Windows 10 IoT Enterprise 2019 LTSC

User's manual

Version: **1.01 (April 2020)**

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1 Introduction

Information:

B&R makes every effort to keep documents as current possible. The most current versions can be downloaded from the B&R website (www.br-automation.com).

1.1 Manual history

Version	Date	Change
1.01	April 2020	• Added software version 1.0.6 (see V1.0.6).
1.00	September 2018	• First version

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.

Table 1: Organization of safety notices

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.

Table 2: Organization of general notices

2 System overview

2.1 Function description

B&R supports Windows 10 in the form of modified images based on Windows 10 IoT Enterprise 2019 LTSC.

Windows 10 IoT Enterprise 2019 LTSC is the successor to Windows 10 IoT Enterprise 2016 LTSB and based on new Windows 10 technology. The operating system offers a higher level of protection for industrial applications through additional lockdown functions. Windows 10 IoT Enterprise 2019 LTSC is a special version of Windows 10 Enterprise for industrial use (Long-Term Servicing Channel) and based on Windows 10 Build 17763 (1809).

Tip:

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

LTSC (Long-Term Servicing Channel) 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 2019 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 2019 LTSC on the following devices:

- Automation PC 910 (APC910 with HM170/QM170/CM236 chip set)
- Automation PC 2200 (APC2200)
- Automation PC 3100 (APC3100)
- Panel PC 2200 (PPC2200)
- Panel PC 3100 (PPC3100)

2.3 Features

Windows 10 IoT Enterprise 2019 LTSC supports the following Microsoft features:

Features	Windows 10 IoT Enterprise 2019 LTSC
Range of functions in Windows 10 Enterprise	✓
Internet Explorer 11 (including Enterprise Mode)	✓
Windows Touch	✓
Multilingual support	With language packs (default: English)
Page file	Configurable (default: disabled by UWF)
Hibernate file	Configurable (default: disabled)
System restore	Configurable (default: disabled by UWF)
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 2019 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSC version is based on build 17763 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 2019 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

Model number	Short description
5SWW10.0900-MUL	W10IoT E 2019 64b
5SWW10.1000-MUL	W10IoT V 2019 64b
5SWW10.1100-MUL	W10IoT H 2019 64b

Three difference licenses are available for Windows 10 IoT Enterprise 2019 LTSC depending on the CPU performance class used. Windows 10 provides the same functionality for all licenses.

License	Code (short form)	CPUs
Entry	W10IoT E 2019 …	Intel Atom
Value	W10IoT V 2019 …	Intel Celeron and Core i3/i5
High End	W10IoT H 2019 …	Intel Core i7 and Xeon E3

2.5 Version overview

The following table shows the assignment of B&R standard images to the B&R Windows 10 IoT Enterprise 2019 LTSC version used:

Model number	Module number	Revision	Version
5SWW10.0900-MUL	W10IoT E 2019 64b	C0	V1.0.6
5SWW10.1000-MUL	W10IoT V 2019 64b	C0	V1.0.6
5SWW10.1100-MUL	W10IoT H 2019 64b	C0	V1.0.6

2.5.1 V1.0.6

Supported devices:

- Automation PC 910 (APC910 with HM170/QM170/CM236 chip set)
- Automation PC 2200 (APC2200)
- Automation PC 3100 (APC3100)
- Panel PC 2200 (PPC2200)
- Panel PC 3100 (PPC3100)

The following B&R standard images are based on B&R Windows 10 IoT Enterprise 2019 LTSC version B1.0.6:

Order number	Order number	Revision	Version
5SWW10.0900-MUL	W10IoT E 2019 64b	C0	V1.0.6
5SWW10.1000-MUL	W10IoT V 2019 64b	C0	V1.0.6
5SWW10.1100-MUL	W10IoT H 2019 64b	C0	V1.0.6

Version history:

```
-------------------------------------------------------------------
Version V1.0.6 / 03.06.2019 / ROG
-------------------------------------------------------------------
- Folgende Microsoft QFEs (WinVer 17763.529) sind installiert:
  +KB4480056,4495590,4495618,4462930,4497932,4497934,4499728
- Zusätzliche inkludierte Treiber:
  +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 V11.8.60.3561_2
  +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 V25.20.100.6615
  +Graphics QM77_BYT V15.33.48.64.5069
  +Network Intel_82573_574_567_579_I210_I219 V23.5.2
  +RapStorTech HM170_QM170_CM236_KBU V15.9.6.1044
  +UniversalADI APC910_PPC900 V2.1.1
  +UniversalADI APC2200_PPC2200 V2.1.1
  +UniversalADI APC2100_PPC2100 V2.1.1
  +UniversalADI APC3100_PPC3100 V2.1.1
  +Touch Treiber V1.4.3
```

2.5.2 Version B1.0.5

Supported devices:

- Automation PC 910 (APC910 with HM170/QM170/CM236 chip set)
- Automation PC 2200 (APC2200)
- Automation PC 3100 (APC3100)
- Panel PC 2200 (PPC2200)
- Panel PC 3100 (PPC3100)

The following B&R standard images are based on B&R Windows 10 IoT Enterprise 2019 LTSC version B1.0.5:

Model number	Module number	Revision	Version
5SWW10.0900-MUL	W10IoT E 2019 64b	A0	B1.0.5
5SWW10.1000-MUL	W10IoT V 2019 64b	A0	B1.0.5
5SWW10.1100-MUL	W10IoT H 2019 64b	A0	B1.0.5

Version history:

```
-------------------------------------------------------------------
Version B1.0.5 / 24.04.2019 / ROG
-------------------------------------------------------------------
- The following QFEs (WinVer 17763.437) are installed:
  +KB4480056,KB4486553,KB4462930,KB4483452,KB4493478,KB4493509
- Additional included drivers:
  +Audio Realtek HDA 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 V11.8.60.3561_2
  +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 V25.20.100.6615
  +Graphics QM77_BYT V15.33.48.64.5069
  +Network Intel_82573_574_567_579_I210_I219 V23.5.2
  +RapStorTech HM170_QM170_CM236_KBU V15.9.6.1044
  +UniversalADI APC910_PPC900 V2.0
  +UniversalADI APC2200_PPC2200 V2.0
  +UniversalADI APC2100_PPC2100 V2.0
  +UniversalADI APC3100_PPC3100 V2.0
  +Touch Treiber V1.4.3
```

2.6 System requirements

2.6.1 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.

2.6.2 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 2019 LTSC is only ensured with MLC CFast data storage media with Rev. D0 or later: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10.**

2.6.3 Display

Windows 10 IoT Enterprise 2019 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 the B&R touch screen driver. This is already included in the 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 2019 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 2019 LTSC has better support for multi-touch devices:

- Multi-touch operation is possible without delay after login.
- In a "customized shell", the multi-touch operation is also immediately possible.

3 Installation

B&R installs and activates Windows 10 IoT Enterprise 2019 LTSC 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 settings (e.g. language, region, keyboard, computer name, username, etc.).

The operating system is now only installed in UEFI mode.

The data storage medium containing the Windows partition is formatted as a GUID Partition Table (GPT) file system in UEFI mode. 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.

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 2019 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 2019 LTSC working guide**).

4.5 Defining the password

B&R standard images are configured so that a password can be set for the created user during the initial startup.

If both Windows 10 IoT Enterprise 2019 LTSC and Windows 10 1809 Build 17763 (Redstone 5) assign a password to a local user, three security questions must be defined.

It is not possible to change this. Windows 10 Build 18237 or later includes a group policy that allows this function to be switched off: **Prevent the use of security questions for local accounts**.

As a workaround, it is recommended to assign the password after the initial switch on (with Windows 10 IoT Enterprise 2019 LTSC):

1. Open menu **Start / Settings / Account / Sign-in options**.
2. Press the "Add" button in section "Password".
3. Enter a **password hint**.

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

Like Windows 10 IoT Enterprise 2016 LTSB, Windows 10 IoT Enterprise 2019 LTSC is multilingual and offers a wide range of languages to choose from (including those with 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

The supported languages are available from B&R as an extra download **(Windows 10 IoT Enterprise 2019 LTSC language pack**). Installing languages later is described in the **Windows 10 IoT Enterprise 2019 LTSC working guide**. This can also be downloaded from the B&R website (www.br-automation.com).

6 Operation

6.1 Activation

Windows 10 IoT Enterprise 2019 LTSC behaves similar to Windows 10 IoT Enterprise 2016 LTSB 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.

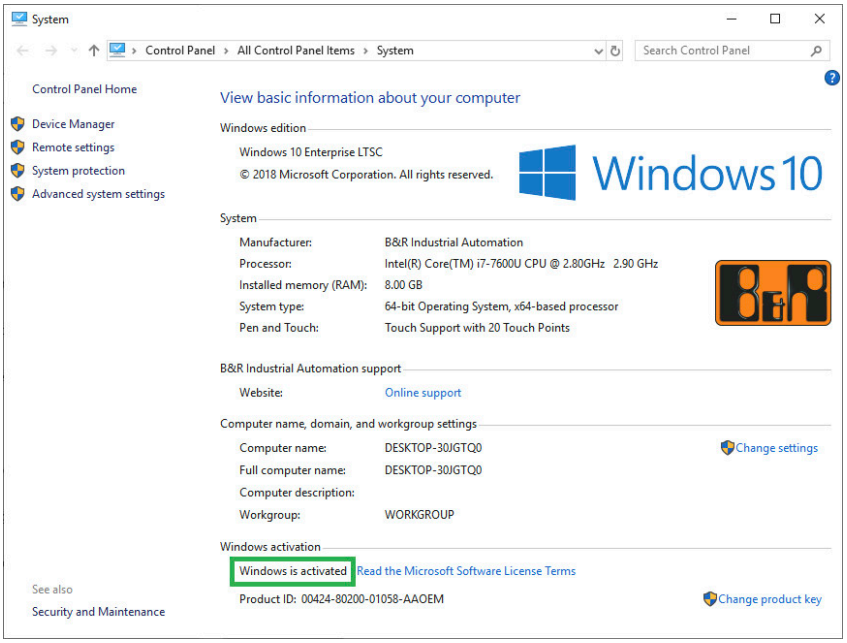
However, the described case can only be guaranteed if the system does not establish a network connection to other systems at any time. If a network connection is temporarily or permanently available, Windows 10 IoT Enterprise 2019 LTSC tries to establish an Internet connection cyclically so that activation 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 LTSB) 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 2019 LTSC. However, it cannot be ruled out that it could occur again in the future.

To prevent this behavior from occurring, B&R delivers standard images for Windows 10 IoT Enterprise 2019 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 2019 LTSC working guide**.

If activation by telephone or online connection is not possible, it is recommended to contact B&R Support.

6.2 Hypervisor

To share the MTCX with Windows and Automation Runtime, the hypervisor mode of the ADI driver must be activated (see **ADI driver user's manual**). An ADI driver V2.0 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.

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.

7 Troubleshooting

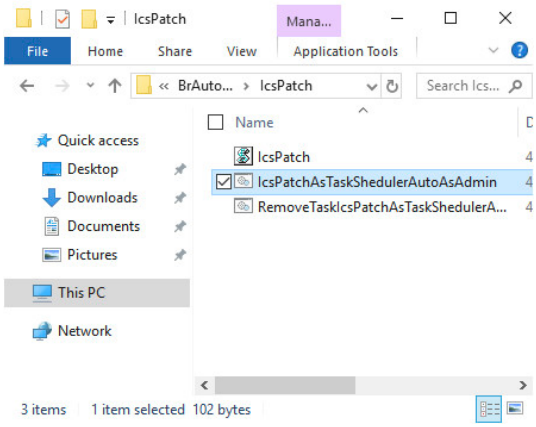
7.1 Internet Connection Sharing (ICS)

The ICS function in Windows 10 IoT Enterprise 2019 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.

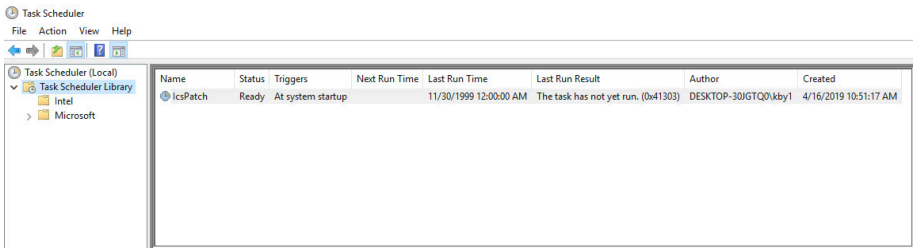
This behavior occurs with Windows 10 IoT Enterprise 2019 LTSC as well as with Windows 10 1809 Build 17763 (Redstone 5) and could already be observed with the previous version (Windows 10 IoT Enterprise 2016 LTSB). With Windows 10 IoT Enterprise 2015 LTSB, this problem did not yet exist.

B&R has developed a workaround to avoid having to manually re-enable the ICS function each time the system is restarted. This automatically disables and enables the ICS function after each restart. To enable the workaround, proceed as follows:

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:

Information:

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

7.2 Device performance & health

If the system cannot establish an online connection, status "Device performance & health" under **Start / Settings / System / About** is not marked with a green check mark.

7.3 Account protection

If the system cannot establish an online connection, status "Account protection" is marked with a yellow warning triangle under **Start / Settings / System / About**.

8 Downloads

For Windows 10 IoT Enterprise 2019 LTSC, the following additional downloads are made available on the B&R website (www.br-automation.com).[1)]

8.1 Documentation

- Windows 10 IoT Enterprise 2019 LTSC working guide
  Describes how a B&R Windows 10 IoT Enterprise 2019 LTSC image can be customized.

8.2 Tools

- .NET Framework 3.5 offline installation
- UWF management
  Dialog-guided software for configuring the Unified Write Filter.
- Windows 10 recovery solution
  ISO file for restoring a B&R Windows 10 IoT Enterprise 2019 LTSC image to a B&R device.
- Windows 10 IoT Enterprise 2019 LTSC language packs
- Windows 10 IoT Enterprise 2019 LTSC 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

Information:

Required drivers (e.g. for optional components such as CAN interface cards), as well as the latest driver versions must be downloaded from the B&R website (www.br-automation.com), not from manufacturer websites!

During installation, make sure that the Unified Write Filter (UWF) is deactivated.

1) Some downloads require a login.

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