 installation guide**
This document explains how to perform a standard Debian installation on an APC910, PPC900, APC2100 and PPC2100.

## 14.2 Installation packages

| Information: |
|---|

**All B&R installation packages are released for Debian 8 (due to dependencies with kernel [9], X.Server [10] or Qt [11] version).**

### 14.2.1 Preinstalled packages

These installation packages are already included in the B&R Debian image. They are also available for download in order to install new versions or use on a customized Debian 8 installation, for example:

- **B&R First Boot**
  Contains the B&R First Boot program for an automated configuration on the first boot.

- **B&R Debian Touch Screen**
  Contains the B&R Touch Screen program for configuring and calibrating resistive and capacitive touch screens.

- **B&R Debian Touch Click**
  Contains the B&R Touch Click control.

- **B&R Debian MTCX Driver**
  Contains the B&R MTCX driver for communicating with the MTCX on a B&R device.
  (Note: Can be compiled from kernel 2.6.23 to 3.16; its functionality depends on the ADI library, however.)

- **B&R Debian ADI Library**
  Contains the B&R ADI library.

- **B&R Debian HMI Diagnostics**
  Contains the B&R HMI Diagnostics program.

---

[8] Login is required for some downloads.

[9] B&R Debian contains kernel version 3.16.

[10] The X Window system (also known as X Version 11, X11, X) is a network protocol and computer software system that enables windows on bitmap displays on most Unix-like operating systems and OpenVMS. X11 has been implemented on all common operating systems.
See also: http://en.wikipedia.org/wiki/X_Window_System

[11] **Qt** (pronounced like "cute") is a C++ class library for cross-platform programming of graphical user interfaces.
See also: http://en.wikipedia.org/wiki/Qt_(framework)

- **B&R Debian Display Brightness**
  Contains the B&R Display Brightness control.

- **B&R Debian License Viewer**
  Contains the B&R License Viewer program.

### 14.2.2 Optional packages

These packages are not included in B&R Debian by default and are only available for download.

- **B&R Debian UPS Daemon**
  Contains the B&R UPS service.

- **B&R Debian UPS Control**
  Contains the B&R UPS Control application.

## 14.3 Tools

**B&R Linux ADI Development Kit**
Contains B&R header files and assistance for accessing ADI functions from Linux C/C++ programs.

# 15 Support

Support for using Debian is available on the Debian website at http://www.debian.org/support.

For support regarding the B&R-specific modifications, please contact B&R.

# 16 Appendix

This chapter contains step-by-step guides to some procedures that are necessary for installation and configuration.

## 16.1 Installation of local packages

Packages that are provided by Debian should always be installed through a package manager from the Debian package repository. To do so tools like apt, aptitude or graphical frontends like the Synaptic Package Manager should be used which download and install packages automatically.

B&R packages can be downloaded as deb files which are the native package format used by Debian. To install packages that were downloaded manually B&R recommends GDebi which is already preinstalled on B&R Debian and ensures that possible dependencies are resolved before installing the local package. The application can be launched from the **System tools** menu. Once opened, a package has to be selected.

**Figure 47: GDebi Package Installer**

When the package has been loaded in the application it can be installed by pressing the install package button. This action requires root permissions.

**Figure 48: GDebi with an installable package opened**

## 16.2 User management

Certain B&R packages create specific user groups during installation. All users that want to run these applications have to be members of the respective groups. LXDE has the capability to manage users and groups graphically. The application can be found in the Settings menu.



**Figure 49: Users Settings**

Here the "Manage Groups" button has to be clicked to open another window with a list of all of the groups in the system.



**Figure 50: Groups Settings**

In this example the user named user is added to the sudo group. This makes user an administrative user. Commands that would require a root login normally can then be executed by simply prepending the sudo command to the command line and authenticating with the user's personal password.

**Figure 51: The account has to be checked to become a member of the group**

To confirm this action root permissions are required and a logout is necessary for these changes to become active.

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