

4diac FORTE on STM32MP1 OpenSTLinux using the X-Nucleo-PLC01A1

[Eclipse 4diac](#) provides an open source software infrastructure for distributed industrial process measurement and control systems based on the IEC 61499 standard. Its FORTE runtime environment is highly portable.

In 2020, [support for the STMicroelectronics X-Nucleo-PLC01A1 was added to the 4diac codebase](#) and tested with a STM32MP157A-DK1 running FORTE on OpenSTLinux. Below is a summary of the steps that are required to successfully use IX and QX blocks in a 4diac application to access the PLC01A1's 24V digital I/Os on this platform.

STM32MP1 board

STMicroelectronics' [STM32MP1 microprocessor series](#) combines an ARM Cortex-A4 core for typical embedded microcontroller applications with 1 or 2 ARM Cortex-A7 cores and an optional GPU. The Cortex-A7 cores are capable of running Linux, with ST maintaining the Yocto-based [OpenSTLinux](#) for this purpose.

ST offers various development kits for evaluating this platform. As of 2020, the [STM32MP157A-DK1](#) is available from various distributors for around EUR 70. More technical information about this kit (together with its larger sibling, the DK2) can be found in the [user manual \(UM2534\)](#) and on [ST's developer wiki](#).

1. For setting up the board with OpenSTLinux and learning how to access it through a remote console, follow the ["Getting Started"](#) guide.
2. For building FORTE for this platform, see the section ["Run FORTE on the Board" on the 4diac documentation page](#).
3. To make FORTE start automatically when powering up the board, see [„Start forte at boot“ on the 4diac documentation page](#).

X-Nucleo-PLC01A1

The STMicroelectronics [X-NUCLEO-PLC01A1](#) provides 24V compatible digital I/O – 8 inputs and 8 solid-state relay outputs – through an SPI interface. With its Arduino compatible connectors, it can be attached to many microcontroller boards easily. More details, including the schematics and board layout files, can be found on ST's site, in the [data brief](#) and in the [user manual \(UM1918\)](#). As of 2020, the X-Nucleo PLC01A1 is available from [various distributors](#) for around EUR 10.

The STMicroelectronics X-Nucleo PLC01A1 expansion board can be attached to the STM32MP157A-DK1 to provide 24V digital I/O capability.

1. To build and install FORTE on the STM32MP1 development board with PLC01A1 support enabled, make sure that your copy of the FORTE source code contains the [required feature](#) and enable it at [build](#): `-DFORTE_IO_PLC01A1=ON`
2. The OpenSTLinux installation on the STM32MP1 development board must be [modified as described in the 4diac documentation](#) to allow FORTE to access the SPI interface to which the PLC01A1 is connected.
3. To access the IOs, assign the instance name of your IX/QX to the respective inputs of the PLC01A1 block in the IDE to define where on the PLC01A1 this IX/QX should be physically connected.

