



INDUSTRIAL SHIELDS

Raspberry Pi PLC Family products

Set up of the Operating System (Adapted Raspberry Pi OS)

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1. Introduction

This document specifies how to adapt an original Raspberry Pi OS (Linux) Operating System to work with the Industrial Shields scripts for use with Raspberry PLC as well as how to synchronize the UPS with the Raspberry Pi integrated into the PLC.

Industrial Shields Raspberry-based PLCs come with the operating system with all these modifications made at the factory, this document is useful in case you have formatted the integrated operating system or want to make a copy of it.

For this we show you below the requirements to be able to leave all the configurations and files in your Raspberry Pi OS operating system.

2. Requirements

- **PLCRaspberryConfig.zip file:** All the needed files, scripts and folders are attached on this zip file.
- **Raspberry PLC from Industrial Shields**
- **Raspberry Pi OS** image on the microSD running on the Raspberry PLC

3. Steps to follow

1. *Config.txt:*

First, we are going to unzip the PLCRaspberryConfig file that you can find attached in the downloads of the following link:

<https://www.industrialshields.com/shop/product/raspberry-plc-cpu-1980?search=raspberry+plc>

Once the file is unzipped, we are going to copy the config.txt file found in PLCRaspberryConfig and copy it directly into the **/boot/** folder of the Industrial Shields Raspberry-based PLC.

Note: This document is normally already created by default on Raspberry Pi OS, so you will have to replace the default file with the new one

2. *Test folder*

After modifying/adding the config.txt file, we will add the test folder located inside the PLCRaspberryConfig directory to **/home/pi/**

3. */usr/local/bin/*

We are going to copy to `/usr/local/bin/` everything located in the `bin` directory of `PLCRaspberryConfig`. This file is usually created by default so, in case that it is not created, we are going to execute this command:

```
sudo mkdir -p /usr/local/bin/
```

Once we did this, we are going to execute these commands in the following order:

```
cd /usr/local/bin/
```

```
sudo chmod ugo+x rpishutdown
```

```
sudo chmod ugo+x temperature-control
```

```
sudo chmod ugo+x hw-config
```

4. */lib/systemd/system*

We are going to move the 3 services that we have, to `/lib/systemd/system`:

```
mv rpishutdown.service /lib/systemd/system
```

```
mv temperature-control.service /lib/systemd/system
```

```
mv hw-config.service /lib/systemd/system
```

5. *Services activation*

We are going to activate the services because, when the system restarts, they have to run automatically:

```
sudo systemctl enable hw-config.service
```

```
sudo systemctl enable rpishutdown.service
```

```
sudo systemctl enable temperature-control.service
```

To start the services at this moment:

```
sudo systemctl start hw-config.service
```

```
sudo systemctl start rpishutdown.service
```

```
sudo systemctl start temperature-control.service
```

If it is needed, we can stop the services:

```
sudo systemctl stop hw-config.service
```

```
sudo systemctl stop rpishutdown.service
```

```
sudo systemctl stop temperature-control.service
```

6. Add file to overlays folder

Create the overlays folder:

```
sudo mkdir /boot/overlays
```

Copy the ads1015.dtbo file to this folder:

```
sudo cp ads1015.dtbo /boot/overlays
```

7. Examples and ventilation control

***Note:** if your device has heatsink, it does not have fan, and you do not need to consider this section.

Move to /etc/network/ everything located in interfaces.d directory.

```
mv interfaces.d /etc/network
```

Change the configuration to activate/deactivate the internal ventilation:

Create a file named rpiplc.conf in /etc/. Open the file and write inside the following commands:

```
FAN_START_TEMP=65 #Temperature to activate the internal fan
```

```
FAN_STOP_TEMP=60 #Temperature to deactivate the internal fan
```

```
FAN_MIN_TIME=120 #Once started, minimum period that the fan is activated
```

ATTENTION: The temperature control (fan management) can be done by the temperature-control.service previously mentioned or using the files start-fan and stop-fan. If you want to use the start-fan and stop-fan files you need to deactivate the other service or they can occur some conflicts between both programs (you cannot use both simultaneously).

7.1 I/Os scripts

All the inputs and outputs scripts must be executed from the correct path. It depends on the shield type of the I/O executed. To be sure of your device's shields, you can consult the table below to ensure it. For example, the Raspberry PLC 57 AAR has the first shield Analog/Digital, the second Analog/Digital and the third Relay. In function of the shield of the I/O that you need to activate, you must execute the scripts from a specific path.

Model	Zones Table			
	Zone 0	Zone A	Zone B	Zone C
Raspberry PLC Ethernet CPU	☑	-	-	-
Raspberry PLC 21+	☑	Analog / Digital	-	-
Raspberry PLC 42+	☑	Analog / Digital	Analog / Digital	-
Raspberry PLC 58+	☑	Analog / Digital	Analog / Digital	Analog / Digital
Raspberry PLC 19R+	☑	Relay	-	-
Raspberry PLC 38R+	☑	Relay	Relay	-
Raspberry PLC 57R+	☑	Relay	Relay	Relay
Raspberry PLC 38AR+	☑	Analog / Digital	Relay	-
Raspberry PLC 53ARR+	☑	Analog / Digital	Relay	Relay
Raspberry PLC 57AAR+	☑	Analog / Digital	Analog / Digital	Relay
Raspberry PLC 54ARA+	☑	Analog / Digital	Relay	Analog / Digital
Raspberry PLC 50RRA+	☑	Relay	Relay	Analog / Digital

7.1.1 Analog/Digital Shield

```
cd /home/pi/test/analog
```

7.1.2 Relay Shield

```
cd /home/pi/test/relay
```

7.1.3 Generic Shield

```
cd /home/pi/test/generic
```

4. Revision Table

Revision Number	Date	Changes
0	11 / 01 / 2021	First implementation
1	18 / 01 / 2021	Changes with paths
2	12 / 02 / 2021	Changes with section 6

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