AXC F 2152 – CHANGE NOTES

Change notes for the AXC F 2152 controller

Application note
108427_en_14

1 General information

This document contains all changes made between firmware version 1.0.0 and the current firmware version of the AXC F 2152 controller (Order No. 2404267).

Current firmware version: 2019.9

NOTE: Material damage due to a freezing of the outputs

With firmware versions 2019.6, 2019.3, or 2019.0 LTS, a high CPU load and frequent PROFINET disconnections may cause the outputs to freeze.

- Make sure to perform an update to firmware version **2019.0.4 LTS**, **2019.6.3** or **2019.9**.

1.1 Maritime approvals

The following firmware versions are certified for use in maritime applications:

– 2019.0.4 LTS
– 2019.0 LTS

2 Table of contents

Make sure you always use the latest documentation.
It can be downloaded at phoenixcontact.net/product/2404267.

3 Changes in firmware version 2019.9

3.1 New functions

New function in the WBM

A diagnosis for the local bus is available in the WBM.

Offline installation of apps from the PLCnext Store

The installation of downloaded apps from the PLCnext Store no longer requires a connection to the Internet.

PROFINET System Redundancy Layer (SRL)

In operation as PROFINET controller or PROFINET device the controller now supports PROFINET SRL.

Forcing GDS variables

You can now force GDS variables and thus the I/Os connected via PROFINET or Axioline F.

PROFINET controller: Behaviour of the BF-C LED

If you do not configure a PROFINET device or interrupt the connection using the "AR_MGT" function block, the BF-C LED remains switched off.

3.2 Error corrections

– Freezing of the outputs

  A high CPU load and frequent PROFINET disconnections could cause the outputs to freeze.

  This error has been rectified.

– Delay of a variable value

  If 24 V voltage was applied to a digital input of the Axioline F local bus and the signal was transmitted with a global variable or a port link into the application, there could be a delay of several cycles.

  This error has been rectified.

– Changing the IP address via DCP

  Changing the IP address via DCP could affect the real-time of the project and trigger the PLC task watchdog.

  This error has been rectified.

– CPU load after PROFINET connection setup

  After many PROFINET connections had been established, the controller could reach 100 % CPU load and the firmware could no longer react.

  This error has been rectified.

– Resetting the IP address via DCP

  If there was a connection to at least one configured PROFINET participant, the PLC task watchdog could be triggered when the IP address was reset via DCP.

  This error has been rectified.

– Setting breakpoints in debug mode

  If a breakpoint was set in debug mode, the PLC task watchdog could be triggered.

  This error has been rectified.

– Error of the Notification Logger

  If an error occurred during a restart of the controller, the Notification Logger was not automatically configured and notifications were not displayed in PLCnext Engineer.

  This error has been rectified.

3.3 Known limitations and errors

– System variables

  The system variables ESM_DATA.ESM_INFOS[*].ESM_TICK_COUNT and ESM_DATA.ESM_INFOS[*].ESM_TICK_INTERVAL are no longer supported.
  Now, the value of the variables is always 0.

– C++ projects

  C++ projects that were created using “WorkerThread” in SDK version 2019.0 LTS have to be compiled again using an SDK version ≥ 2019.6.
  Otherwise, the “WorkerThread” is not loaded after restart of the application.

– Copying configuration files

  If you use the Linux command “scp” **without** the option “-p” to copy configuration files from a Linux PC to the directory /opt/plcnext/projects on the controller, the file permissions are partly set incorrectly.
  Remedy:
  After copying the configuration files, use the Linux command “chmod” to set the file permissions in such a way that the firmware can delete the configuration files in case of “Download Changes” (group: “plcnext”, owner: “plcnext_firmware”).

– Deinstalling a licensed app from the PLCnext Store

  The deinstallation of a licensed app via the PLCnext Store is not possible if you manually deleted the license from the controller beforehand.

– Large amount of retain data

  In projects with a large amount of retain data, the PLC task watchdog infrequently triggers.

4 Changes in firmware version 2019.0.4 LTS

When using SafetyBridge Technology, note the following:

To ensure reliable operation in conjunction with SafetyBridge Technology, make the following settings in PLCnext Engineer.

„/ Profinet“ editor group, „Interface List“ editor:

– Reduction ratio: 8 (or higher)
– Monitor factor: 6 (or higher)

Firmware version 2019.0.4 LTS offers the same features as firmware version 2019.0 LTS, but the error described below has been rectified.

4.1 Error corrections

– Freezing of the outputs
  A high CPU load and frequent PROFINET disconnections could cause the outputs to freeze.
  This error has been rectified.

5 Changes in firmware version 2019.6.3

When using SafetyBridge Technology, note the following:

To ensure reliable operation in conjunction with SafetyBridge Technology, make the following settings in PLCnext Engineer.

„/ Profinet“ editor group, „Interface List“ editor:

– Reduction ratio: 8 (or higher)
– Monitor factor: 6 (or higher)

Firmware version 2019.6.3 offers the same features as firmware version 2019.6, but the error described below has been rectified.

5.1 Error corrections

– Freezing of the outputs
  A high CPU load and frequent PROFINET disconnections could cause the outputs to freeze.
  This error has been rectified.

6 Changes in firmware version 2019.6

If you changed system files via a “root” access, the controller might not start up correctly after a firmware update.

- In this case, reset the controller to default setting type 1.

6.1 New functions

PROFINET stack

The PROFINET controller/device stack was updated from version 6.2 to version 6.3:

– MRP Client function

– SRL S2 function

MRP (Media Redundancy Protocol)

You can use the controller as a Media Redundancy Client (MRC) in an MRP ring. The MRC is activated and configured via the higher-level controller and PDEV objects. Only the default domain 0xFFFFFFFF is supported.

DataLogger

The DataLogger transfers real-time date from the GDS (Global Data Space) to an SQL based database for recording and storage.
The scope of functions of the DataLogger was extended:

– New recording modes:
  – Storage in case of changes
  – Continuous

– Historical data can be called within a defined period of time.

For more detailed information on the DataLogger, please refer to the “PLCnext Technology” user manual.

Updating Axioline F I/O data

The behavior for updates of Axioline F I/O data was changed:

If you do not select a trigger task, the firmware automatically calculates an interval for updating the Axioline F I/O data from the interval times of all available cyclic tasks. Event or idle tasks are not taken into account for the calculation. If no cyclic task is available, the data of the Axioline F modules is updated every 500 µs.

As an alternative to a cyclic task, you can select an idle task for updating Axioline F I/O data.

Interval times for cyclic tasks

The interval time of a cyclic task now has to be at least 1 ms. For projects that were created using an earlier firmware version and contain cyclic tasks with interval times < 1 ms, the PLC task watchdog might trigger.

TON_R_LTIME, TP_R_LTIME and TOF_R_LTIME function blocks

The time accuracy of the TON_R_LTIME, TP_R_LTIME and TOF_R_LTIME function blocks was improved. Now, also times < 1 ms can be recorded.
To be able to use the improved time accuracy of the function blocks in existing projects, you have to compile the project again and transfer it to the controller.

New functions in the WBM

– On the “Profinet” page, the PROFINET topology is displayed in tree view.

– You can activate the support of an external SD card via the WBM.
  If you deactivate the support of an SD card, and the SD card is then inserted into the controller, the SD card is not recognized during the initialization phase of the controller. Therefore, the data from the internal parameterization memory is **not** automatically copied to the SD card.

– The name of the PLCnext Engineer project running on the controller is displayed.

– On the “License Management“ page, you can view the licenses of the apps from the PLCnext Store that are installed on the controller.

OPC UA Historical Access (HA)

The integrated OPC UA server (eUA) supports access to historical data (OPC UA Historical Access Specification).

PROFINET controller/device function

– Now, you can select if an application relation (AR) is to be established while the boot project is being loaded.
– The DNS names of the PROFINET controller and the PROFINET devices can now be set via the "IConfigurationService" RSC service.
Via the RSC interface, the functions Read(), Write(), GetControllerName() und GetDeviceNames() are now available.

For more detailed information on RSC (Remote Service Calls), please refer to the "PLCnext Technology" user manual.

6.2 Error corrections

– HTTPS connection
After 20 minutes, the connection of an HTTPS client to the HTTPS server used to be disconnected automatically.
This error has been rectified.
– Static_String array in C++ programs
In an array of the type Static_String (C++), the array size was miscalculated.
This error has been rectified.
– Disconnection from the HMI web server
After the DISABLE system variable of the HMI_CONTROL data structure was set to TRUE, and this way, the connection to the HMI web server was set, the PLCnext Engineer HMI web server and the client were able to connect nevertheless.
This error has been rectified.
– Controller breakdown in the PROFINET network
If in a larger PROFINET network, the IP address of a PROFINET device was changed, the controller used to break down.
This error has been rectified.
– PROFINET diagnostic state in the WBM
If the application relation (AR) of a PROFINET device was disabled, a wrong diagnostic state was displayed on the "Profinet" page in the WBM.
This error has been rectified.
– AXC F 2152 as a PROFINET device
The AXC F 2152 could not be operated as a PROFINET device under PROFINET controllers from third-party manufacturers.
This error has been rectified.
– SINT type process data elements
Linking SINT type process data elements led to a runtime error in the application program (LED FAIL).
This error has been rectified.
– Reading out OPC UA subscriptions
Reading out OPC UA subscriptions via the "UA Expert" tool was not possible.
This error has been rectified.
– OPC UA: "IecTime" data type variables
"IecTime" data type variables were not displayed correctly.
This error has been rectified.
– OPC UA: Index based monitoring
Independent of the index set, all data of an array was output during index based monitoring.
This error has been rectified.
– OPC UA: Index calculation
Access to an array of the data type StaticString resulted in errors in index calculation.
This error has been rectified.
– Traces in the format YYYYMMDD
For traces in the format YYYYMMDD, sometimes the leading 0 was missing for the day.
This error has been rectified.
– Setting breakpoints
Setting breakpoints in extensive ST code worksheets resulted in controller freezing.
This error has been rectified.
– Event task "Cold Start"
In the following cases, the event task "Cold Start" was not executed:
  – After resetting the controller to default setting type 1 or 2
  – After SFTP transmission of the project and subsequent reboot of the controller

This error has been rectified.
– Installed apps from the PLCnext store
Resetting the controller to default setting type 1 or 2 resulted in licensing conflicts for apps from the PLCnext store that were installed on the controller.
This error has been rectified.

6.3 Known limitations and errors

– System variables

  The system variables ESM_DATA.ESM_INFOS[*].ESM_TICK_COUNT and ESM_DATA.ESM_INFOS[*].ESM_TICK_INTERVAL are no longer supported.
  Now, the value of the variables is always 0.

– C++ projects

  C++ projects that were created using “WorkerThread” in SDK version 2019.0 LTS have to be compiled again using an SDK version ≥ 2019.3.
  Otherwise, the “WorkerThread” is not loaded after restart of the application.

– EtherNet/IP™

  If you enable the controller firewall in the WBM, EtherNet/IP™ is no longer available.
  To be able to use EtherNet/IP™ with enabled firewall, you have to activate the ports for incoming and outgoing connections subsequently (port 44818 and port 2222).

– HMI applications

  You cannot access an HMI application while a PLCnext Engineer project is downloaded to the controller.
  In this case, an error message is displayed in the web browser.

– Copying configuration files

  If you use the Linux command “scp” **without** the option “-p” to copy configuration files from a Linux PC to the directory /opt/plcnext/projects on the controller, the file permissions are partly set incorrectly.
  Remedy:
  After copying the configuration files, use the Linux command “chmod” to set the file permissions in such a way that the firmware can delete the configuration files in case of “Download Changes” (group: “plcnext”, owner: “plcnext_firmware”).

– Deinstalling a licensed app from the PLCnext Store

  The deinstallation of a licensed app via the PLCnext Store is not possible if you manually deleted the license from the controller beforehand.

– Availability of network services

  In case of frequent and fast linkUp and linkDown in large PROFINET quantity structures, the controller can infrequently reach 100% CPU load. In this case, network services are no longer available.

– Restart of a project

  For projects with extremely long task cycle times (e.g., 15000 ms), the restart of the project after a project download can take several minutes.

– Setting network settings via DCP

  Setting network settings via DCP can affect the real-time of the project. For watchdog times < 10 ms, this can infrequently result in a triggering of the PLC task watchdog.

– SafetyBridge Technology

  Reliable operation in conjunction with SafetyBridge Technology is not ensured.
  If you want to use SafetyBridge Technology, use the controller with firmware version 2019.3.

7 Changes in firmware version 2019.3

7.1 New functions

PRL (Phoenix Redundancy Layer)

The PROFINET device functionality has been extended to include the PRL function (Phoenix Redundancy Layer).

EtherNet/IP™ device function

You can use the controller as an EtherNet/IP™ device.

Dynamic bus configuration

The controller supports the dynamic bus configuration of the Axioline F local bus.

Left-alignable INTERBUS master

The controller now supports left-alignment of the INTERBUS AXC F XT IB master (Order No. 2403018).

PLCnext Store: New app types

The controller supports the execution of the app types “function extension”, “runtime”, “library”, and “solution app”.

7.2 Known limitations and errors

- Static_String array in C++ programs

  The array sizes are incorrectly calculated in Static_String-type arrays (C++), meaning that access to the second element contained in the array and to those following is incorrect.
  String arrays in IEC 61131 programs are not affected by this.
- AXC F 2152 as a PROFINET device

  The AXC F 2152 cannot be operated as a PROFINET device under PROFINET controllers from third-party manufacturers.
- Monitor time of PROFINET data

  The PROFINET data monitor time must be at least 24 ms. The monitor time is the product of „Reduction ratio“ and „Monitor factor“ (in PLCnext Engineer: „Profinet“ editor group, „Interface list“ editor).

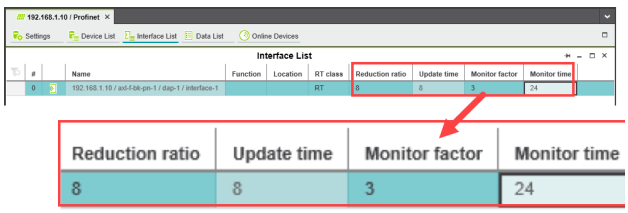

Figure 1 Monitor time

- Metrics that can be transferred to the PROFICLOUD

  You can transfer up to 194 variable values as metrics into the PROFICLOUD.
- Very high CPU utilization

  The online connection to PLCnext Engineer may be interrupted when the controller CPU utilization is very high.
  The connection interruption is indicated in PLCnext Engineer without any indication of the cause.
- Setting breakpoints is not supported

  Setting breakpoints in debug mode results in the controller becoming unreachable.

8 Changes in firmware version 2019.0 LTS

Please note:

Updating to firmware version 2019.0 LTS will reset the controller to factory default setting type 1. Any application-specific data and projects on the controller will be deleted.

8.1 New functions

Download changes

The controller now supports the “Download Changes” function. With the “Download Changes” function, program changes can be transferred to the controller during operation without interruption.

This is subject to the following conditions:

– You have not made any changes to the bus configuration.
– You have not changed the process data assignment.
– You have not changed the properties of the existing tasks (e.g., task type, interval, watchdog).
– You have not deleted any tasks or added any new tasks.

Left-alignment of Axioline F extension modules

The controller now supports left-alignment of the Axioline F AXC F XT ETH 1TX extension module (left-alignable Ethernet interface, Order No. 2403115).

New functions in the WBM

New functions are now available in the web-based management (WBM), e.g., PROFINET diagnostics and firewall configuration.

Declaring retentive data

You can now also declare variables from C++ programs as retentive data in PLCnext Engineer.

Updating Axioline F I/O data

You can now specify the refresh interval for Axioline F I/O data. This is done by selecting which task triggers the Axioline F I/O data update in the PLCnext Engineer project.

To do this, proceed as follows:

- Double-click on the “Axioline F (x)” node in the “PLANT” area.

The “/ Axioline F” controller editor group opens.

- Select the “Trigger task” view in the “Settings” editor.
- In the drop-down list, select the task that is to trigger the Axioline F I/O data update.

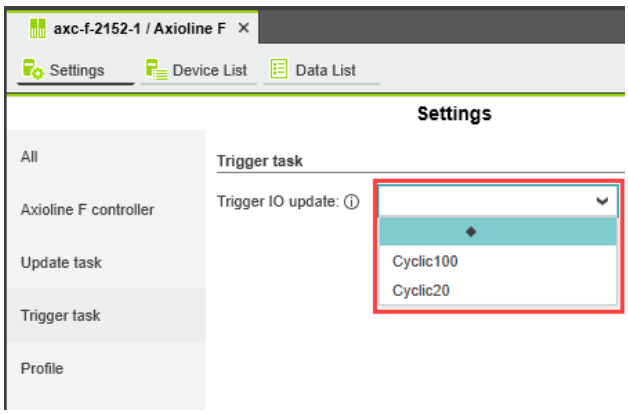

Figure 2 Select Trigger task

If you do not select a task, the update will occur by default every 50 ms.

8.2 Known limitations and errors

– AXC F 2152 as a PROFINET device

  The AXC F 2152 cannot be operated as a PROFINET device under PROFINET controllers from third-party manufacturers.

– Downloading PC Worx Engineer projects to the controller

  You can only download PLCnext Engineer projects to the controller with firmware version 2019.0 LTS that were created and compiled in PLCnext Engineer version 2019.0 LTS. Projects that you created in PC Worx Engineer must be re-created in PLCnext Engineer.

  If you download a PC Worx Engineer project to the controller with firmware version 2019.0 LTS, the project will not run on the controller. However, no error message is displayed in PLCnext Engineer.

Please note:

The PC Worx Engineer software has been renamed to PLCnext Engineer:

– Name up to Version 7.2.3:
  PC Worx Engineer

– Name starting from Version 2019.0 LTS:
  PLCnext Engineer

– Monitor time of PROFINET data

  The PROFINET data monitor time must be at least 24 ms. The monitor time is the product of „Reduction ratio“ and „Monitor factor“ (in PLCnext Engineer: „Profinet“ editor group, „Interface list“ editor).

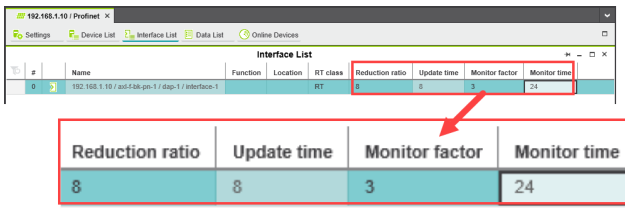

Figure 3 Monitor time

– Metrics that can be transferred to the PROFICLOUD

  You can transfer up to 194 variable values as metrics into the PROFICLOUD.

– Exceeding CPU system limits

  Exceeding the CPU system limits for the controller may result in an interruption of the online connection to PLCnext Engineer.
  The connection interruption is indicated in PLCnext Engineer without any indication of the cause.

– Setting breakpoints is not supported

  Setting breakpoints in debug mode results in the controller becoming unreachable.

9 Changes in firmware version 1.2.0

9.1 New functions

Design of a PLCnext Inline station

As an alternative to an Axioline F station, you can now set up a PLCnext Inline station using the controller. To do so, you need the AXC F IL ADAPT Inline adapter terminal (Order No. 1020304). You can directly install the Inline modules in series on the adapter terminal.

License verification

When an SD card is used, the controller now verifies if the SD card contains a Phoenix Contact license. You can only use the controller together with an appropriate Phoenix Contact SD card.

9.2 Notes on firmware downgrades and resetting the controller

For performing firmware downgrades, please note the following:

Downgrade to a firmware version ≤ 1.0.2

After downgrading to a firmware version ≤ 1.0.2, you can only use the controller **with** an SD card. Using it without an SD card is possible starting from firmware version 1.1.0.

- Ensure that the SD card has been inserted before switching the controller on, in order that the controller can use it.
- Only use an SD card provided by Phoenix Contact.

Downgrade to firmware version 1.0.0

After downgrading to firmware version 1.0.0, you can only use the reset button of the controller while an application is running.
Resetting the controller to default setting type 2 is not possible.

For resetting the controller to default setting type 2, please note the following:

When restoring to default setting type 2, the firmware of the controller is also reset to the delivery state. Controllers with a firmware version ≤ 1.0.2 can only be used **with** an SD card. Using them without an SD card is possible starting from firmware version 1.1.0.

- Ensure that the SD card has been inserted before switching the controller on, in order that the controller can use it.
- Only use an SD card provided by Phoenix Contact.

9.3 Known limitations and errors

– Time-outs during the communication with PCP devices

  If more than eight PCP devices are connected at the same time, time-outs can occur during the communication between the controller and the PCP devices.

– Maximum permissible number of Axioline F local bus devices

  Currently, a maximum of 30 Axioline F local bus devices is supported.

– Interrupting the PROFINET communication

  When transmitting files via SFTP to the controller, the PROFINET communication is interrupted.

– Function of the reset button

  When the controller is reset to default setting type 2, all LEDs light up after approx. 30 s.
  To actually restore the controller to default setting type 2, you need to press and hold the reset button for another 2 s after all LEDs have lit up.

10 Changes in firmware version 1.1.0

Please note:
After the update to firmware version 1.1.0, the controller has to be restarted.

10.1 New functions

Use of SD card now optional

The SD card is now optional and is no longer mandatory for operating the controller.

– Operation without SD card:
  All data is saved on the internal parameterization memory. If you make changes to files and directories on the internal parameterization memory, the Linux operating system generates an overlay filesystem from the changed files and directories.
– Operation with SD card:
  If you use an SD card, all application-specific data (e.g. network configuration, project bus configuration, etc.) is saved to the SD card.
  Two cases of SD card use can be distinguished:
  1) There is no overlay filesystem on the SD card:
     If there is an overlay filesystem on the internal parameterization memory, it is copied to the SD card.
  2) There already is an overlay filesystem on the SD card:
     If there is an overlay filesystem on the internal parameterization memory, it is **not** copied to the SD card.
     The controller accesses the overlay filesystem on the SD card. The overlay filesystem on the internal parameterization memory is deleted.

Please note:
The SD card is recognized during initialization of the controller. If you insert the SD card during operation, the SD card will not be detected.
- Make sure that the SD card has been inserted before you switch on the controller.

Memory expanded

– The program memory of the controller has been expanded from 4 MB to 8 MB.
– The data memory of the controller has been expanded from 8 MB to 16 MB.

11 Changes in firmware version 1.0.2

Please note:

After an update from firmware version 1.0.0 to firmware version 1.0.2, high-level language programs created with the Phoenix Contact SDK version 1.0.0 will no longer be executable. In this case, proceed as follows:

- Download the latest version of the Phoenix Contact SDK from phoenixcontact.net/products and install it.
- Compile existing high-level language programs with the latest version of the Phoenix Contact SDK.

When updating from firmware version 1.0.1 to firmware version 1.0.2, this procedure is not necessary.

11.1 Error corrections

– PROFINET configuration

The controller was stopped when transmitting a PC Worx Engineer project with a faulty PROFINET configuration to the controller.

This error has been rectified.

11.2 Known limitations and errors

– Controller breakdown

In some rare cases the controller may break down. In case of a controller breakdown, power is disconnected to the I/O modules contained in the bus configuration.

12 Changes in firmware version 1.0.1

Please note:

After an update from firmware version 1.0.0 to firmware version 1.0.1, high-level language programs created with the Phoenix Contact SDK version 1.0.0 will no longer be executable. In this case, proceed as follows:

- Download the latest version of the Phoenix Contact SDK from phoenixcontact.net/products and install it.
- Compile existing high-level language programs with the latest version of the Phoenix Contact SDK.

12.1 Error corrections

– Task processing time

  The programmed maximum task processing time was exceeded by occasional task processing time outliers. The ESM watchdog was triggered.
  This error has been rectified.

– User authentication

  A user authentication security vulnerability was patched.

– Requested memory

  An error occurred when memory was requested from a C++ program. The requested memory was not released again.
  This error has been rectified.

– Data Access Service

  An error in the Data Access Service (online view in the “Data List” editor in PC Worx Engineer) has been rectified.

– Subscription service

  During data query via OPC UA, an error occasionally occurred in the subscription service.
  This error has been rectified.