

Windows 10 IoT Enterprise 2016 LTSC

User's manual

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1 Introduction

Information:

B&R makes every effort to keep documents as current as possible. The latest versions are available for download on the B&R website (www.br-automation.com).

1.1 Manual history

Version	Date	Comment
1.00	May 2017	First edition
1.00a	July 2017	Updated order number texts. Added APC3100/PPC3100 Legacy order numbers. Added touch screen driver V1.4.2.
1.10	March 2018	Updated order number texts. Added APC2200/PPC2200. Added version 1.1.5.
	March 2018	Adopted from working guide. Updated document template. Included Windows 10 description from introduction as separate sections. Combined "Activation notes" and "Activation". Included "Supported display resolutions" under "System requirements". Removed redundant sections "Important new features in B&R standard images" (this information is included in the manual history). Removed redundant section "Content of delivery" (already partly included in "Installation" and "Drivers"). Combined "Assigning a standard image" and "Manual history" under "Version overview". New section "Documentation". Divided "Application notes" into "Limitations" and "Known problems". Removed "Unsupported interface options".
	March 2018	Added note on UEFI and legacy mode as well as GPT. Added note on Value, Entry and High End licenses. Included system requirements as body text instead of table.
	April 2018	Added version 1.1.6.
	September 2018	Updated order numbers.
	October 2018	Added downloading information for ".NET Framework 3.5 offline installation".
1.11	November 2018	Added downloading information for "Windows Settings Changer".
	November 2018	Added hypervisor mode.
1.12	August 2019	Added legacy versions for xPC2200 and updated revisions. Updated "Windows 10 recovery solution".
1.13	January 2019	Added MP7200. Added instructions for restoring activation in hypervisor mode.
2.00	March 2020	Transferred data to SMC.
2.01	April 2020	Added version 1.2.8; updated activation and hypervisor chapters.
2.02	July 2020	Updated section Internet Connection Sharing (ICS) .
2.03	September 2020	Editorial corrections.
2.10	December 2020	Added note to chapter "Version overview" on page 8. Licenses as a separate chapter. Added new chapter to "Configuration" on page 14. Added new chapter to "Why is it not possible to install a Windows update?" on page 18. Updated section "Downloads" on page 19.
2.11	April 2021	Updated section "Licenses" on page 7. Updated section "Tools" on page 19.
2.20	May 2021	New section "Certificate for B&R software" on page 18. Updated section "Downloads" on page 19.

1.2 Information about this document

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.2.1 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

2 System overview

2.1 Function description

B&R supports Windows 10 in the form of modified images based on Windows 10 IoT Enterprise 2016 LTSC.

Windows 10 IoT Enterprise 2016 LTSC is the successor to Windows 10 IoT Enterprise 2015 LTSC and based on new Windows 10 technology. The operating system also offers a higher level of protection for industrial applications through additional lockdown functions. Windows 10 IoT Enterprise 2016 LTSC is a special version of Windows 10 Enterprise for industrial use (Long-Term Servicing Branch) and based on Windows 10 Build 14393 (July 2016).

Tip:

When searching the Internet, "Windows 10 Enterprise 2016 LTSC" is recommended as a search term because it produces more hits.

LTSC (Long-Term Servicing Branch) means that, in contrast to a standard Windows 10 version, the range of features does not change over time. In a "standard" Windows 10 version, automatic feature updates and security updates cannot be completely prevented, but they can be delayed up to several months for certain versions. At some point, however, the time comes when a standard Windows 10 installs the feature updates or security updates and reboots automatically.

In a Windows 10 IoT Enterprise 2016 LTSC version, security updates and associated automatic reboots can be disabled. According to current Microsoft specifications, feature updates are not planned or possible at all, but are only carried out with a new LTSC version!

2.2 Compatibility

B&R supports Windows 10 IoT Enterprise 2016 LTSC on the following devices:

- Automation PC 910 (APC910)
- Automation PC 2100 (APC2100)
- Automation PC 2200 (APC2200)
- Automation PC 3100 (APC3100)
- Panel PC 900 (PPC900)
- Panel PC 2100 (PPC2100)
- Panel PC 2200 (PPC2200)
- Panel PC 3100 (PPC3100)
- Mobile Panel 7200 (MP7200)

2.3 Features

Windows 10 IoT Enterprise 2016 LTSC supports the following Microsoft features:

Features	Windows 10 IoT Enterprise 2016 LTSC
Range of functions in Windows 10 Enterprise	✓
Internet Explorer 11 (including Enterprise Mode)	✓
Windows Touch	✓
Multilingual support	With language packs (default: English)
Hibernate file	Configurable (default: disabled)
Page file	Configurable (default: disabled by UWF)
System restore	
SuperFetch	
File indexing service	
Fast boot	
Defragmentation service	✓ (disabled when enabling the UWF)
Additional lockdown features (excerpt)	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

The following are some differences from standard Windows 10 Enterprise:

- Windows 10 IoT Enterprise 2016 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSC version is based on build 14393 of Windows 10 and does not receive any feature updates.
- The version installed by B&R contains optimized settings for operation in an industrial environment.

These are described in detail in the **Windows 10 IoT Enterprise 2016 LTSC working guide**. This contains information about installing languages, enabling lockdown and other features.

Information:

These settings, as well as all features not included in the LTSC version, result in different behavior compared to a standard Windows 10 Enterprise installation.

2.4 Order data

Order number	Short description
Windows 10 IoT Enterprise 2016 LTSC	
5SWW10.0542-MUL	W10IoT E 2016 64b APC2100 BYT
5SWW10.0543-MUL	W10IoT E 2016 64b PPC2100 BYT
5SWW10.0640-MUL	W10IoT V 2016 64b APC910 QM77/HM76
5SWW10.0649-MUL	W10IoT V 2016 64b APC910 QM170/HM170
5SWW10.0641-MUL	W10IoT V 2016 64b PPC900 QM77/HM76
5SWW10.0740-MUL	W10IoT H 2016 64b APC910 QM77/HM76
5SWW10.0749-MUL	W10IoT H 2016 64b APC910 QM170/CM236
5SWW10.0741-MUL	W10IoT H 2016 64b PPC900 QM77/HM76
5SWW10.0653-MUL	W10IoT V 2016 64b APC3100 KBU UEFI
5SWW10.0654-MUL	W10IoT V 2016 64b PPC3100 KBU UEFI
5SWW10.0655-MUL	W10IoT V 2016 64b APC3100 KBU Legacy
5SWW10.0656-MUL	W10IoT V 2016 64b PPC3100 KBU Legacy
5SWW10.0753-MUL	W10IoT H 2016 64b APC3100 KBU UEFI
5SWW10.0754-MUL	W10IoT H 2016 64b PPC3100 KBU UEFI
5SWW10.0755-MUL	W10IoT H 2016 64b APC3100 KBU Legacy
5SWW10.0756-MUL	W10IoT H 2016 64b PPC3100 KBU Legacy
5SWW10.0544-MUL	W10IoT E 2016 64b APC2200 APL UEFI
5SWW10.0545-MUL	W10IoT E 2016 64b PPC2200 APL UEFI
5SWW10.0558-MUL	W10IoT E 2016 64b APC2200 APL Legacy
5SWW10.0559-MUL	W10IoT E 2016 64b PPC2200 APL Legacy
5SWW10.0561-MUL	W10IoT E 2016 64b MP7251
Optional accessories	
Windows 10 IoT Enterprise 2016 LTSC	
5SWW10.0800-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64b - Language Packs DVD

2.5 Licenses

Three different licenses are available for Windows 10 IoT Enterprise 2016 LTSC depending on the CPU performance class. Windows 10 provides the same functionality for all licenses.

License	Code (short form)	CPUs
Entry	W10IoT E 2016 ...	Intel Atom and Celeron N
Value	W10IoT V 2016 ...	Intel Celeron and Core i3/i5
High End	W10IoT H 2016 ...	Intel Core i7 and Xeon E3

The B&R extensions in the standard images use parts of program "7-Zip". "7-Zip" is licensed under the GNU LGPL license. The source code is available on the website of the program (www.7-zip.org).

2.6 Version overview

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSP version used:

Order number	Order number	Revision	Version
5SWW10.0542-MUL	W10IoT E 2016 64b APC2100 BYT	C0	V1.0.12
5SWW10.0543-MUL	W10IoT E 2016 64b PPC2100 BYT	C0	V1.0.12
5SWW10.0640-MUL	W10IoT V 2016 64b APC910 QM77/HM76	C0	V1.0.12
5SWW10.0649-MUL	W10IoT V 2016 64b APC910 QM170/HM170	C0	V1.0.12
5SWW10.0641-MUL	W10IoT V 2016 64b PPC900 QM77/HM76	C0	V1.0.12
5SWW10.0740-MUL	W10IoT H 2016 64b APC910 QM77/HM76	C0	V1.0.12
5SWW10.0749-MUL	W10IoT H 2016 64b APC910 QM170/CM236	C0	V1.0.12
5SWW10.0741-MUL	W10IoT H 2016 64b PPC900 QM77/HM76	C0	V1.0.12
5SWW10.0653-MUL	W10IoT V 2016 64b APC3100 KBU UEFI	C0	V1.0.12
5SWW10.0654-MUL	W10IoT V 2016 64b PPC3100 KBU UEFI	C0	V1.0.12
5SWW10.0655-MUL	W10IoT V 2016 64b APC3100 KBU Legacy	C0	V1.0.12
5SWW10.0656-MUL	W10IoT V 2016 64b PPC3100 KBU Legacy	C0	V1.0.12
5SWW10.0753-MUL	W10IoT H 2016 64b APC3100 KBU UEFI	C0	V1.0.12
5SWW10.0754-MUL	W10IoT H 2016 64b PPC3100 KBU UEFI	C0	V1.0.12
5SWW10.0755-MUL	W10IoT H 2016 64b APC3100 KBU Legacy	C0	V1.0.12
5SWW10.0756-MUL	W10IoT H 2016 64b PPC3100 KBU Legacy	C0	V1.0.12
5SWW10.0544-MUL	W10IoT E 2016 64b APC2200 APL UEFI	C0	V1.1.6
5SWW10.0545-MUL	W10IoT E 2016 64b PPC2200 APL UEFI	C0	V1.1.6
5SWW10.0558-MUL	W10IoT E 2016 64b APC2200 APL Legacy	C0	V1.1.6
5SWW10.0559-MUL	W10IoT E 2016 64b PPC2200 APL Legacy	C0	V1.1.6
5SWW10.0561-MUL	W10IoT E 2016 64b MP7251	D0	V1.2.9

Information:

The images created by B&R are based on certain Windows update versions. These can be viewed in the description of the individual versions via the KB numbers. Additional information (e.g. known problems) is available on the Microsoft Support website (<https://support.microsoft.com/>).

2.6.1 V1.2.9

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSP version used:

Order number	Order number	Revision	Version
5SWW10.0561-MUL	W10IoT E 2016 64b MP7251	D0	V1.2.9

Version: 1.2.9 / 2020-09-04

The following Microsoft QFEs (WinVer 14393.3866) are installed:

+ KB4565912, KB4103720, KB4494175, KB4561600, KB4571694

Additional included drivers:

+ B&R devices 1.5.0.0
 + Chipset APL 10.1.1.38
 + Chipset APL TXE 3.0.0.1115
 + Chipset HM76_QM77_BYT 10.0.27
 + Chipset HM170_QM170_CM236 10.1.1.38
 + Chipset HM170_QM170_CM236 MEI 11.8.79.3722
 + Chipset KBU 10.1.1.38
 + Chipset KBU MEI 11.8.79.3722
 + Graphics HM76 15.28.24.64.4229
 + Graphics HM170_QM170_CM236_KBU_APL 27.20.100.8588
 + Graphics QM77_BYT 15.33.52.64.5146
 + Network Intel_82573_574_567_579_I210_I219 25.2
 + RapStorTech HM170_QM170_CM236_KBU 15.7.0.1014
 + UniversalADI APC910_PPC900 2.2.0
 + UniversalADI APC2200_PPC2200 2.2.0
 + UniversalADI APC2100_PPC2100 2.2.0
 + UniversalADI APC3100_PPC3100 2.2.0
 + ADI driver MP7200 1.0.1
 + Touch screen driver V1.4.3
 + WPD 1.5.2

2.6.2 V1.2.8

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSP version used:

Order number	Order number	Revision	Version
5SWW10.0561-MUL	W10IoT E 2016 64b MP7251	C0	V1.2.8

Version: V1.2.8 / 2020-04-02

The following Microsoft QFEs (WinVer 14393.3474) are installed:

+ KB4520724, KB4103720, KB4346087, KB4516115, KB4534307

Additional included drivers:

+ B&R devices 1.5.0.0
 + Chipset APL 10.1.1.38
 + Chipset APL TXE 3.0.0.1115
 + Chipset HM76_QM77_BYT 10.0.27
 + Chipset HM170_QM170_CM236 10.1.1.38
 + Chipset HM170_QM170_CM236 MEI 11.8.71.3630
 + Chipset KBU 10.1.1.38
 + Chipset KBU MEI 11.8.71.3630
 + Graphics HM76 15.28.24.64.4229
 + Graphics HM170_QM170_CM236_KBU_APL 26.20.100.7263
 + Graphics QM77_BYT 15.33.49.64.5100
 + Network Intel_82573_574_567_579_I210_I219 24.3
 + RapStorTech HM170_QM170_CM236_KBU 15.7.0.1014
 + UniversalADI APC910_PPC900 2.2.0
 + UniversalADI APC2200_PPC2200 2.2.0
 + UniversalADI APC2100_PPC2100 2.2.0
 + UniversalADI APC3100_PPC3100 2.2.0
 + ADI driver MP7200 1.0.0
 + Touch screen driver V1.4.3
 + WPD 1.4.0

2.6.3 Version 1.2.8-beta

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSB version used:

Order number	Order number	Revision	Version
5SWW10.0561-MUL	W10IoT E 2016 64b MP7251	A0	1.2.8-beta

Version: V1.2.8-beta / 2020-01-30

The following Microsoft QFEs (WinVer 14393.3474) are installed:

+ KB4520724, KB4103720, KB4346087, KB4516115, KB4534307

Additional included drivers:

+ B&R devices 1.5.0.0
 + Chipset APL 10.1.1.38
 + Chipset APL TXE 3.0.0.1115
 + Chipset HM76_QM77_BYT 10.0.27
 + Chipset HM170_QM170_CM236 10.1.1.38
 + Chipset HM170_QM170_CM236 MEI 11.8.71.3630
 + Chipset KBU 10.1.1.38
 + Chipset KBU MEI 11.8.71.3630
 + Graphics HM76 15.28.24.64.4229
 + Graphics HM170_QM170_CM236_KBU_APL 26.20.100.7263
 + Graphics QM77_BYT 15.33.49.64.5100
 + Network Intel_82573_574_567_579_I210_I219 24.3
 + RapStorTech HM170_QM170_CM236_KBU 15.7.0.1014
 + UniversalADI APC910_PPC900 2.1.1
 + UniversalADI APC2200_PPC2200 2.1.1
 + UniversalADI APC2100_PPC2100 2.1.1
 + UniversalADI APC3100_PPC3100 2.1.1
 + ADI driver MP7200 1.0.0
 + Touch screen driver V1.4.3
 + WPD 1.4.0

2.6.4 Version 1.1.6

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSB version used:

Order number	Order number	Revision	Version
5SWW10.0544-MUL	W10IoT E 2016 64b APC2200 APL UEFI	C0	V1.1.6
5SWW10.0545-MUL	W10IoT E 2016 64b PPC2200 APL UEFI	C0	V1.1.6
5SWW10.0558-MUL	W10IoT E 2016 64b APC2200 APL Legacy	C0	V1.1.6
5SWW10.0559-MUL	W10IoT E 2016 64b PPC2200 APL Legacy	C0	V1.1.6

Version: V1.1.6 / 2018-06-05

The following Microsoft QFEs (WinVer 14393.2068) are installed:

+ KB4074590, KB4074595, KB4049065

Additional included drivers:

+ Realtek HDA audio codec V281
 + B&R devices V1.5.0.0
 + Chipset APL V10.1.1.38
 + Chipset APL TXE V3.0.0.1115
 + Chipset HM76_QM77_BYT V10.0.27
 + Chipset HM170_QM170_CM236 V10.1.1.38

- + Chipset HM170_QM170_CM236 MEI V11.8.50.3434
- + Chipset KBU V10.1.1.38
- + Chipset KBU MEI V11.8.50.3434
- + Graphics HM76 V15.28.24.64.4229
- + Graphics HM170_QM170_CM236_KBU_APL V15.65.4.1.64.4973
- + Graphics QM77_BYT V15.33.46.64.4885
- + Network Bluetooth LM811 V3.887.893.051816
- + Network Intel_82573_574_567_579_I210_I219 V23.1
- + Network WLAN LM811 V1030.15.0901.2016
- + RapStorTech HM170_QM170_CM236_KBU V15.7.0.1014
- + UniversalADI APC910_PPC900 V1.4
- + UniversalADI APC2200_PPC2200 V1.4
- + UniversalADI APC2100_PPC2100 V1.4
- + UniversalADI APC3100_PPC3100 V1.4
- + Touch screen driver V1.4.3

2.6.5 Version B1.1.5

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSB version used:

Order number	Order number	Revision	Version
5SWW10.0544-MUL	W10IoT E 2016 64b APC2200 APL UEFI	A0	B1.1.5
5SWW10.0545-MUL	W10IoT E 2016 64b PPC2200 APL UEFI	A0	B1.1.5

Version: V1.1.5 / 2018-03-13

- The following Microsoft QFEs are installed:

- + KB4074595, KB4077525, KB4049065

Additional included drivers:

- + Realtek HDA audio codec V281
- + B&R devices V1.5.0.0
- + Chipset APL V10.1.1.38
- + Chipset APL TXE V3.0.0.1115
- + Chipset HM76_QM77_BYT V10.0.27
- + Chipset HM170_QM170_CM236 V10.1.1.38
- + Chipset HM170_QM170_CM236 MEI V11.8.50.3434
- + Chipset KBU V10.1.1.38
- + Chipset KBU MEI V11.8.50.3434
- + Graphics HM76 V15.28.24.64.4229
- + Graphics HM170_QM170_CM236_KBU_APL V15.65.4.64.4958
- + Graphics QM77_BYT V15.33.46.64.4885
- + Network Bluetooth LM811 V3.887.893.051816
- + Network Intel_82573_574_567_579_I210_I219 V23.1
- + Network WLAN LM811 V1030.15.0901.2016
- + RapStorTech HM170_QM170_CM236_KBU V15.7.0.1014
- + UniversalADI APC910_PPC900 V1.3
- + UniversalADI APC2200_PPC2200 V1.3
- + UniversalADI APC2100_PPC2100 V1.3
- + UniversalADI APC3100_PPC3100 V1.3
- + Touch screen driver V1.4.3

2.6.6 Version 1.0.12

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2016 LTSB version used:

Order number	Order number	Revision	Version
5SWW10.0542-MUL	W10IoT E 2016 64b APC2100 BYT	C0	V1.0.12
5SWW10.0543-MUL	W10IoT E 2016 64b PPC2100 BYT	C0	V1.0.12
5SWW10.0640-MUL	W10IoT V 2016 64b APC910 QM77/HM76	C0	V1.0.12
5SWW10.0649-MUL	W10IoT V 2016 64b APC910 QM170/HM170	C0	V1.0.12
5SWW10.0641-MUL	W10IoT V 2016 64b PPC900 QM77/HM76	C0	V1.0.12
5SWW10.0740-MUL	W10IoT H 2016 64b APC910 QM77/HM76	C0	V1.0.12
5SWW10.0749-MUL	W10IoT H 2016 64b APC910 QM170/CM236	C0	V1.0.12
5SWW10.0741-MUL	W10IoT H 2016 64b PPC900 QM77/HM76	C0	V1.0.12
5SWW10.0653-MUL	W10IoT V 2016 64b APC3100 KBU UEFI	C0	V1.0.12
5SWW10.0654-MUL	W10IoT V 2016 64b PPC3100 KBU UEFI	C0	V1.0.12
5SWW10.0655-MUL	W10IoT V 2016 64b APC3100 KBU Legacy	C0	V1.0.12
5SWW10.0656-MUL	W10IoT V 2016 64b PPC3100 KBU Legacy	C0	V1.0.12
5SWW10.0753-MUL	W10IoT H 2016 64b APC3100 KBU UEFI	C0	V1.0.12
5SWW10.0754-MUL	W10IoT H 2016 64b PPC3100 KBU UEFI	C0	V1.0.12
5SWW10.0755-MUL	W10IoT H 2016 64b APC3100 KBU Legacy	C0	V1.0.12
5SWW10.0756-MUL	W10IoT H 2016 64b PPC3100 KBU Legacy	C0	V1.0.12

Version: V1.0.12 / 2017-07-19

- The following Microsoft QFEs are installed:

- + KB4013418, KB4015217, KB4018483

Additional included drivers:

- + Realtek HDA audio codec V281
- + B&R devices V1.5.0.0
- + Chipset HM76_QM77_BYT V10.1.1.38
- + Chipset KABYLAKE V10.1.1.38
- + Chipset HM170_QM170_CM236 V10.1.1.38
- + Chipset KABYLAKE ManagementEngine V11.7.0.1002
- + Graphics HM76 V15.28.24.64.4229
- + Graphics HM170_QM170_CM236_KBYxPC3100 V15.45.16.64.4627
- + Graphics QM77_BYT V15.33.43.64.4425
- + Network Bluetooth V3.887.893.051816
- + Network Intel_82573_574_567_579_I210_I2190 V22.0.1
- + Network WLAN V1030.15.0901.2016
- + RapStorTech HM170_QM170_CM236 15.2.0.1020
- + UniversalADI APC910_PPC900 V1.0
- + UniversalADI APC2100_PPC2100 V1.0
- + UniversalADI APC3100_PPC3100 V1.0
- + Touch screen driver V1.4.2

2.7 System requirements

2.7.1 RAM

RAM: At least 2 GB

The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 4 GB with 64-bit operating systems, however.

2.7.2 Data storage medium

Data storage medium: At least 20 GB

The memory space required by additional language packs is not taken into account in the minimum size for the data storage medium.

Information:

Functionality of Windows 10 IoT Enterprise 2016 LTSC is only ensured with MLC CFAST data storage media with Rev. D0 or later: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10.

2.7.3 Display

Windows 10 IoT Enterprise 2016 LTSC requires XGA resolution (800 x 600) or higher per Microsoft requirements to activate full operation of the Windows interface (e.g. with system dialog boxes). A lower resolution can be selected for applications.

Single-touch

Current B&R single-touch panels (analog resistive with ELO or B&R touch controller) are supported by B&R touch screen driver version 1.4 and later. This is already included in B&R standard images and installed automatically on Panel PCs.

Information:

Windows 10 is optimized for operation with capacitive (PCT) multi-touch devices. Resistive touch devices are only conditionally suitable for Windows 10 IoT Enterprise 2016 LTSC due to the poor accessibility of the edges since some gestures and operating options (e.g. Action Center) may be difficult or impossible to perform.

Multi-touch

Current B&R multi-touch panels (PCT) are supported by the included Microsoft driver; an additional installation is not necessary.

In comparison to older Windows versions, Windows 10 IoT Enterprise 2016 LTSC has better support for multi-touch devices:

- Multi-touch operation is possible without delay after login.
- Multi-touch operation is also immediately possible in a "customized shell".

3 Installation

B&R installs and activates Windows 10 IoT Enterprise 2016 LTSB on a suitable data storage medium. After the system is switched on for the first time, it runs through the out-of-box experience (OOBE), which allows the user to make various settings (e.g. language, region, keyboard, computer name, username).

Depending on the B&R product used, the operating system is installed in UEFI or legacy mode.¹⁾

The data storage medium containing the Windows partition is formatted with a GUID Partition Table (GPT) file system. For other drives, it is possible to use either the GPT or Master Boot Record (MBR) file format. A GPT drive can have up to 128 partitions.

Notice!

It is important to note that when installing in UEFI mode, the GPT file system must be supported by the software being used when backing up and restoring the installation.

¹⁾ APC3100 and PPC3100: Either UEFI or legacy mode
With the APC2200 and PPC2200 and later, only UEFI mode is installed.

4 Initial startup

4.1 Creating a backup image

B&R recommends creating a backup image for each device series before the initial startup of the PC.

This backup image can be used to restore the delivery status.

4.2 Planning a modified customer image

If the customized customer image should be used on multiple devices, it is recommended to create a complete backup with a suitable image program before the initial startup of the B&R standard image. This means that personal adjustments can be made at any time from this defined starting point.

For more information about creating a customer image, see the **Windows 10 IoT Enterprise 2016 LTSC working guide**.

Notice!

Resetting the PC does not reset the device to the B&R factory settings and should therefore not be used! Only a complete backup of the data storage medium before the initial startup of the device can ensure this!

4.3 Checking the date and time

Before the initial startup, the date and time must be checked in the BIOS and corrected if necessary.

If these deviate by +/- 1 day, it is possible that Windows Update will no longer work! This can also cause problems when enabling or restoring an activation.

4.4 Creating a user

Information:

Functionality of B&R standard images is only ensured with a local user profile; Microsoft account user profiles on the web are not supported!

It is recommended to unplug the network cable so that a Microsoft account is not accidentally defined as a user profile.

B&R standard images are configured so that a freely definable username can be entered during initial startup.

If a built-in administrator should be used, the device can be put into audit mode during the initial startup (see **Windows 10 IoT Enterprise 2016 LTSC working guide**).

5 Configuration

5.1 Windows settings

Windows is configured via the standard Windows dialog boxes and options. For more information, see the Microsoft website (www.microsoft.com).

B&R's **Windows Settings Changer** program is available as an extra download for more convenient configuration of certain Windows settings.

5.2 Unified Write Filter

B&R's **UWF Management** program is available as an extra download for more convenient configuration of the Unified Write Filter.

5.3 Languages

Windows 10 IoT Enterprise 2016 LTSC is multilingual and offers a wide range of languages to choose from (including Arabic and Chinese character sets).

Language	Code	Language	Code
Arabic (Saudi Arabia)	ar-SA	Japanese (Japan)	ja-JP
Bulgarian (Bulgaria)	bg-BG	Korean (Korea)	ko-KR
Chinese (PRC)	zh-CN	Latvian (Latvia)	lv-LV
Chinese (Taiwan)	zh-TW	Lithuanian (Lithuania)	lt-LT
Croatian (Croatia)	hr-HR	Norwegian, Bokmål (Norway)	nb-NO
Czech (Czech Republic)	cs-CZ	Polish (Poland)	pl-PL
Danish (Denmark)	da-DK	Portuguese (Brazil)	pt-BR
Dutch (Netherlands)	nl-NL	Portuguese (Portugal)	pt-PT
English (United States)	en-US	Romanian (Romania)	ro-RO
English (United Kingdom)	en-GB	Russian (Russia)	ru-RU
Estonian (Estonia)	et-EE	Serbian (Latin, Serbia)	sr-Latn-RS
Finnish (Finland)	fi-FI	Slovak (Slovakia)	sk-SK
French (Canada)	fr-CA	Slovenian (Slovenia)	sl-SI
French (France)	fr-FR	Spanish (Mexico)	es-MX
German (Germany)	de-DE	Spanish (Spain)	es-ES
Greek (Greece)	el-GR	Swedish (Sweden)	sv-SE
Hebrew (Israel)	he-IL	Thai (Thailand)	th-TH
Hungarian (Hungary)	hu-HU	Turkish (Turkey)	tr-TR
Italian (Italy)	it-IT	Ukrainian (Ukraine)	uk-UA

Installing languages later is described in the **Windows 10 IoT Enterprise 2016 LTSC working guide**. This is available for download on the B&R website (www.br-automation.com).

6 Operation

6.1 Activation

Windows 10 IoT Enterprise 2016 LTSC behaves similar to Windows 10 IoT Enterprise 2015 LTSC when activated. It is important to note the problems described below:

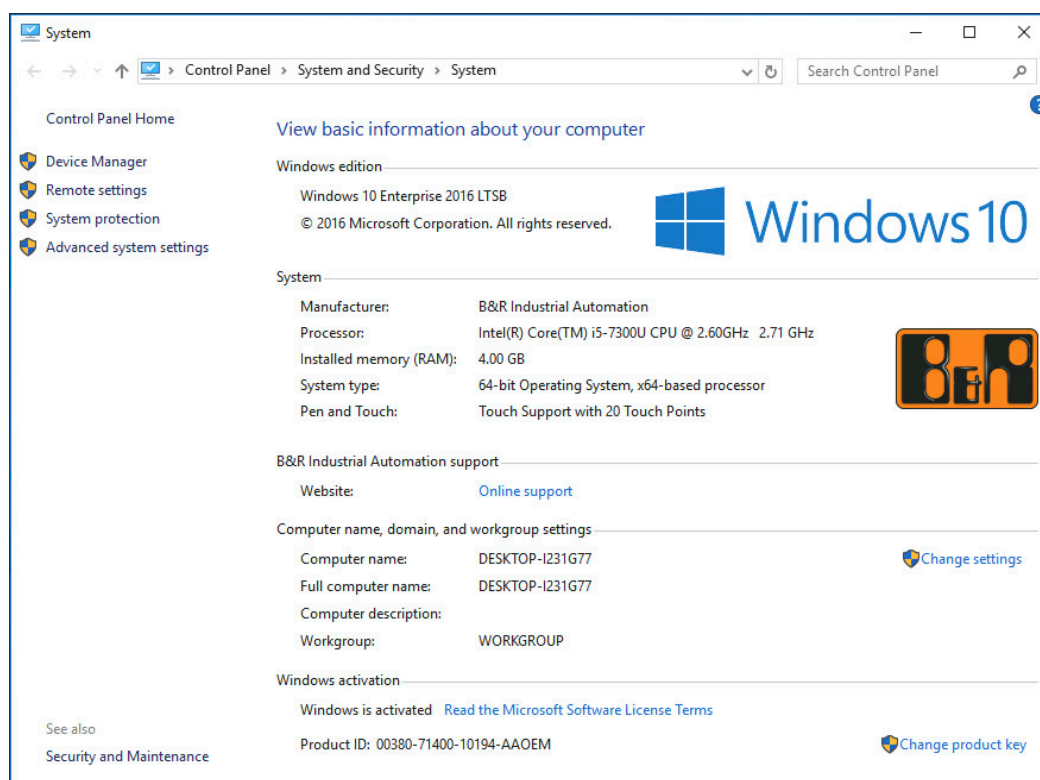
Typically, no activation is required until the system is connected to the Internet. As a result, activation takes place as soon as a connection to the Internet is established.

However, the described case can only be guaranteed if the system does not establish a network connection to other systems at any time. If a network connection is temporarily or permanently available, Windows 10 IoT Enterprise 2016 LTSC tries to establish an Internet connection cyclically so that activation can be performed.

Potential Internet access does not necessarily mean that activation is possible. If activation is not possible, e.g. due to internal IT guidelines or other reasons, a previous version (Windows 10 IoT Enterprise 2015 LTSC) has gone into the deactivated state. This was due to potential activation manipulation. In the deactivated state, a Watermark text was placed over all applications and no personalizations could be made to the system (e.g. no new user could be created).

This behavior could not be reproduced with Windows 10 IoT Enterprise 2016 LTSC. However, it cannot be ruled out that it could occur in the future. To prevent this behavior from occurring, B&R delivers standard images for Windows 10 IoT Enterprise 2016 LTSC in the activated state and stores the activation-relevant data for reuse on the device in nonvolatile memory.

The activation status can be checked in the Control Panel:



The activation carried out by B&R in the production process is supported by special B&R extensions in the operating system and should not be lost when the hardware is changed (e.g. replacement of components in the event of repair) or when the system is reinstalled (Microsoft reserves the right to make technical changes without notice).

It is not required to enter a product key for activation of preinstalled images. For more information about backing up or restoring activation, see **Windows 10 IoT Enterprise 2016 LTSC working guide**.

Restoring activation in hypervisor mode is only supported with ADI driver 2.2.0 and later; the original data storage medium used to pre-activate the device during B&R production must still be in the device.

Information:

Given that Microsoft does not release activation-related data, B&R can make no guarantee that executed reactivation attempts will succeed in all cases.

In this case, activation can be attempted via telephone or online.

6.2 Hypervisor

To use the MTCX together with Windows and Automation Runtime, hypervisor mode of the ADI driver must be enabled (see the **ADI driver user's manual**). ADI driver version 1.2 or later is required for this. The current ADI driver can be downloaded at no cost from the B&R website (www.br-automation.com).

Information:

Restoring activation is supported in hypervisor mode is supported with ADI driver 2.2.0 or later (for requirements, see "[Activation](#)" on page 15).

6.3 RAID

PCI SATA controllers 5ACPCI.RAIC-01, 5ACPCI.RAIC-03, 5ACPCI.RAIC-05 and 5ACPCI.RAIC-06 are not supported due to missing drivers.

SATA RAID controllers on the APC910 and PPC900 with chipset QM77 are also not supported by Intel due to a missing driver and Control Panel support.

7 Troubleshooting

7.1 MLC CFast - Older revisions

Functionality of Windows 10 IoT Enterprise 2016 LTSC is only ensured with MLC CFast data storage media with Rev. D0 or later:

- 5CFAST.032G-10
- 5CFAST.064G-10
- 5CFAST.128G-10

7.2 Internet Connection Sharing (ICS)

The ICS function in Windows 10 IoT Enterprise 2016 LTSC only works correctly directly after configuration. After restarting the system, this is no longer the case; the ICS function must first be completely disabled and then reassigned.

This behavior occurs on Windows 10 IoT Enterprise 2016 LTSC as well as on Windows 10 1607 Build 14393 (Redstone 1). This problem is also present in Windows 10 Redstone 2 builds. With Windows 10 IoT Enterprise 2015 LTSC, ICS still works without problems.

The following workarounds are available to avoid having to manually re-enable the ICS function each time the system is restarted.

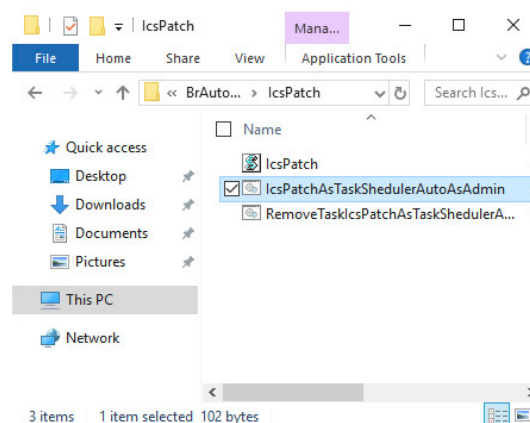
Information:

The ICS workaround should only be used if ICS has been enabled and problems were detected after a restart.

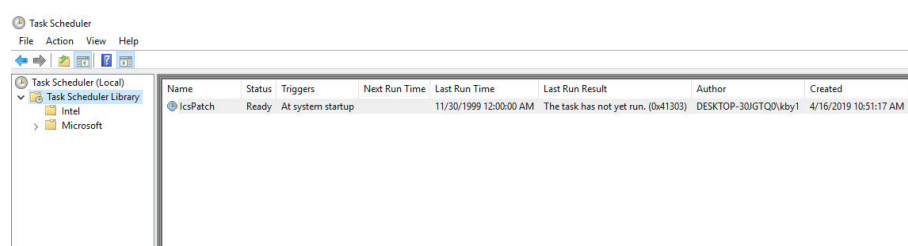
Images with OS builds less than 14393.2097 (B&R images V1.0.12 and V1.1.6)

The ICS function is disabled and re-enabled after each restart.

1. Open path *C:\Program Files (x86)\BrAutomation\IcsPatch*.
2. Execute file **IcsPatchAsTaskShedulerAutoAsAdmin.cmd** as an administrator.



3. Launch the **Task scheduler**.
4. Check whether the B&R ICS workaround was enabled:



To disable the ICS workaround again, relaunch file **RemoveTaskIcsPatchAsTaskShedulerAsAdmin.cmd** as an administrator.

Images with OS build 14393.2097 and later (B&R image V1.2.8 and later)

1. To resolve the problem, define the following registry subkey:

```
Path: HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\SharedAccess
Type: DWORD
Setting: EnableRebootPersistConnection
Value: 1
```

2. Change setting *ICS service startup mode* to **Automatic**.

7.3 Error when hiding the taskbar automatically

It is possible that error message *The memory could not be written* is displayed in Windows Explorer when the system is shut down or restarted. The error message occurs if option **Automatically hide the taskbar in desktop mode** is selected.

This is system-dependent behavior of Windows 10 IoT Enterprise 2016 LTSP.

To avoid this behavior, proceed as follows:

1. Open the *Turn system icons on or off* menu using the search function.
2. Disable option *Volume*.

7.4 Why is it not possible to install a Windows update?

Before installing a cumulative update from the Microsoft Update Catalog (<https://catalog.update.microsoft.com>), a servicing stack update (SSU) must be installed. The minimum SSU required for installing a cumulative update is described in the KB entry of the respective update.

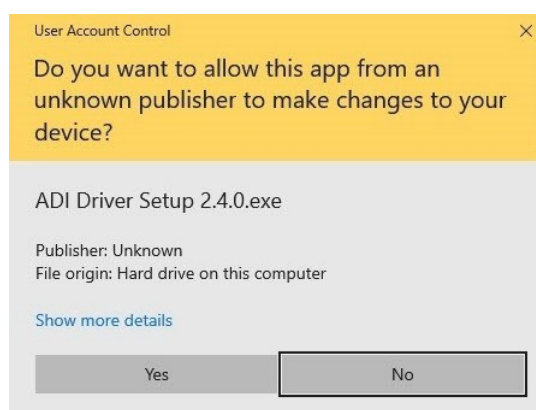
The latest SSU²⁾ is also available on the following website:

<https://portal.msrm.microsoft.com/en-us/security-guidance/advisory/ADV990001>

On systems with only a few free mass storage devices or little RAM, it may not be possible to install the cumulative update due to its size (free memory can be checked in the Task Manager while installing the Windows update). If there are enough free mass storage devices but only little RAM is available, a page file (recommended size at least 8 GB) can be used temporarily for installing the update.

7.5 Certificate for B&R software

It is possible that some B&R software is classified as untrusted due to new root certificates:



The necessary root certificates can be installed later using the "B&R Root Certificate Offline Installation" package. This package can be downloaded at no cost from the B&R website (www.br-automation.com).

²⁾ As of November 2020

8 Downloads

For Windows 10 IoT Enterprise 2016 LTSB, the following additional downloads are available on the B&R website (www.br-automation.com).³⁾

8.1 Documentation

- Windows 10 IoT Enterprise 2016 LTSB working guide
Describes how a B&R Windows 10 IoT Enterprise 2016 LTSB image can be customized.

8.2 Tools

- .NET Framework 3.5 offline installation
- B&R Root Certificate Offline Installation
Package for post-installation of necessary root certificates.
- UWF management
Dialog-guided software for configuring the Unified Write Filter.
- Windows 10 recovery solution
Tool for restoring Windows 10 IoT Enterprise 2016 LTSB on a B&R device. The Windows 10 recovery image (2016 LTSB) is available as a separate download.
- Windows 10 IoT Enterprise 2016 LTSB lockdown scripts
PowerShell scripts for configuring the following lockdown features: Shell Launcher, Unified Write Filter and Keyboard Filter.
- Windows Settings Changer
Dialog-guided software for changing Windows settings.

8.3 Drivers

The B&R standard image contains all drivers necessary for operation. If an older driver version is installed, the latest version can be downloaded and installed from the B&R website (www.br-automation.com). It is important to ensure that the Unified Write Filter (UWF) is disabled.

Information:

It is recommended that the installation is not performed until after the out-of-box experience (OOBE).
Only download necessary drivers from the B&R website, not from vendor websites!

³⁾ Some downloads require a login.