

# BECKHOFF New Automation Technology

Manual | EN

## IPC OS Overview





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# 1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

The following instructions and explanations must be followed during installation and commissioning of the components. The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

## Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation. All illustrations shown are only examples. The configurations depicted may deviate from the standard.

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The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 and similar applications and registrations in several other countries.

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## Delivery state

All the components are supplied in particular hardware and software configurations appropriate for the application. Changes to the hardware or software configuration are permitted, provided they are within the specified limits for power consumption and power loss (please refer to the respective data sheet).

## Delivery conditions

In addition, the general delivery conditions of the company Beckhoff Automation GmbH & Co. KG apply.

## 2 Overview

Beckhoff does not develop stand-alone Windows operating systems but creates images of them. This means, that Beckhoff configures Windows operating systems that were previously installed on a disk according to industrial requirements to provide them to customers. The images must offer a stable basis for real-time applications in TwinCAT automation software. Beckhoff therefore only integrates software components into its images that meet these requirements and subjects them to strict test scenarios. This ensures that the images run reliably. As the Windows versions used in Beckhoff images are procured from the so-called Long Term Servicing channel, they have constant properties and are not subject to feature upgrades.

### Stability and real-time capability

Only tested driver and software components that are regularly subjected to intensive real-time and functional tests are integrated in Beckhoff images. The drivers are optimally matched to the Beckhoff hardware. All settings in the operating system are adapted to the use of TwinCAT. This optimizes the real-time capability of the controller and minimizes machine downtime.

Table 1: Available operating systems at Beckhoff

Operating system	Feature information
<b>Windows 10</b>	
Windows 10 IoT Enterprise 2016 LTSC	<a href="#">New and updated features</a>
Windows 10 IoT Enterprise 2019 LTSC	<a href="#">New and updated features</a>
Windows 10 IoT Enterprise 2021 LTSC	<a href="#">New and updated features</a>
<b>Windows Server</b>	
Windows Server 2016	<a href="#">New and updated features</a>
Windows Server 2019	<a href="#">New and updated features</a>
<b>Windows 7</b>	
Windows 7 Professional	<a href="#">New and updated features</a>
Windows 7 Ultimate	<a href="#">New and updated features</a>
Windows Embedded Standard 7	
<b>Windows Embedded Compact</b>	
Windows Embedded Compact 7	
<b>Beckhoff</b>	
TwinCAT/BSD	<a href="#">General information and features</a>

## 2.1 Long Term Servicing Channel

Beckhoff distributes Microsoft Windows 10 IoT Enterprise from the LTSC/LTSB channel only. The renaming from LTSB (Long Term Servicing Branch) to LTSC (Long Term Servicing Channel) by Microsoft is only for marketing purposes.

LTSC are versions of operating systems (OS) from Microsoft designed for the use in embedded systems. These OS versions are designed for embedded devices targeting a wide market, ranging from small-footprint, real-time devices used in Industrial Controllers or HMI panels. LTSC operating systems are available to OEM (original equipment manufacturer) system builders, who make it available to end users preloaded with the hardware.

### LTSB/LTSC vs CBB/SAC

The following graph illustrates the differences between Beckhoff LTSC and SAC (Semi Annual Channel, previously named CBB – Current Branch for Business).

The Windows versions seen in the following graph consist of the following parts:

- **Windows Version: 1607**
- Release year: 2016
- Release month/half year: July (07)/second half year (H2)

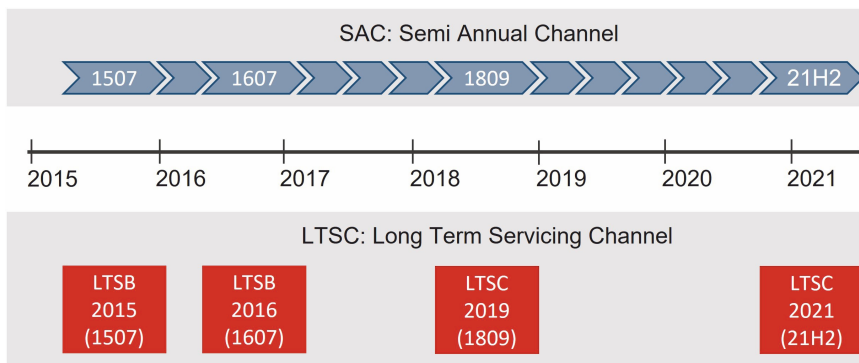


Fig. 1: LTSC vs SAC

As of February 2022, in SAC the updates to new Windows versions are performed automatically. In LTSB/LTSC is no upgrade to new release versions and there are no feature upgrades within the same version. LTSB/LTSC also has no update obligation for security and quality updates (more information [here](#)).

Each LTSB/LTSC version is a stand-alone operating system and not an update of a previous version. Thus, they are not license compatible (more information [here](#)).

Beckhoff distributes the following versions:

Table 2: Windows versions at Beckhoff

Windows version	OS build
Microsoft Windows 10 IoT Enterprise 2016 LTSB: 1607	14393.xxxx
Microsoft Windows 10 IoT Enterprise 2019 LTSC: 1809	17763.xxxx
Microsoft Windows 10 IoT Enterprise 2021 LTSC: 21H2	19044.xxxx

Both versions coexist. Customers can still get the same version used before.

## LTSB/LTSC as an “Industrial” operating system

LTSB/LTSC images come with advantages for the industrial field. They mainly consist of the following (status February 2022):

- no update and upgrade obligation
- no Store, Edge or Cortana
- embedded enabling features allowing to protect with write filters: storage media (protect storage media), registry (read/write access), popup dialog filter, keyboard filter
- scalable pricing, dependent on the CPU performance
- longer support compared to Professional family, longer availability

## 2.2 Lifecycle

### Microsoft Lifecycle Policy

Microsoft has clearly defined a lifecycle policy for operating systems (see [here](#)). A difference is made between a modern and a fixed policy, depending on the type of operating system. The operating systems distributed by Beckhoff are subject to the fixed policy. Operating systems in the fixed policy are always assigned to one of the following lifecycle phases:

- Mainstream Support
- Extended Support
- Beyond End of Support

Each lifecycle phase provides a different type of support. You can get an overview of these types [here](#). In the following, the types of support are described briefly:

*Table 3: Type of support in lifecycle phases*

Lifecycle phase	Type of support
Mainstream Support	Requests to change product design and features, security updates and non-security updates
Extended Support	Security updates, non-security updates are no longer available free of charge and on a regular base
Beyond End of Support	Security and non-security updates are no longer available free of charge and on a regular base

Beckhoff provides an up-to-date [overview](#) of the availability of operating systems used and distributed by Beckhoff in Industrial PCs.



## Finding Microsoft lifecycle information

You can find the individual support dates that apply to the available operating systems on the [Microsoft website](#) in the product search section. The support dates include the start date of the operating system and the end dates of the lifecycle phases.

In the following you will find the steps to find the support dates of your operating system. Windows 10 IoT Enterprise 2019 LTSC is used as an example:

1. Enter the [Search by Product](#) page (see fig. 2).

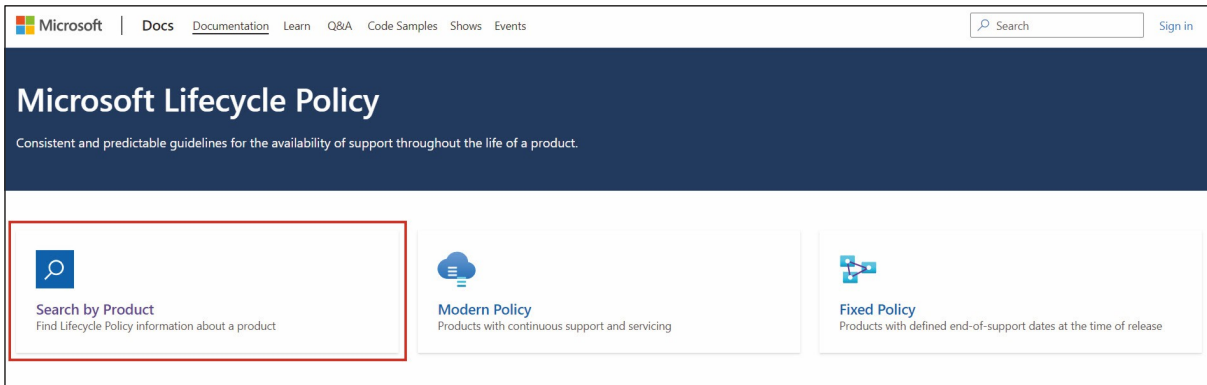


Fig. 2: Search by Product

2. Search for your operating system (see fig. 3).

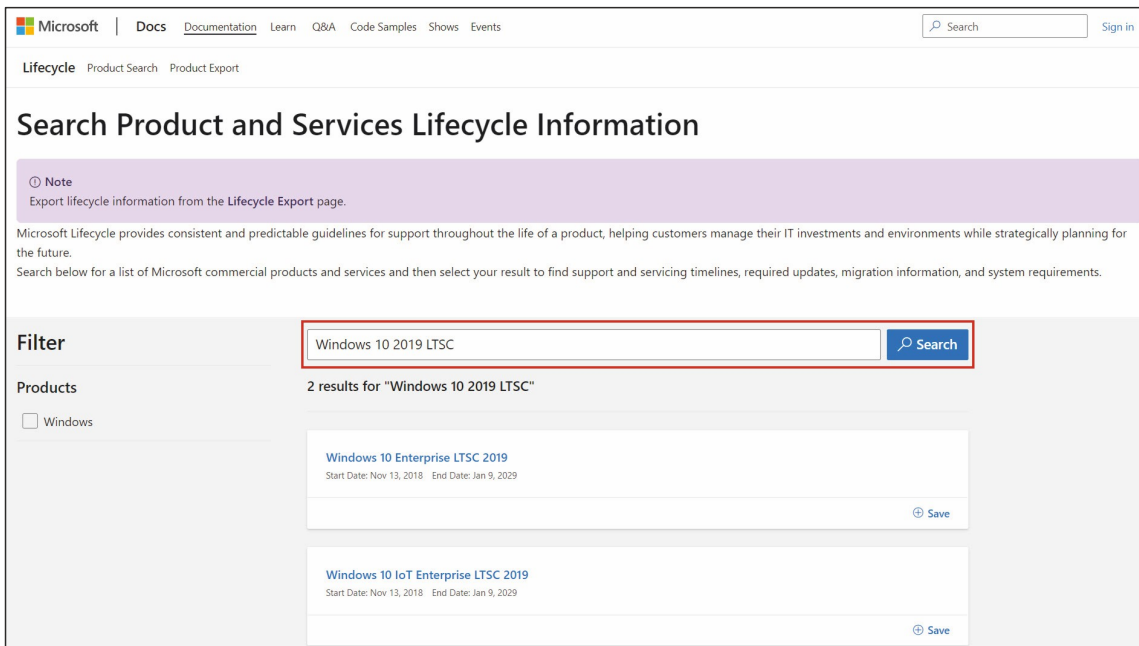


Fig. 3: Search for operating system

3. Look up the support dates (see fig. 4).

The screenshot shows the Microsoft Docs page for Windows 10 IoT Enterprise LTSC 2019. The page title is "Windows 10 IoT Enterprise LTSC 2019". Below the title, it states "Windows 10 IoT Enterprise LTSC 2019 follows the Fixed Lifecycle Policy." A purple box contains the text "Support dates are shown in the Pacific Time Zone (PT) - Redmond, WA, USA." Below this is a table titled "Support Dates" with the following data:

Listing	Start Date	Mainstream End Date	Extended End Date
Windows 10 IoT Enterprise LTSC 2019	Nov 13, 2018	Jan 9, 2024	Jan 9, 2029

Fig. 4: Support dates

## 3 Windows security

This chapter provides information on how to increase the security of Industrial PCs by making Windows security updates and using Trusted Platform Modules (TPM). Windows operating systems already provide some features that help to increase the security of the operating system. You can get more information in the [IPC Security Guideline](#).

### 3.1 Security updates

Beckhoff is not responsible for any side effects negatively affecting the real-time capabilities of your TwinCAT control application possibly caused by updates. Beckhoff offers update images with qualified performance for Beckhoff hardware. The TwinCAT System Manager offers tools, which can be of assistance to verify real-time performance after an update. We recommend creating a security backup of the image before patching the system. Only administrators or IT experts should perform the backup and update procedure.

Because of the differences in making Windows updates with an Industrial PC and making them with a traditional office PC, this chapter describes the structure and handling of Windows security updates on Beckhoff Industrial PCs.

#### Structure of Windows updates

Among the operating system versions distributed by Beckhoff, only Windows 10 is provided with regular security updates by Microsoft (status February 2022). A Microsoft Windows 10 IoT Enterprise update state consists of a servicing stack update (tool collection for Windows update service), a cumulative update (includes each previous update) and a few additional updates. New updates are released on every second Tuesday each month. This day is called *patch day*.

#### Testing Windows updates

Microsoft patches its operating systems by Windows updates, which improve the quality and extend the lifetime of the software. Negative side effects on the functionality and real-time capability of TwinCAT are possible. Therefore, we are checking all updates for compatibility with TwinCAT before integrating them in our images.

#### Release of information

Regularly, Beckhoff patches its standard images with the newest Windows updates and raises the service and production images to the current security state (that is released by Microsoft). Additionally, customers would like to update their IPCs that are already in the field. Beckhoff communicates the latest update test results as follows:

If an update passes the test successfully it gets the status “Beckhoff approved”. Beckhoff informs its customers about the approved updates, for each operating system individually. As of February 2022, the cumulative update of one month (if available also the cumulative .NET framework update) and the current servicing stack update are included. Beckhoff does not publish a history of updates from previous months. Beckhoff always tests with the latest TwinCAT build but does not guarantee compatibility to older TwinCAT builds. Please contact Beckhoff to be informed regularly about successfully tested updates.

#### Installation of Windows updates

The installation of Windows updates requires a running Windows update service. This service is disabled in some Beckhoff standard images by default. After a successful update process you should disable automatic updates to prevent potential negative side effects of Windows security updates on the system.

### 3.2 TPM in Windows systems

The Trusted Platform Module (TPM) is designed to increase the security of a software system through hardware. Devices with a TPM are extended with basic security features. Among other features, this enables encryption of the user data and thus prevents unauthorized read access while the device is switched off. Unauthorized manipulation of the software is also prevented.

Beckhoff implements Firmware TPMs (fTPM), where the main CPU features a complementary microcode to represent the function of the TPM.

The use of a fTPM on a Beckhoff Industrial PC requires:

- UEFI BIOS
- 64-bit Windows 10 version 1809 or higher

You can get further information about Trusted Platform Modules in this [manual](#).

## 4 Provision of a Beckhoff Image

Beckhoff provides several images of Windows operating systems. To use the images, they must be installed and activated. Microsoft provides security updates for Windows to increase the security of an Industrial PC (see chapter 2 [Windows security](#) [► 11]) but they are not available for all operating systems. This can be the reason to switch to a newer operating system. In that case, you need a license upgrade. Afterwards, you can get and install a Beckhoff image of the newer operating system from the Beckhoff service department.

### 4.1 License upgrade

To run an IPC after changing the operating system, a license upgrade is necessary. The Beckhoff service department issues license upgrades upon request. The procedure is as follows:

1. Contact the Beckhoff service department ([service@beckhoff.com](mailto:service@beckhoff.com)).
2. The service department sends the corresponding form to you (see fig. 5).
3. Fill out the form and send it back to the service department.
4. The service department provides the image via email and the license sticker via post.
5. Attach the license sticker to the device. The license can be clearly assigned to the corresponding device.
6. Install the new service image (see chapter 4.2 [Installation](#) [► 13]).

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Upgrade of Windows Software for Beckhoff Products

Form sheet for Upgrade of Windows Software for Beckhoff Products

Customer (Address) \_\_\_\_\_

Order to Upgrade / Downgrade Windows versions via image exchange

From: \_\_\_\_\_

To: \_\_\_\_\_

For Products as identified below

Products (please fill)	Product Name	Serial Number	MPC ID

Fig. 5: License upgrade form sheet

### 4.2 Installation

Beckhoff service images are supplied in a specific backup format: the tib format. This format belongs to the backup and recovery solution Acronis Backup 11.7. You can restore an image to a storage medium or a single partition. The Beckhoff Service Tool (BST) is a tool including Acronis Backup for reliable installation of a Beckhoff image. You can use this function in the event of an error, to perform a license upgrade (see chapter 4.1 [License upgrade](#) [► 13]) or to create PC systems with identical configurations and settings.

You can get all the detailed information on how to create and restore images via the Beckhoff Service Tool in our [Information System](#).

## 4.3 Windows 10 activation

All Windows IoT Enterprise operating systems must be prepared for activation. Every Beckhoff IPC with a preinstalled Windows 10 IoT Enterprise is already activated ex-factory. The devices are connected to the Microsoft activation verification server via an internet during the deployment process. After a successful activation a connection to the internet is no longer necessary.

You can look up the activation state of the device in the Windows computer description (see fig. 6).

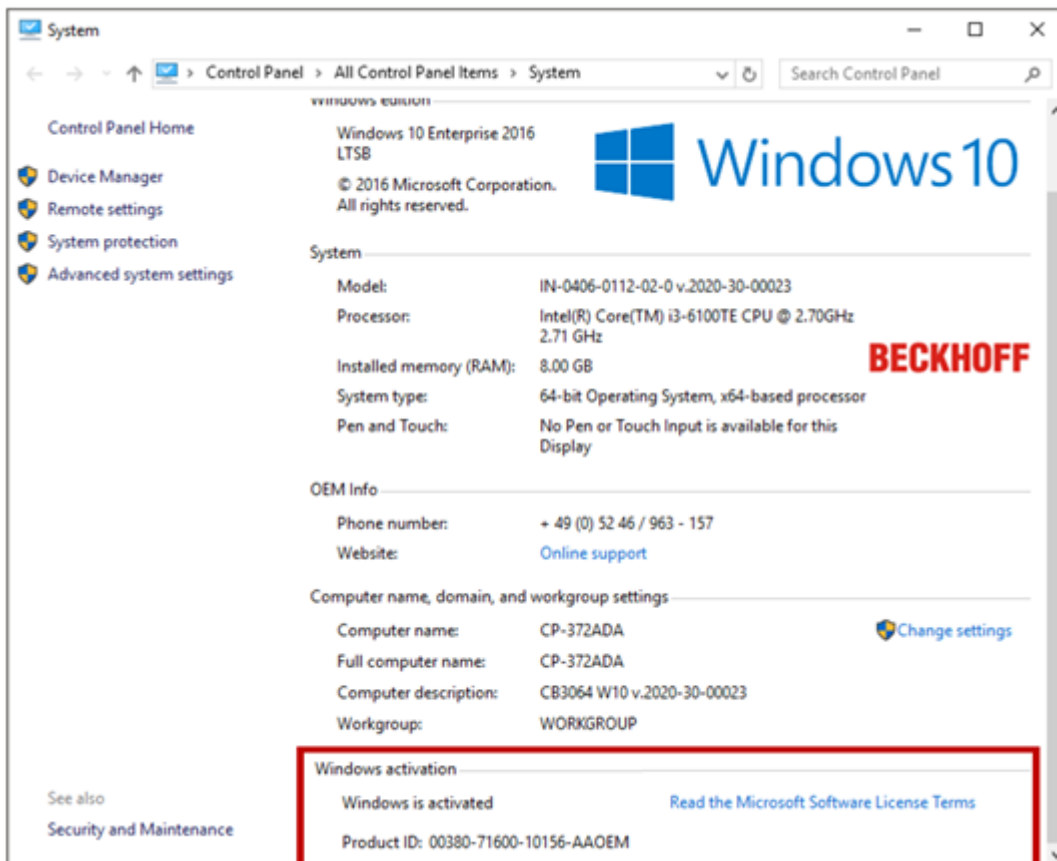


Fig. 6: Activation state

The Windows 10 activation can take three different states:

- Activated: The device had contact with the Microsoft activation verification server via an internet connection and was automatically activated. The system is fully functional.
- Deferred activation: The device is not connected to the internet. It will remain in a deferred activation state. The System is fully functional.
- Not activated: The device had contact with the Microsoft activation verification server via an internet connection and the activation failed. Get in contact with the Beckhoff service department ([service@beckhoff.com](mailto:service@beckhoff.com)). The functionality of the system is limited, and a watermark will appear.

After the device has been activated it remains activated. Only a significant system change (e.g. a replacement of the motherboard) requires a new system activation.

## 5 Service and support

Beckhoff and its worldwide branch offices offer comprehensive service and support, providing fast and competent assistance with all issues relating to Beckhoff products and system solutions.

### Beckhoff Service

The Beckhoff Service Centre supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: + 49 (0) 5246/963-460

Fax: + 49 (0) 5246/963-479

e-mail: [service@beckhoff.com](mailto:service@beckhoff.com)

If servicing is required, please quote the serial number of your Industrial PC, which can be found on the name plate.

### Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- World-wide support
- design, programming and commissioning of complex automation systems
- extensive training program for Beckhoff system components

Hotline: + 49 (0) 5246/963-157

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e-mail: [support@beckhoff.com](mailto:support@beckhoff.com)

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The addresses of the worldwide Beckhoff branch offices and agencies can be found on our website at <http://www.beckhoff.com/>.

You will also find further documentation for Beckhoff components there.

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