KINGSTAR 4.1

SDK

INSTALLATION GUIDE

KS-DOC-x64-0037-R02

IntervalZero

KINGSTAR IntervalZero

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KINGSTAR

KINGSTAR provides two installations: a Runtime and a Software Development Kit (SDK). The Runtime supplies the KINGSTAR Subsystem that will be deployed as part of your application, while the SDK supplies headers and libraries for you to develop your own KINGSTAR applications.

KINGSTAR Software Development Kits (SDK) contains:

- Headers and libraries used to develop KINGSTAR applications.
- Support the following developer tools: Visual Studio 2019 and 2017. 2019 is preferred.
- Source code for sample applications.

Product editions and requirements

The difference between product editions and the hardware, software requirements for KINGSTAR are listed below.

Product editions

The features of the product depends on the licenses you purchase. To learn more about the KINGSTAR licenses, see KINGSTAR Runtime components.

Hardware requirements

This section lists hardware requirements for KINGSTAR and the considerations about processors.

Drives and I/O

KINGSTAR supports many servo drives, stepper drives, EtherCAT I/O modules and EtherCAT couplers. For the up-to date list, see the KINGSTAR Supported Hardware PDF file at kingstar.com.

Network interface card (NIC)

KINGSTAR requires a dedicated NIC. The NIC is configured when the Install Wizard is run. For the up-to-date list, see Network interface cards, or the PDF file at kingstar.com.

EtherCAT

KINGSTAR uses EtherCAT technology for communication. Do the following to set up the EtherCAT network:

1. Make sure your computer and devices have the network interface cards (NICs) or chips that support the EtherCAT protocol. To know whether the hardware supports EtherCAT:

- Computers: in Windows, go to **Device Manager** and find the NIC under **Network adapters**. Make a note of the model number of the NIC. Check the KINGSTAR online help from kingstar.com > **Support** > **KINGSTAR 4.x Help** > **Network interface cards**, or check the offline help by clicking Start > **KINGSTAR 4.1 Runtime** > **Help System** > **Network interface cards**. If your NIC is listed in the document, it supports EtherCAT.
- Devices: see the manual of your device, or contact the device manufacturer.

2. Prepare the Ethernet cables that are CAT-5 (Category 5) or higher. The transmission rate needs to be at least 100 Mbps.
3. Connect your computer and devices using the Ethernet cables.

Technically, the EtherCAT protocol allows up to 65,535 devices to be connected, but rarely an EtherCAT master supports such many devices, which take large memory. By default, KINGSTAR supports up to 256 devices, but you can increase the maximum number of supported devices by adding a registry key. For more information about how to increase the maximum number, see **Product TechNotes** > **KINGSTAR Fieldbus** > **General** > **Increase the maximum number of supported devices**.

Product TechNotes is on the KINGSTAR website. Go to **Support** >**Support Login**.

Hardware considerations

KINGSTAR requires a multiprocessor platform that supports 64-bit Windows 10 with Update and Windows 10 IoT Enterprise. Uniprocessor systems are not supported. At minimum, two cores are required; one core must be dedicated to Windows and another core must be dedicated to the KINGSTAR Subsystem. Systems with up to 64 cores are supported.

NOTE: If your system is hyper-threaded, you should assign an even number of processors between Windows and KINGSTAR real-time components. The Windows logical processor and real-time logical processor must not share the same physical processor.

Some hardware configurations are not supported by the KINGSTAR Runtime installations. Although KINGSTAR runs on most x64 platforms, unique attributes of some processors require special consideration before using them in your system.

- For a comprehensive list of approved and supported hardware, see the Windows hardware certification web page:

  https://docs.microsoft.com/en-us/windows-hardware/drivers/dashboard/windows-certified-products-list

- For a comprehensive list of system requirements for Windows 10, see the Windows 10 System Requirements web page:

  https://www.microsoft.com/en-us/windows/windows-10-specifications

Software requirements

This section lists software requirements for KINGSTAR and things to know before you install the software.

Operating system requirements

KINGSTAR are supported on 64-bit multiprocessor configurations for the following operating systems:

- Windows 10 October 2020 Update Version 2009
- Windows 10 May 2020 Update Version 2004
- Windows 10 November 2019 Update Version 1909
- Windows 10 May 2019 Update Version 1903
- Windows 10 November 2018 Update Version 1809
- Windows 10 IoT Enterprise Long Term Servicing Channel (LTSC) Version 1607

Microsoft Visual Studio

Microsoft Visual Studio 2019 or 2017 must be installed in your system if you want to develop KINGSTAR applications. For KINGSTAR 4.x, Visual Studio 2019 is preferred.

Microsoft .NET Framework

Microsoft .NET Framework 4.7.2 is required. If the client is not detected, the Install Wizard installs the client for you.

Real-Time Software Development Kit

KINGSTAR SDK is required for KINGSTAR application development.

Administrator privileges

Administrator privileges are required for installing and uninstalling the KINGSTAR, which provides local Windows Groups to control user access to KINGSTAR features. By default, all users can access the KINGSTAR features. You should modify groups to limit the access to specific users.

Request a free trial

For access to evaluation kits, go to http://kingstar.com/download-trial/. In the form that appears, select KINGSTAR from the product choices, fill out the contact information, and then click **Request Trial**.

Install KINGSTAR SDK

After purchasing KINGSTAR SDK, you will receive an email confirmation that includes the activation key and a link to the KINGSTAR download page. After downloading the file, complete the steps that follow to install KINGSTAR SDK.

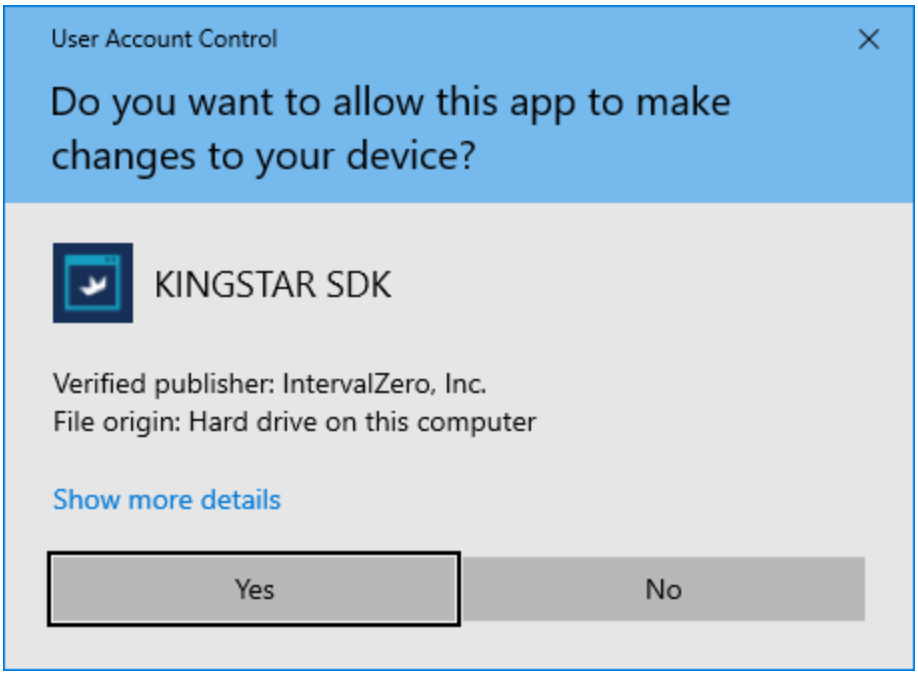
NOTE: If you are using Visual Studio as your development environment and you want to create your application in the RT interface, you need to install Visual Studio before you install SDK. KINGSTAR will find the installation path of Visual Studio and install RTX64 extensions for Visual Studio automatically. If you install SDK first, you need to install RTX64 extensions manually: go to `C:\Program Files\IntervalZero\KINGSTAR SDK\<Version Number>\VSExtensions`. Double-click `RTXProjectWizard.vsix` to install the RTX64 templates.

NOTE: If you are using Visual Studio 2019 and the `RTXProjectWizard.vsix` installation is failed, double-click `RTX64VSSupport.vsix`, which installs RTX64 files for Visual Studio.

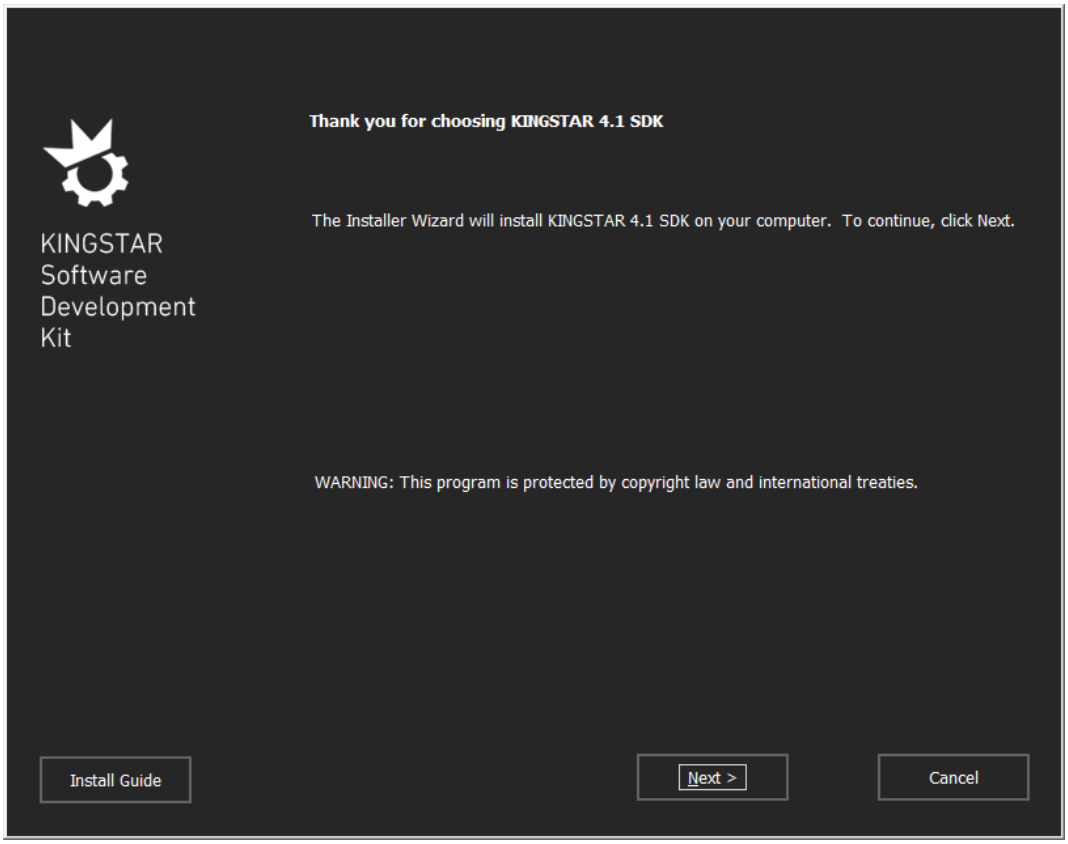
NOTE: If you have installed KINGSTAR SDK 4.0, you can upgrade directly using the installer of the latest version. If you have installed 3.x or earlier versions of KINGSTAR SDK, it can co-exist with 4.x.

1. Double-click `KINGSTARSDKInstaller.exe`.

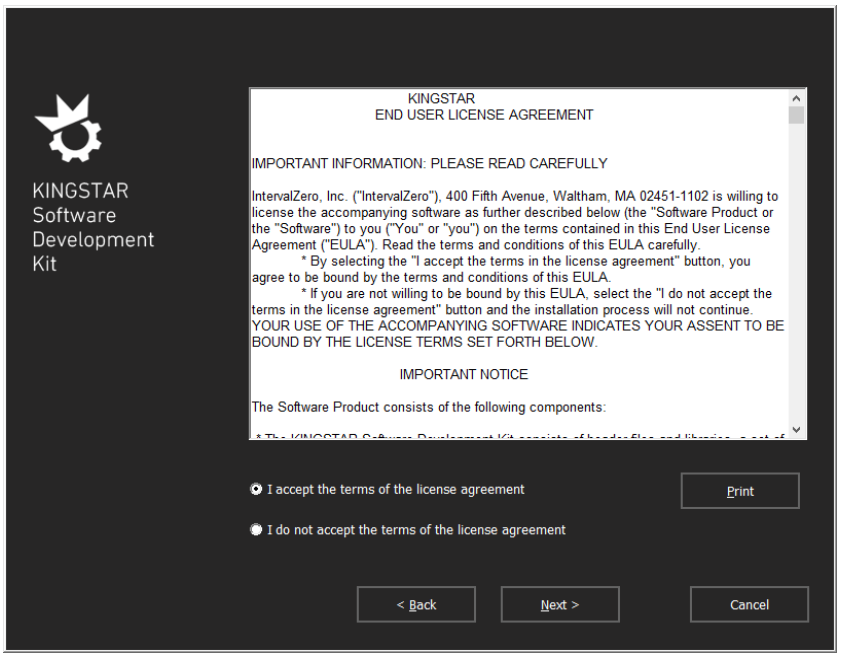
   NOTE: You must have the administrator permission to install KINGSTAR SDK. Before the installation begins, the **User Account Control** dialog box may ask if you want the installer to make changes to your device. Click **Yes** to continue the installation.



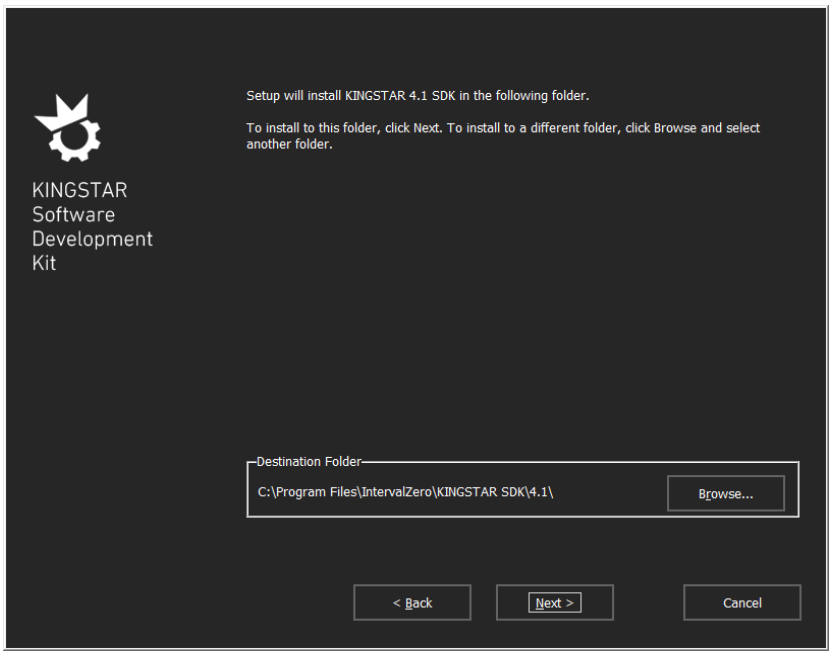
2. On the installation page, click **Next** to begin the installation.



3. Read the End User License Agreement, select **I accept the terms of the license agreement** and click **Next**.

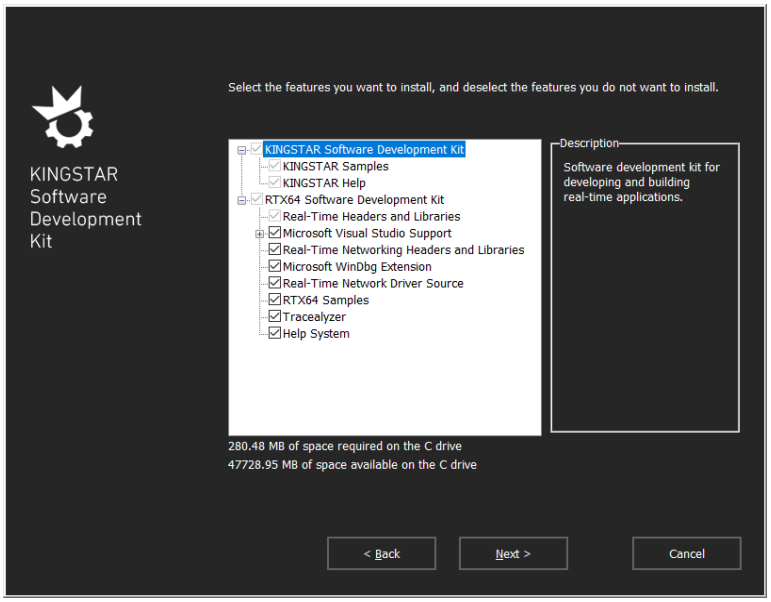


4. Choose the location you want to install KINGSTAR SDK. You can accept the default installation path, or click **Browse** to choose a different location. When you are done, click **Next**.

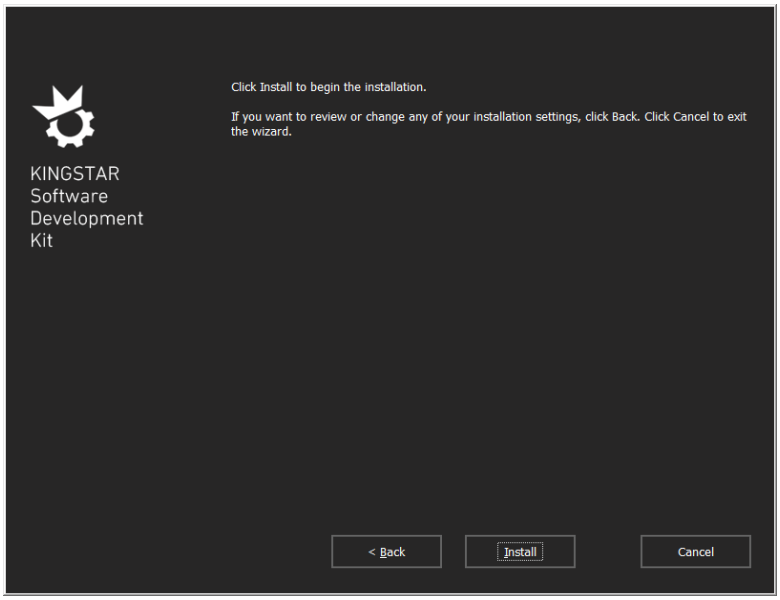


5. Expand **KINGSTAR Software Development Kit** and **RTX64 Software Development Kit** and select the features you want to install. The required components are not available for selection. When you're done, click **Next**.

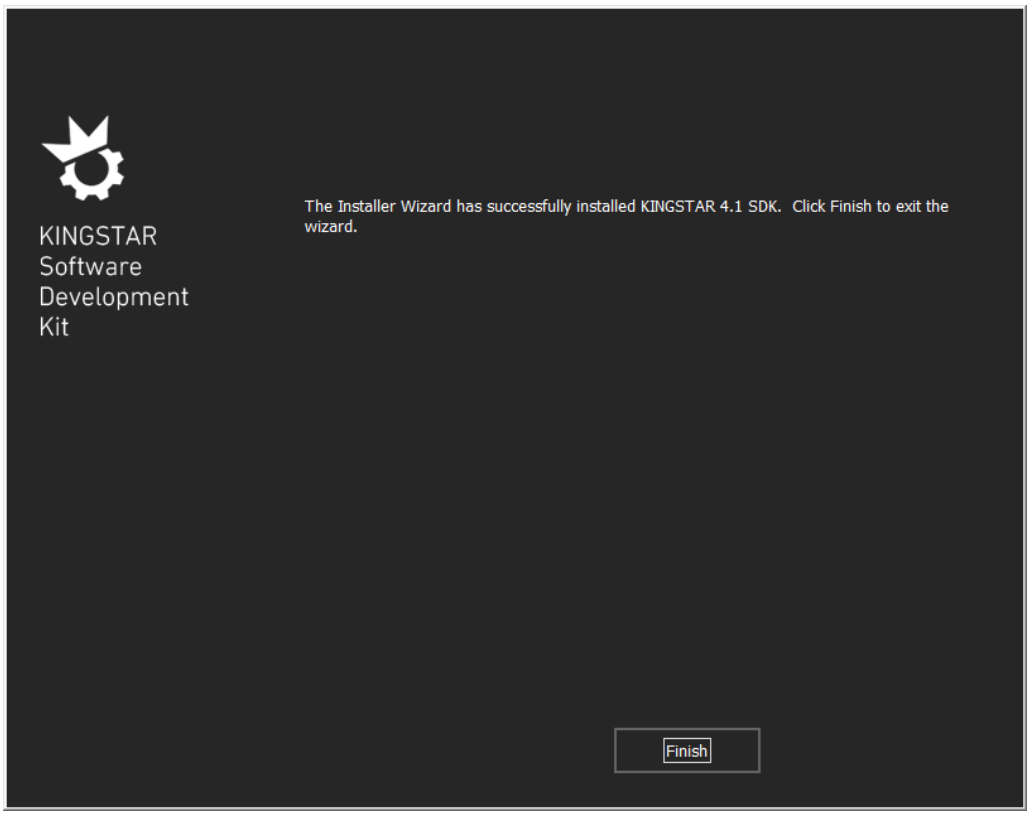
   NOTE: If you already have RTX64 SDK installed on your computer, only **KINGSTAR Software Development Kit** will be displayed.



6. Click **Install** to install KINGSTAR SDK.



7. After the installation is completed, click **Finish** to close the wizard. For more information about activating your KINGSTAR components, see Activate and configure KINGSTAR.



Uninstall KINGSTAR

Before uninstallation, consider the following:

- When KINGSTAR Runtime is uninstalled from a system, any device given to KINGSTAR will no longer have an associated driver and should be returned to Windows. When you uninstall KINGSTAR, the network interface card (NIC) used by KINGSTAR will be returned to Windows automatically. If you want to give it back manually, see one of the following guides:
  - KINGSTAR online or offline help > Tools > KINGSTAR Control Panel > Tools > Runtime Settings > Network Interface Cards
  - KINGSTAR online help > Manually configure system settings > Give the NIC back to Windows
- KINGSTAR applications must not be running.
- KINGSTAR Subsystem and Real-Time Subsystem must be stopped. You can turn them off in KINGSTAR Control Panel.
- If the RTX64 boot configuration is the only boot configuration present on uninstallation, it will be retained so that you can start your system.

To uninstall KINGSTAR, take the following steps:

- Uninstall from Windows Control Panel:
  1. Go to **Control Panel**. Under **Programs**, click **Uninstall a program**.
  2. Select the KINGSTAR software from the list and uninstall it.
  3. After uninstalling KINGSTAR, restart your computer.
- Uninstall using a KINGSTAR installer:
  1. Double-click the Runtime or SDK installer.
  2. On the Setup screen, click **Remove**.

Licensing and activation

This section describes KINGSTAR licensing (packages) and explains how to activate KINGSTAR keys.

- KINGSTAR Runtime components: from primary to advanced, KINGSTAR offers sufficient flexibility for you to combine the packages that best meet your needs.
- Activate and configure KINGSTAR: activates KINGSTAR keys online, offline, or using dongles.

KINGSTAR Runtime components

To provide the greatest flexibility to customers, KINGSTAR offers packages that can be added on to the KINGSTAR Fieldbus Runtime.

The available packages are described below. You can combine packages depending on your application's needs.

KINGSTAR Fieldbus Runtime package

The Fieldbus Runtime is the primary component of KINGSTAR and provides an EtherCAT master and communication capabilities. This package has no axes support. Only I/O modules can be controlled. The Fieldbus Runtime package comes with an RTX64 Runtime Solo Core package, allowing for one core to be dedicated to the KINGSTAR Subsystem and applications. You can upgrade the Core package to any of the following:

- RTX64 Runtime Entry Core Package – allows for up to 2 cores to be dedicated to the KINGSTAR Subsystem and applications.
- RTX64 Runtime Basic Core Package – allows for up to 3 cores to be dedicated to the KINGSTAR Subsystem and applications.
- RTX64 Runtime Professional Core Package – allows for up to 7 cores to be dedicated to the KINGSTAR Subsystem and applications.

KINGSTAR Motion packages

Provides support for motion control within KINGSTAR. These Motion Control packages are available:

- PTP Motion Package – allows for point to point single-axis and multi-axis motion. This package does not include cam and geared motion.

  Functions: Axis PTP motion

- Synchronization Motion Package – allows for point to point single-axis and multi-axis motion, including cam and geared motion.

  Functions: Cam and Gear

- Blending Motion Package – allows for point to point single-axis and multi-axis motion, including cam and geared motion, plus blending support.

  Types: McBufferMode

- Kinematic Package – allows for coordinate transformation among Axis Coordinate System (ACS), Machine Coordinate System (MCS), and Product Coordinate System (PCS).

NOTE: Only RT/Win32 functions and types are listed above. Other interfaces have the same features.

Each motion package comes with an Axis Level 1 package, allowing up to 8 axes to be used for motion control. You can upgrade the Axis package to any of the following:

- Level 2 Axis Package – allows for up to 16 axes to be used with KINGSTAR motion control.
- Level 3 Axis Package – allows for up to 32 axes to be used with KINGSTAR motion control.
- Level 4 Axis Package – allows for an unlimited number of axes to be used with KINGSTAR motion control.

KINGSTAR Feature packages

The optional Feature Packages add functionality to the KINGSTAR Subsystem and EtherCAT master.

- Cable Redundancy Package – supports connecting the last EtherCAT slave to another network interface card on the computer so all the slaves can be communicated even if one cable is broken.
- High Speed Timer Package – supports an EtherCAT cycle time of less than 1 millisecond.
- HMI Package – supports the use of HMI software with KINGSTAR Subsystem and tools. Contact Sales for more information on available third-party HMI software.
- Hot Connect Package – supports adding new hardware to an EtherCAT network while the KINGSTAR Subsystem is running.

- Multiple Master Package – supports multiple EtherCAT masters running concurrently using different network cards and cores. This feature requires the upgraded Fieldbus core package.
- PLC Package – supports KINGSTAR PLC, which provides KINGSTAR PLC Runtime for you to run PLC motion programs developed using KINGSTAR LogicLab. KINGSTAR PLC Runtime requires the PLC Package to activate, while KINGSTAR LogicLab can be used without any limitation.

  KINGSTAR LogicLab contains KINGSTAR motion function blocks (FBs), which require a Motion package. Without a Motion package communications FBs can be used.
- Vision Package – supports the use of GigE Vision Cameras. The upgraded Fieldbus' core package is recommend with this feature.

Activate and configure KINGSTAR

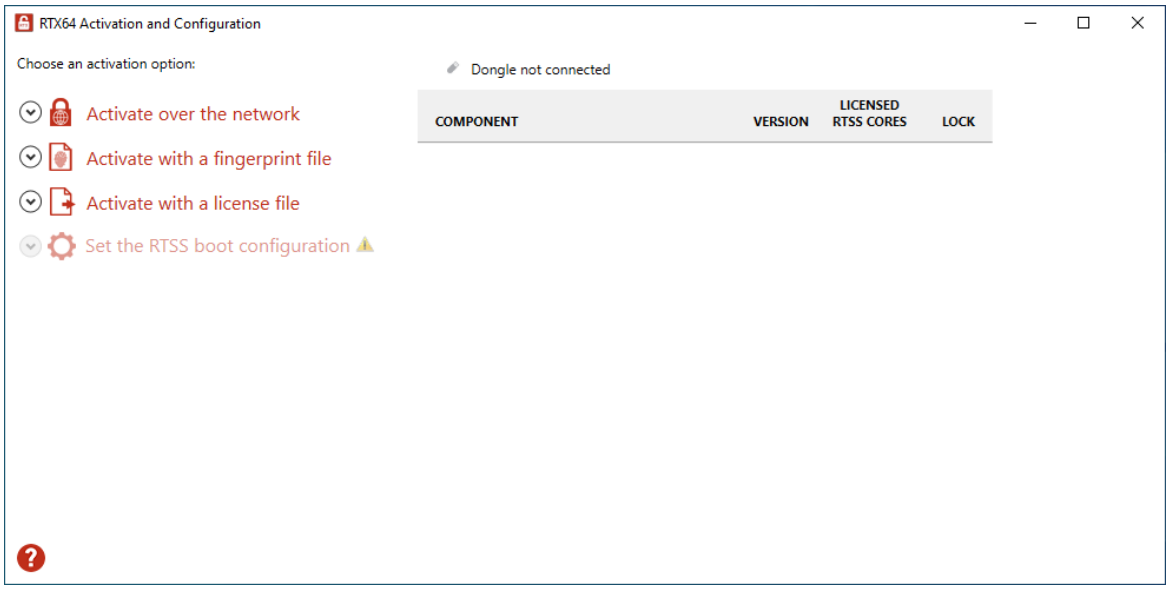
The instructions in this section apply to KINGSTAR 4.0 and later versions. For more information about the 4.x license, see KINGSTAR Runtime components.

Activate over the internet

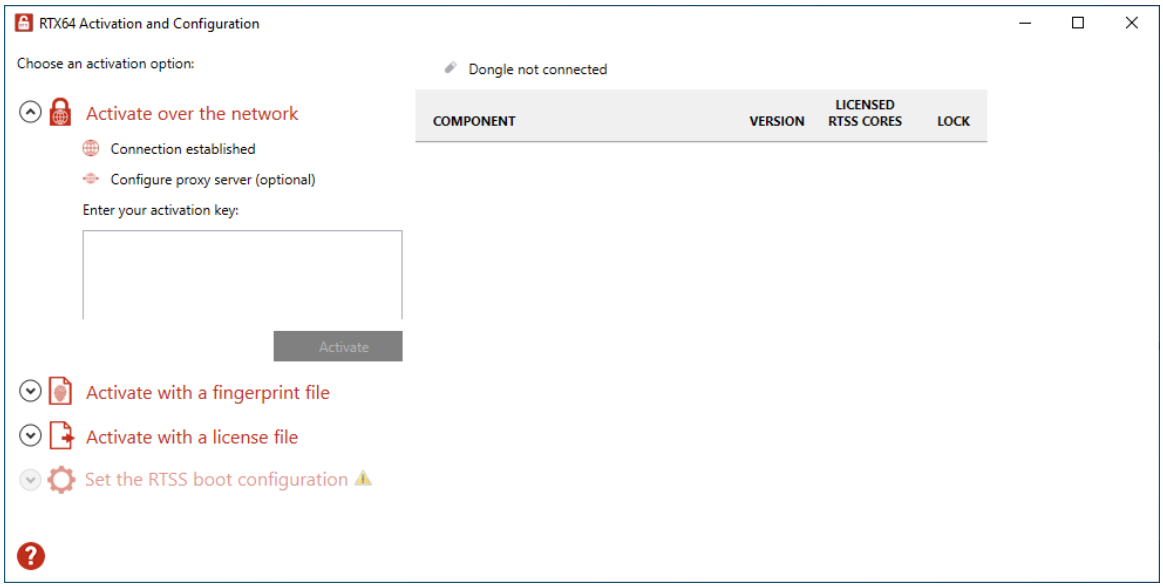
These steps apply ony if you can access the IntervalZero license server. If you do not have the internet access, see the section Activate by the file.

1. On the taskbar, click Start > **RTX64 4.1 Runtime** > **RTX64 Activation and Configuration**.

   NOTE: You must have administrative permissions to launch this utility. Before the utility starts, **User Account Control** may ask if you want to allow this app to make changes to your device. Click **Yes** to continue.



2. Click **Activate over the network**. Make sure your machine is connected to the internet with access to the IntervalZero license server. If a connection is available, you will see **Connection established**. If the connection is not available, make sure all network cables are plugged in and click **Unable to establish a connection** to refresh. If the connection is still not available, you may need to configure a proxy server.



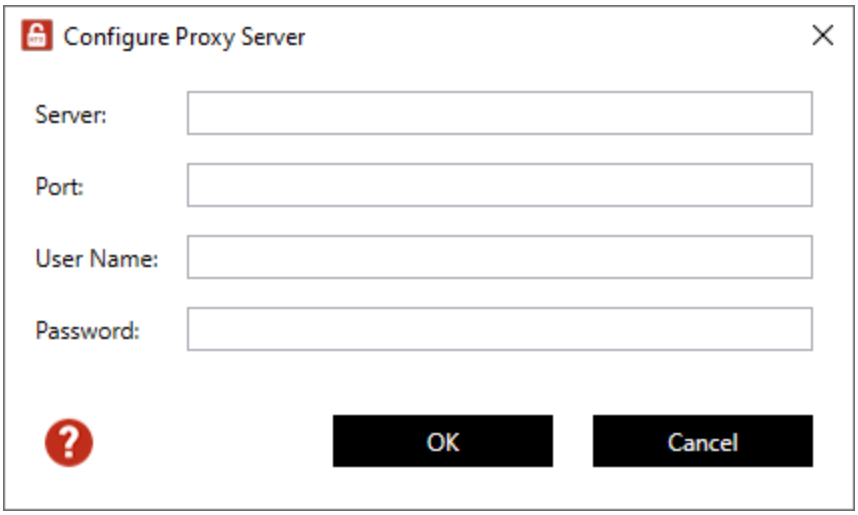
3. To configure a proxy server:

   a. Click **Configure proxy server**.

   b. In the **Configure Proxy Server** dialog box, enter the information in the empty boxes and click **OK**. The information should be available from your IT department.

      NOTE: The proxy server must be able to process HTTP connections. SOCKS proxies are not supported.

      NOTE: If no network connection can be established, see the section Activate by the file.



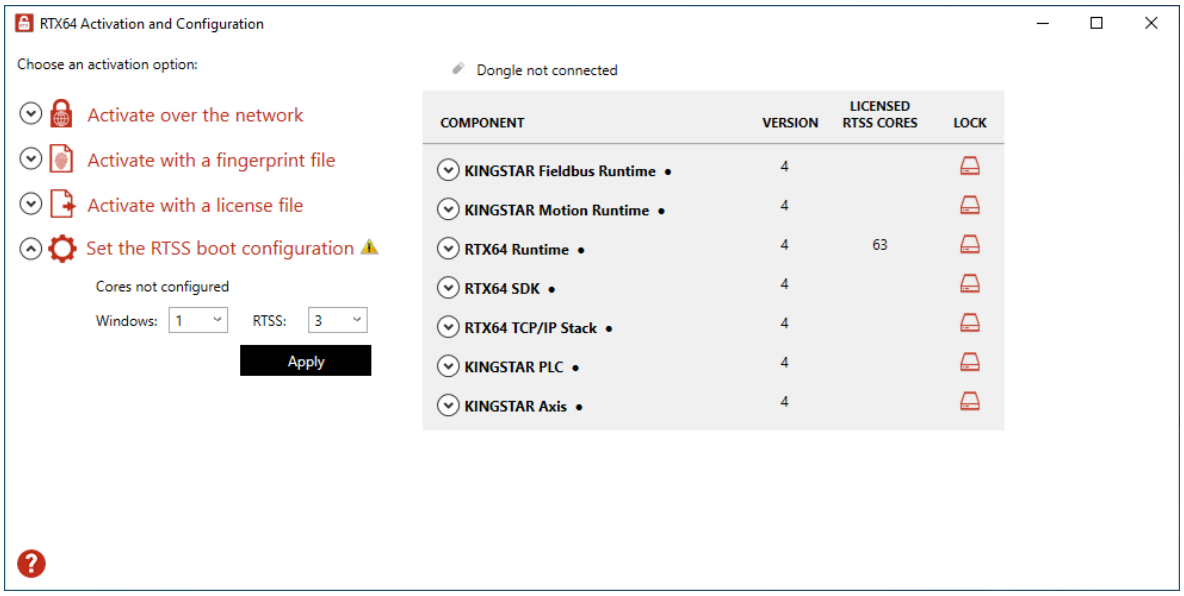
4. Back to the **RTX64 Activation and Configuration** dialog box, in the **Enter your activation key** box, enter your activation key and click **Activate**.

   The product components activated by your keys are listed on the right. These are the possible components:

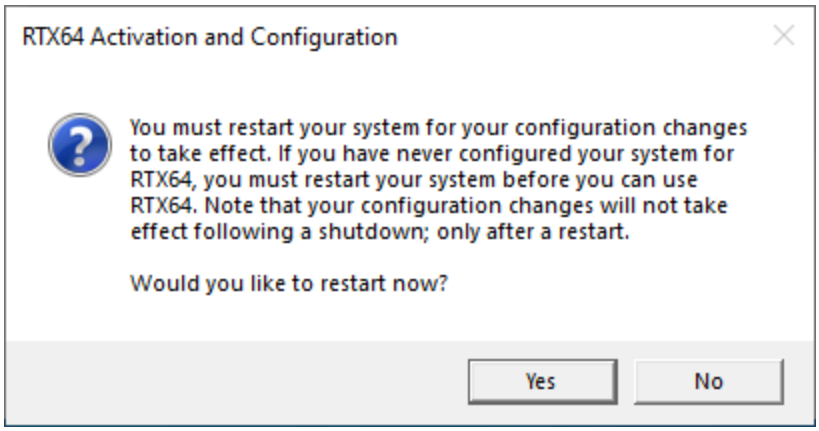
   - KINGSTAR Fieldbus Runtime
   - KINGSTAR Motion Runtime
   - RTX64 Runtime
   - RTX64 SDK
   - RTX64 TCP/IP Stack
   - KINGSTAR PLC
   - KINGSTAR Axis

   NOTE: The order of the components varies between keys.

5. Click **Set the RTSS boot configuration** to assign processors between Windows and RTX64 (RTSS). There must be at least one processor for Windows. You must configure this setting before you use KINGSTAR. Click **Apply** after you complete the configuration.



6. When you are prompted to restart your computer, click **Yes**.



7. Choose the RTX64 boot configuration at system startup:

   Windows 10 – RTX64

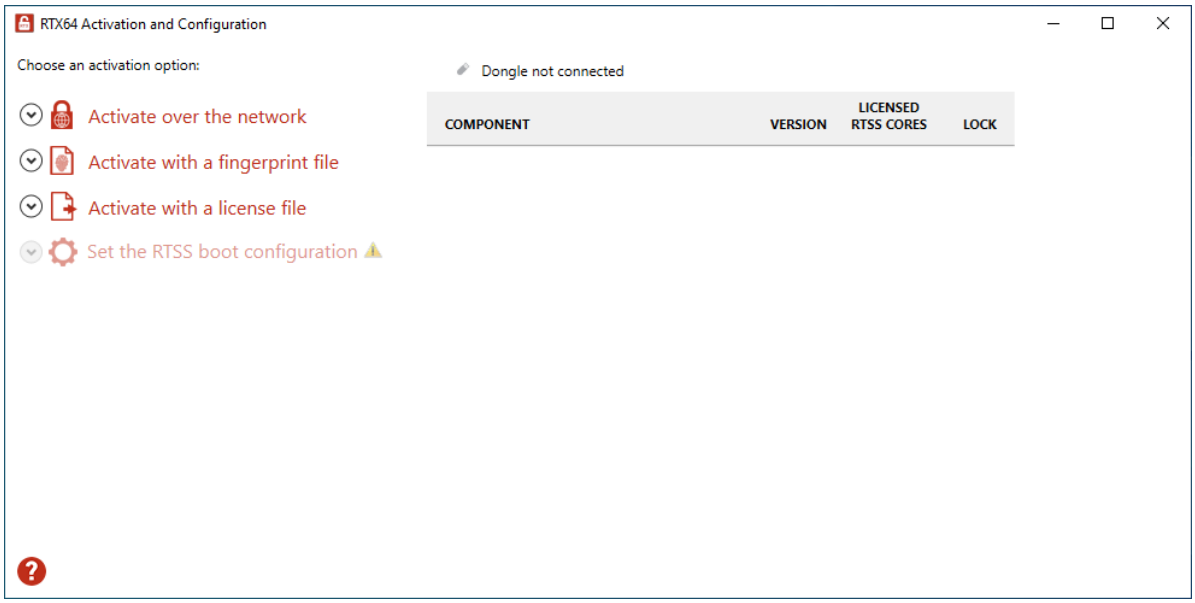
   NOTE: If you start your system with a configuration other than RTX64, KINGSTAR won't work properly.

Activate by the file

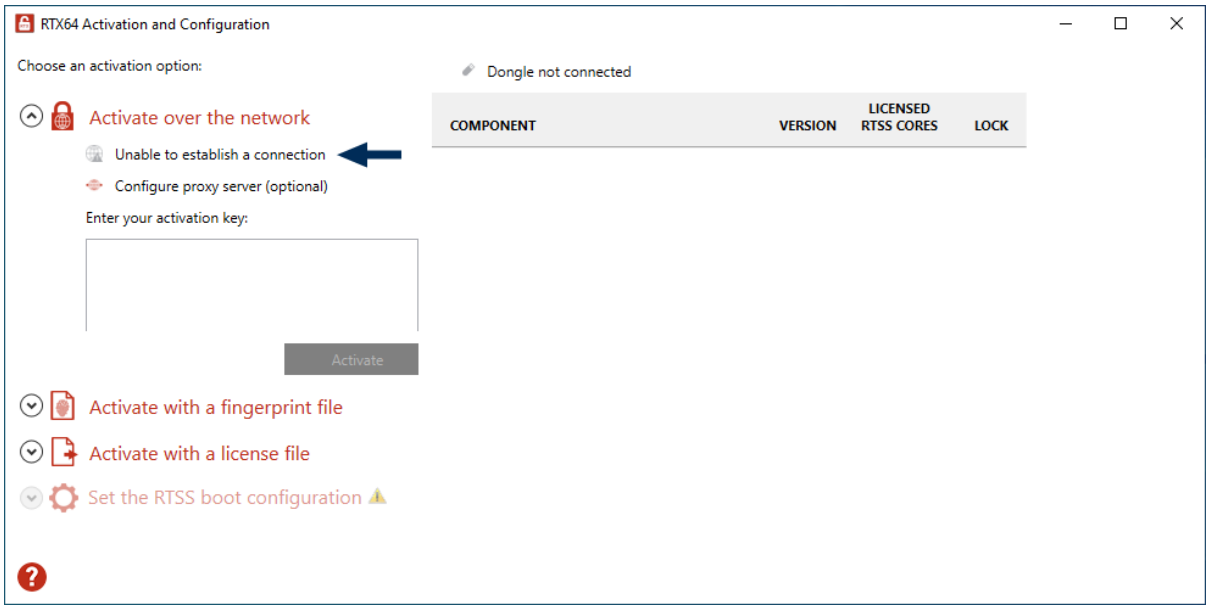
Follow these steps if you can't access the IntervalZero license server.

Step I. Create a fingerprint file

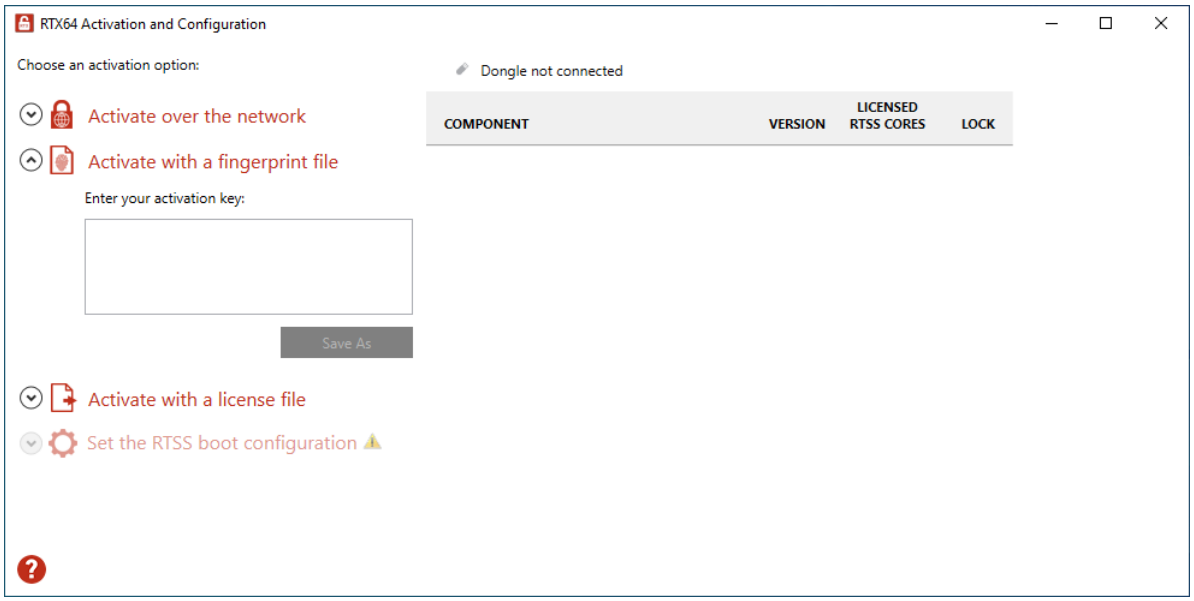
1. On the taskbar, click Start > **RTX64 4.1 Runtime** > **RTX64 Activation and Configuration**. The **RTX64 Activation and Configuration** dialog box appears.



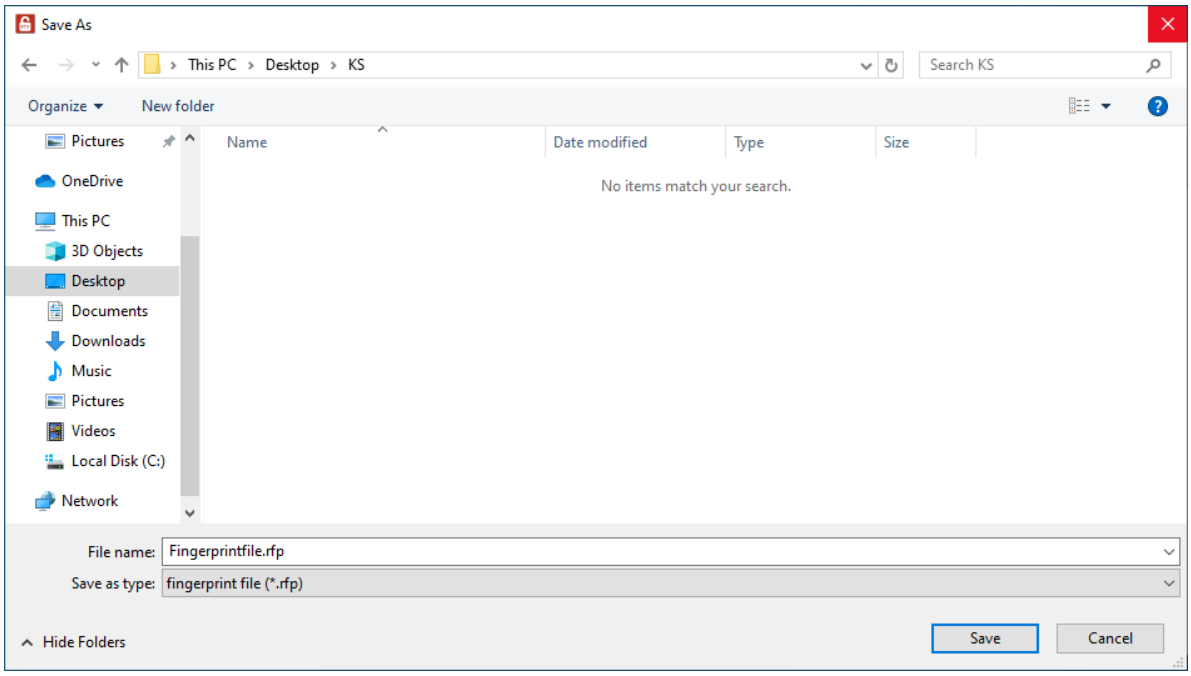
2. Click **Activate over the network**. If it doesn't connect to the IntervalZero license server, you'll see **Unable to establish a connection**. If the connection is available, you will see **Connection established**. For further details, see the section Activate over the internet.



3. Click **Activate with a fingerprint file**.



4. In the **Enter your activation key** box, enter your activation key and click **Save As**.
5. In the **Save As** dialog box, the file is automatically named `Fingerprintfile.rfp`. Specify a path and click **Save**.

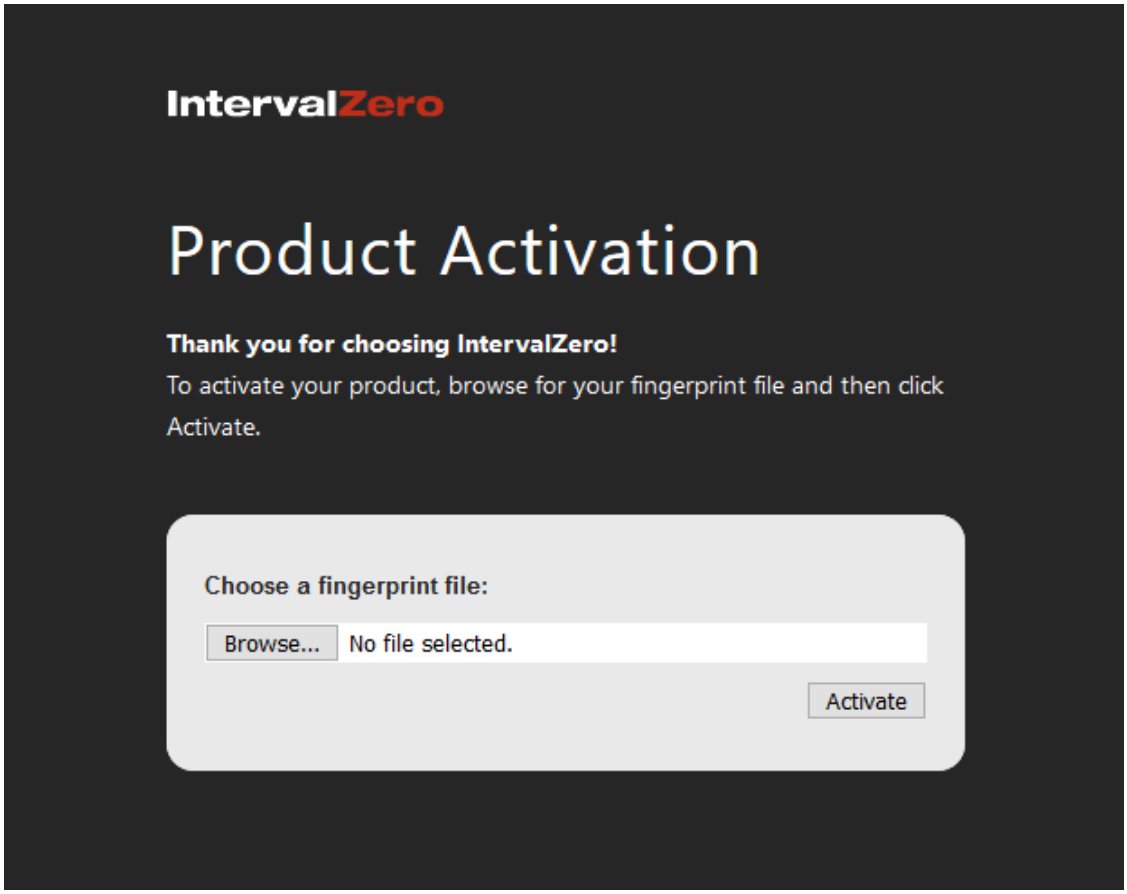


6. Navigate to the desktop, and copy the `Fingerprintfile.rfp` file to your USB flash drive.

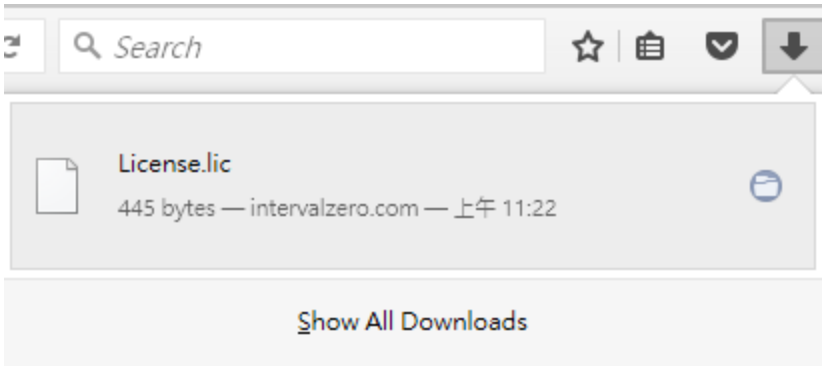
7. Plug the flash drive into a machine with internet connectivity.

Step II. Create the license file and activate the product

1. Launch a web browser, and go to http://activation.intervalzero.com.

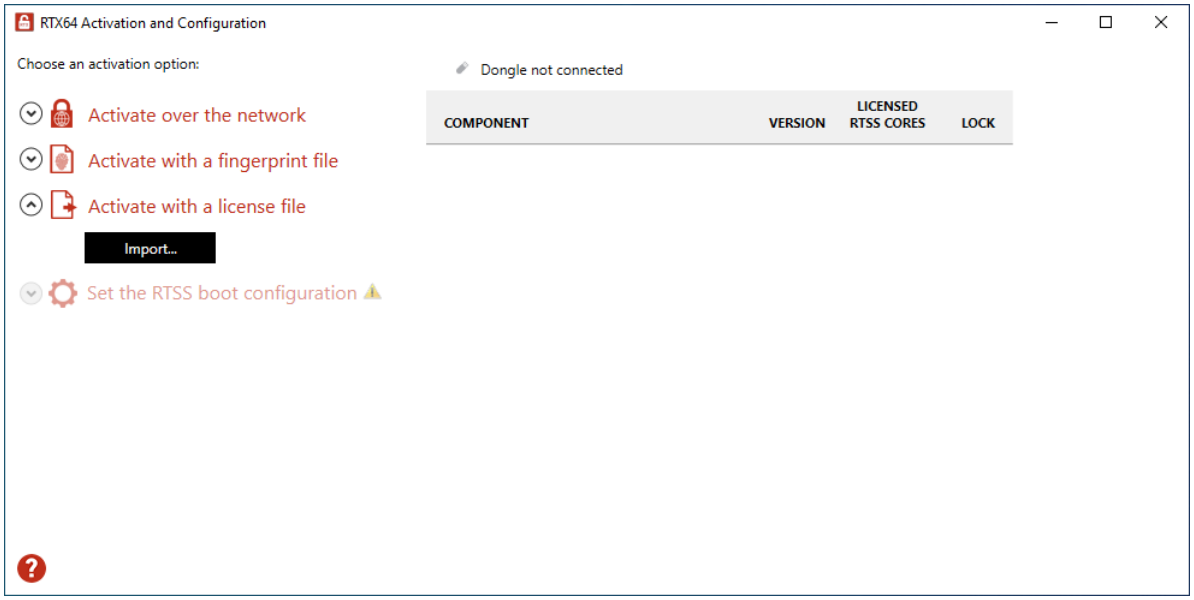


2. Click **Browse**, browse to and open the file `Fingerprintfile.rfp`.
3. Click **Activate** to generate a license (.lic) file.
4. Download the `License.lic`. Depending on your browser, you may be prompted to save the file.



5. Copy the file `License.lic` to your USB flash drive, and use it to transfer the license file to the machine on which KINGSTAR is installed.

6. In the **RTX64 Activation and Configuration** dialog box, click **Activate with a license file** and click **Import**.

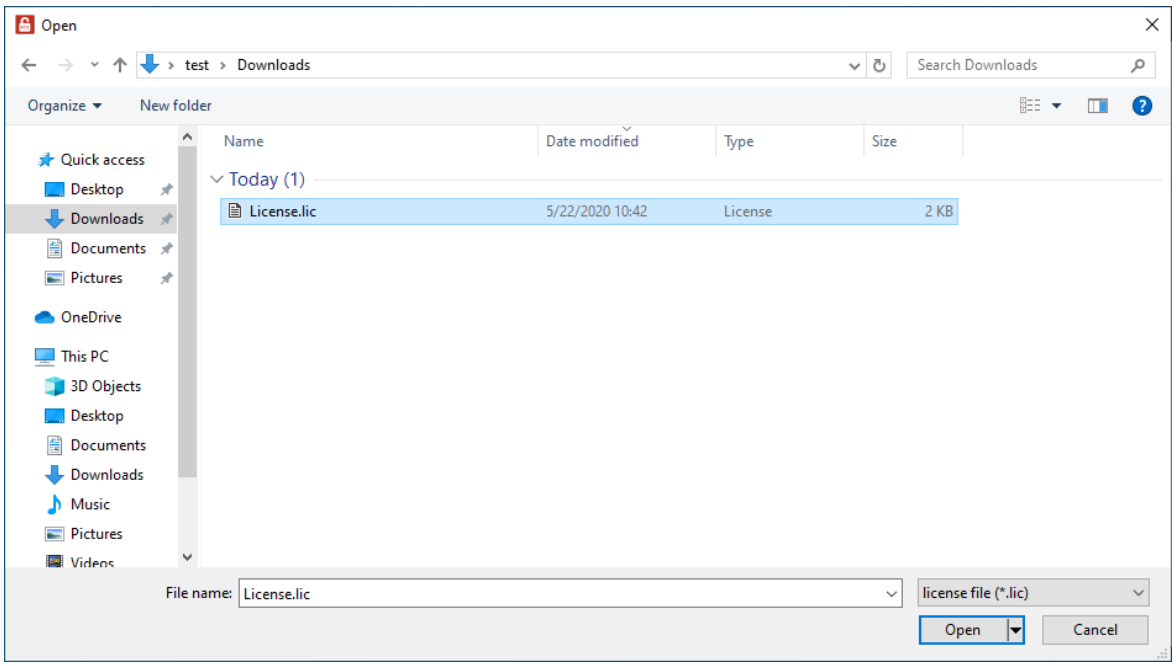


7. In the **Open** dialog box, browse to `License.lic` and click **Open**. The product components activated by your key are listed on the right. These are the possible components:

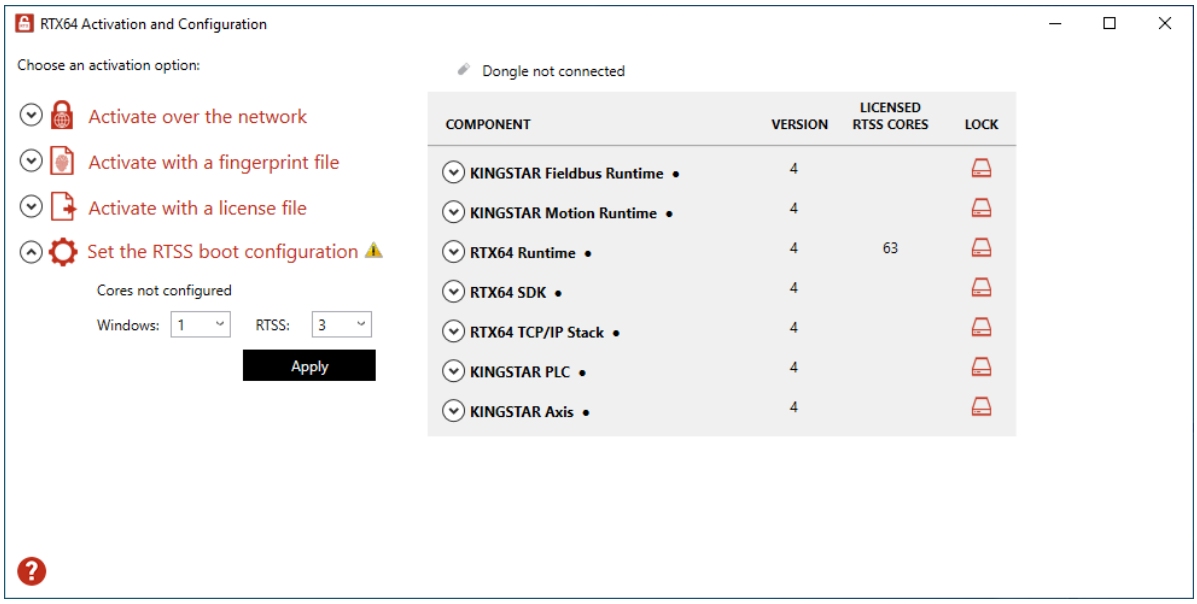
   - KINGSTAR Fieldbus Runtime
   - KINGSTAR Motion Runtime
   - RTX64 Runtime

- RTX64 SDK
- RTX64 TCP/IP Stack
- KINGSTAR PLC
- KINGSTAR Axis

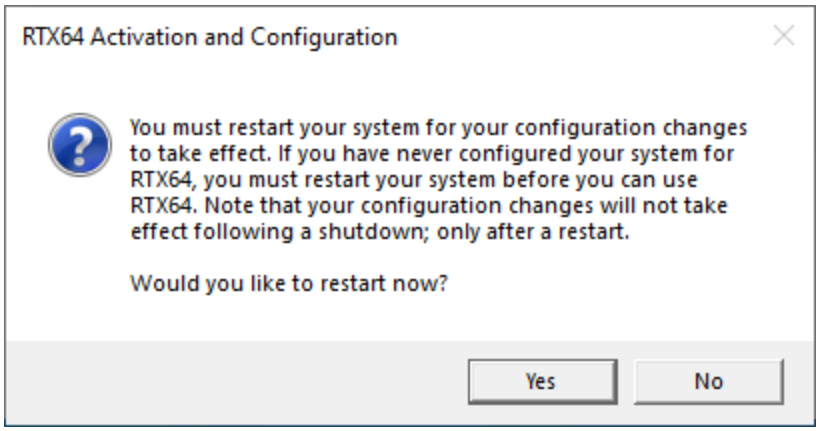
NOTE: The order of the components varies between keys.



8. Click **Set the RTSS boot configuration** to assign processors between Windows and RTX64 (RTSS). There must be at least one processor for Windows. You must configure this setting before you use KINGSTAR. Click **Apply** after you complete the configuration.



9. When you are prompted to restart your computer, click **Yes**.



10. Choose the RTX64 boot configuration at system startup:

    Windows 10 – RTX64

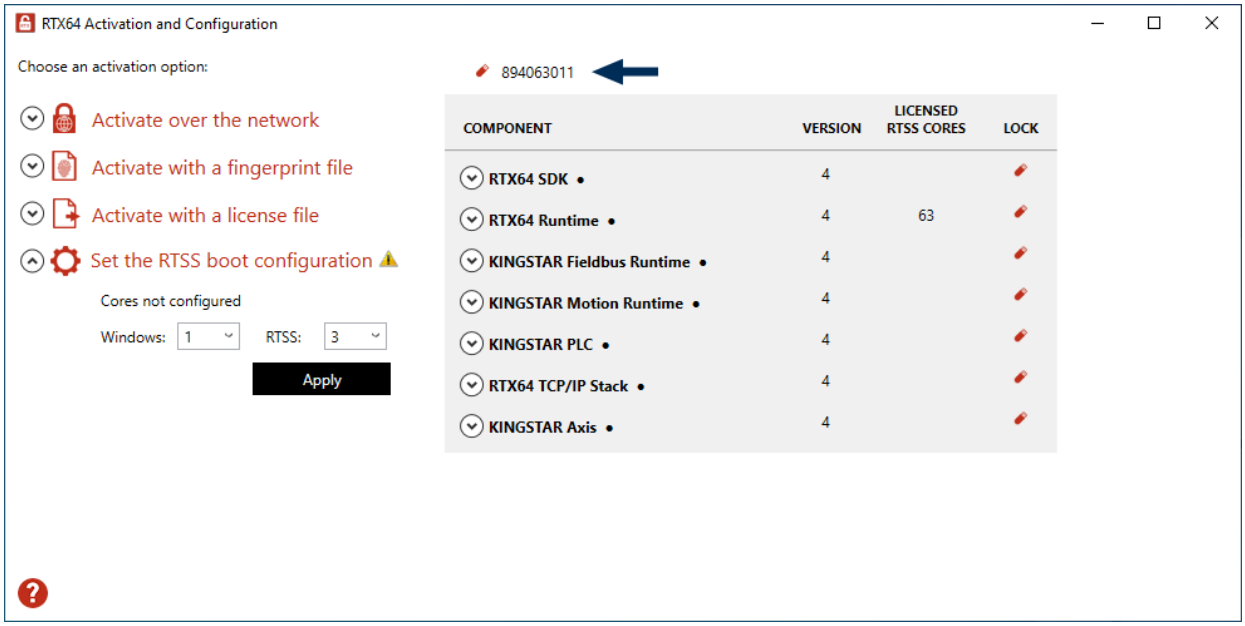
    NOTE: If you start your system with a configuration other than RTX64, KINGSTAR won't work properly.

Activate using the dongle

A dongle is a USB flash drive specifically designed for containing KINGSTAR license. It is convenient for people who need to take the license with them. When you purchase the KINGSTAR license you can optionally purchase a dongle.

- If you purchase the KINGSTAR licenses with the same number of dongles, we'll put the license files in the dongles and activate them in advance. Once you receive the dongles, plug them into the computers that have the corresponding KINGSTAR products to complete activation. After assigning the processors to Windows and RTX64 and restarting your computer, you can start to use KINGSTAR.
- If you purchase the KINGSTAR licenses with a different number of dongles, we'll send you the empty dongles so you can decide which dongle you want to put the license on. Once you activate a dongle, plug it into a computer that has the corresponding KINGSTAR product to complete activation. After assigning the processors to Windows and RTX64 and restarting your computer, you can start to use KINGSTAR. For more information about activating a dongle, visit the KINGSTAR website (kingstar.com), go to **Support** > **Support Login**, enter your support email and password to sign in. In KINGSTAR help center, go to **KINGSTAR Quick Links** > **Quick Links** > **Add-Ons, Tools & Utilities**, download **Dongle Activation Utility**, which includes the file and manual.

After the dongle is plugged in, a dongle icon is displayed above the component list, as shown below. Click **Set the RTSS boot configuration** to assign processors between Windows and RTX64 (RTSS). There must be at least one processor for Windows. You must configure this setting before you use KINGSTAR. Click **Apply** after you complete the configuration.


RTX64 Activation and Configuration
Choose an activation option:
Activate over the network
Activate with a fingerprint file
Activate with a license file
Set the RTSS boot configuration
Cores not configured
Windows: 1
RTSS: 3
Apply
894063011
COMPONENT
VERSION
LICENSED RTSS CORES
LOCK
RTX64 SDK
4
RTX64 Runtime
4
63
KINGSTAR Fieldbus Runtime
4
KINGSTAR Motion Runtime
4
KINGSTAR PLC
4
RTX64 TCP/IP Stack
4
KINGSTAR Axis
4

Get support

KINGSTAR offers a number of support options for KINGSTAR users, including third-party, online, and phone support.

Third-party support

If you are a customer who purchased a KINGSTAR product through a third-party reseller, contact the reseller for support.

Online support

The KINGSTAR Customer Support web page is located at:

http://kingstar.com/support/

The KINGSTAR support web pages provide electronic access to the latest product releases, documentation, and release notes. You can access the online support ticketing system to submit issues or questions.

Before calling technical support

Please have the following information ready before calling KINGSTAR Technical Support:

The version number of your RTX64 and KINGSTAR software

To obtain the RTX64 version number:

1. Click Start > **RTX64 4.1 Runtime** > **RTX64 Control Panel**.
2. In the **RTX64 4.1 Control Panel**, record the **Version** shown in the **Installed Runtime components** area.

To obtain the KINGSTAR version number:

1. Click Start > **KINGSTAR 4.1 Runtime** > **KINGSTAR Control Panel**. Or, in the notification area, double-click the KINGSTAR icon.

2. In KINGSTAR Control Panel, click **About**.
3. Record the **Version** shown on the page.

Phone support

For technical support related to installing and using KINGSTAR, please call technical support at this number:

+886-2-2556-8117

Hours are Monday – Friday from 9:30 to 17:30, UTC+08:00, excluding holidays.