



Getting Started

"VisionSensor PV2 / PV3"

Version 1.9 – March 2022

Welcome

Congrats on your new VisionSensor PV2 / PV3! In this “Getting Started” guide, we will show you all necessary steps to get the VisionSensor PV2 / PV3 ready for first operation.



VisionSensor PV2 / PV3

What you need

- A PC with the following requirements:
 - OS: Windows 10 or Debian GNU/Linux
 - Internet connection for downloading the required tools
 - Ethernet port
- Requirements for the VisionSensor PV2 / PV3:
 - 8-pin power and I/O cable with green terminal connector (included in the VisionSensor PV2 / PV3 starter kit)



- Ethernet cable (included in the VisionSensor PV2 / PV3 starter kit)

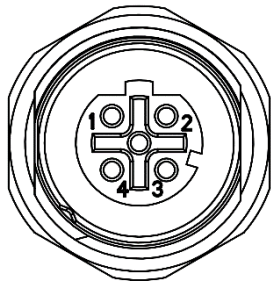


- Power supply 24 V, minimum 1 A with green terminal connector (included in the VisionSensor PV2 / PV3 starter kit)

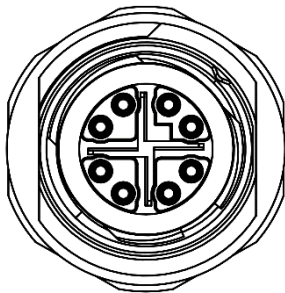


Attach the Ethernet cable

If you have **VisionSensor PV2** or a **VisionSensor PV3** you have to attach the Ethernet cable to the Ethernet connector of the camera. Depending on the version of the camera, the Ethernet connector can look like this:



**4-pin Ethernet connector of
VisionSensor PV2**



**8-pin Ethernet connector of
VisionSensor PV3**

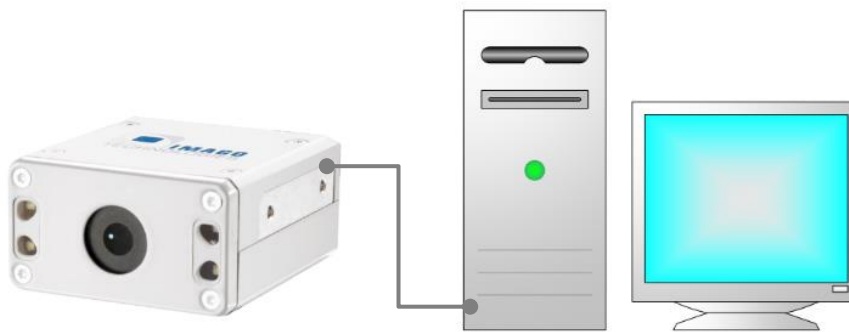
Prepare the Ethernet connection

The network interface of the VisionSensor PV2 / PV3 is set to DHCP. If you want to connect the camera to your local network infrastructure, a running DHCP server is required. Usually, every modern router has a built-in DHCP server.

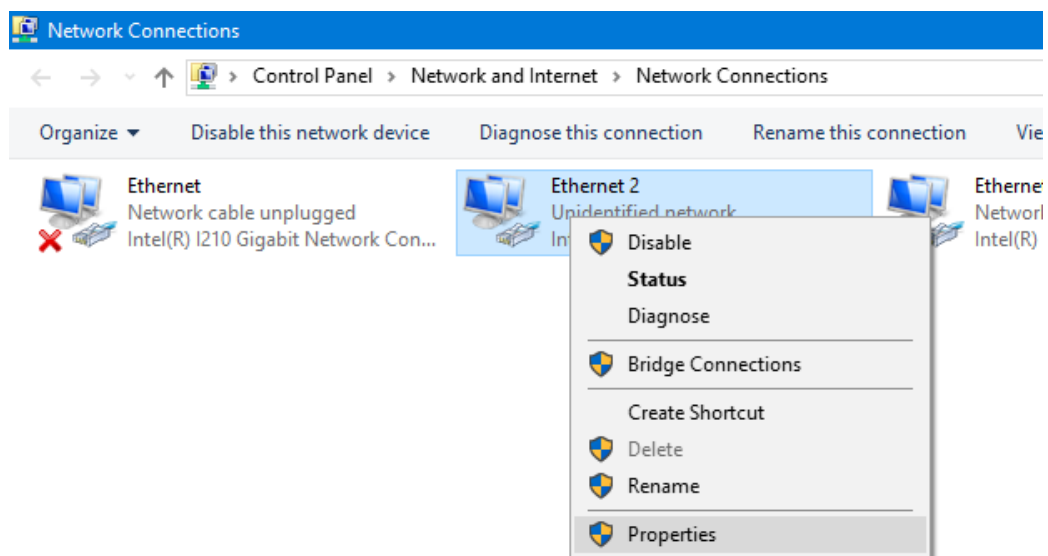
You also have the possibility to attach the VisionSensor PV2 / PV3 directly to your PC. Due to the missing DHCP server, the camera and the PC will use Automatic Private IP Addressing (APIPA) or Zeroconf.

Direct attach (APIPA / Zeroconf):

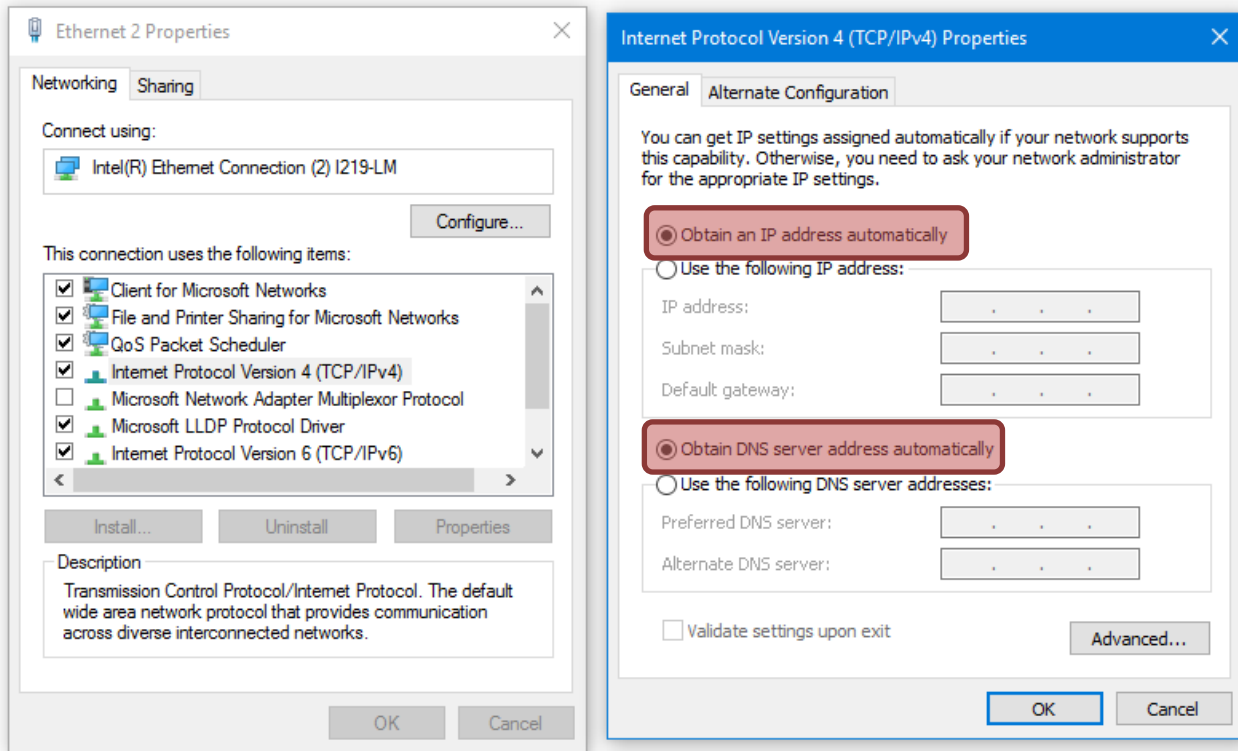
You can connect the VisionSensor PV2 / PV3 directly to your PC. Simply plug in the Ethernet cable of the VisionSensor PV2 / PV3 into the Ethernet port of your PC.



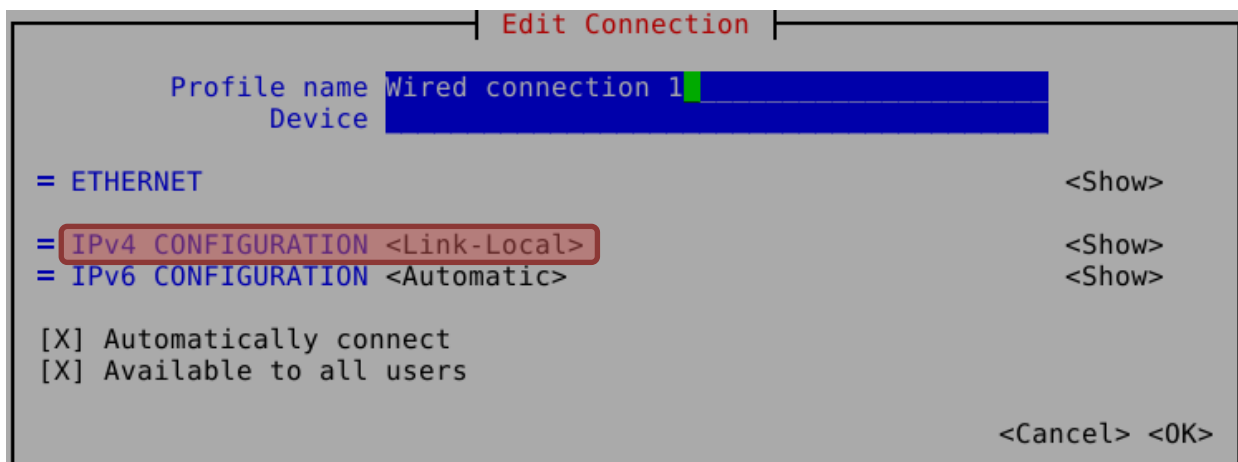
For direct attach, the PC and the camera must support Automatic Private IP Addressing (APIPA) or Zeroconf. If you have a Windows 10 PC, APIPA is enabled by default. Go to the Ethernet adapter settings. Select the Ethernet adapter (right click), which is connected to the VisionSensor PV2 / PV3, then click on “Properties”.



Select “Internet Protocol Version 4”. Then click on “Properties”. Make sure that both options “Obtain an IP address automatically” and “Obtain DNS server address automatically” are enabled.

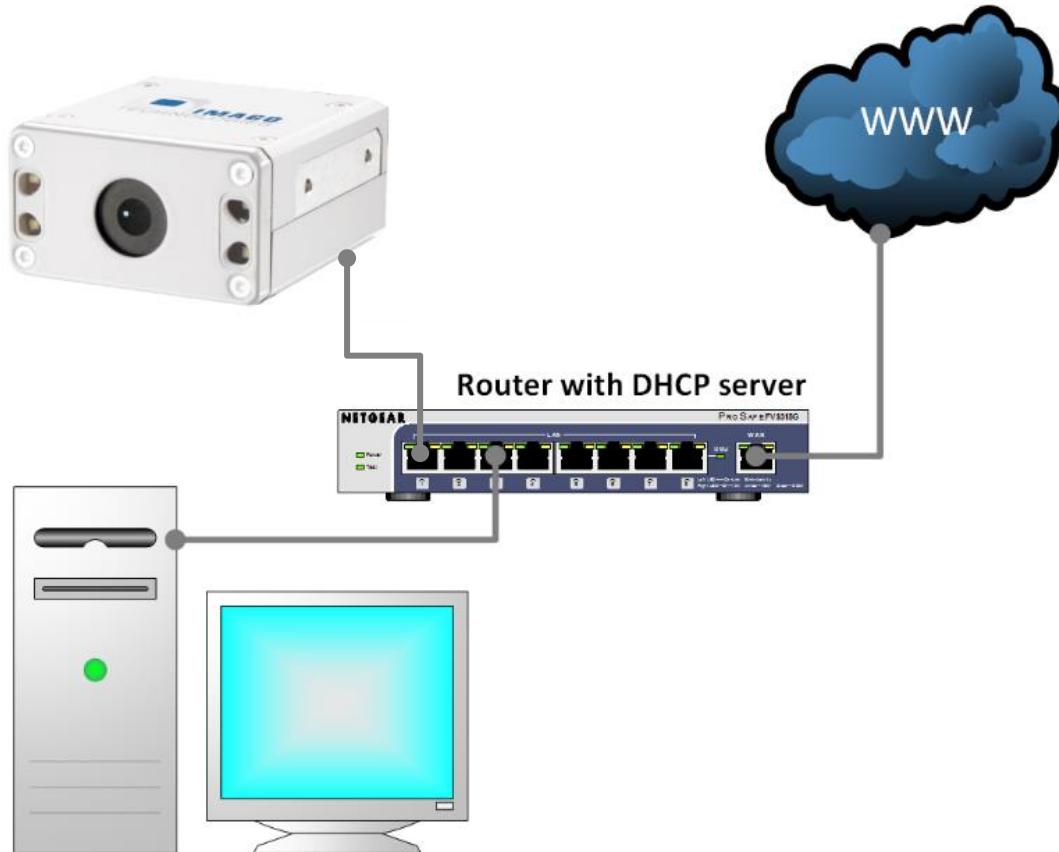


If you are using Debian GNU-/Linux on your PC, you can use for example nmtui to configure the Ethernet adapter. Start nmtui and select the Ethernet adapter which is connected to the camera. Then select “Link-Local” as IPv4 address method:



Local network infrastructure (DHCP Server):

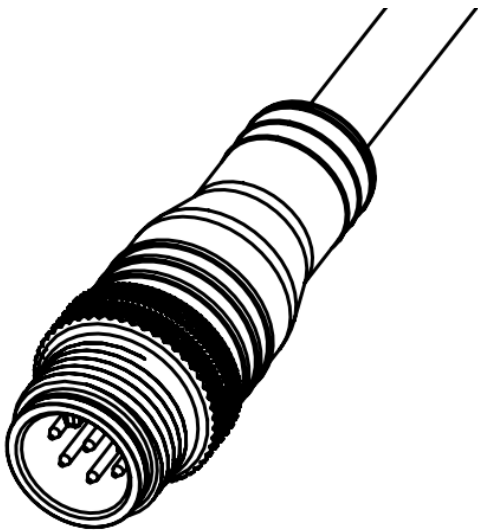
You also have the possibility to connect the camera to your local network infrastructure. In this case, please make sure that a DHCP server is available and running in your network. Usually, every modern router has a built-in DHCP server.



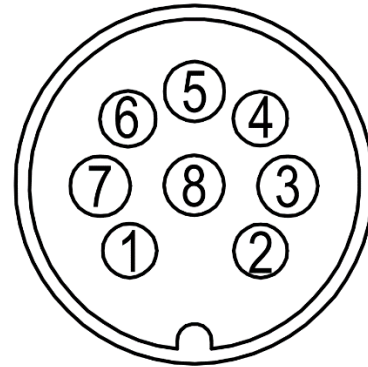
Now you can continue with the next step “Establish power supply”.

Establish power supply

If you have **VisionSensor PV2** or a **VisionSensor PV3** an 0.5 meter cable with an M12 8-pin connector is used for power supply and I/O.



Power and I/O cable



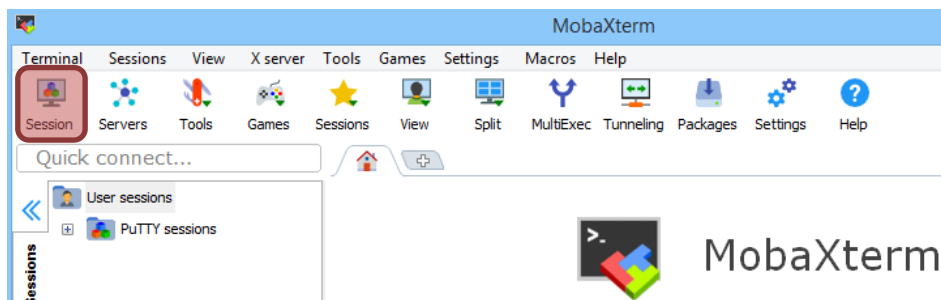
Pin assignment M12 connector camera

| Pin | Function |
|-----|-----------------|
| 1 | Power (21V-28V) |
| 2 | GND |
| 3 | Digital IN0 |
| 4 | Digital IN1 |
| 5 | Digital OUT3 |
| 6 | Digital OUT0 |
| 7 | Digital OUT1 |
| 8 | Digital OUT2 |

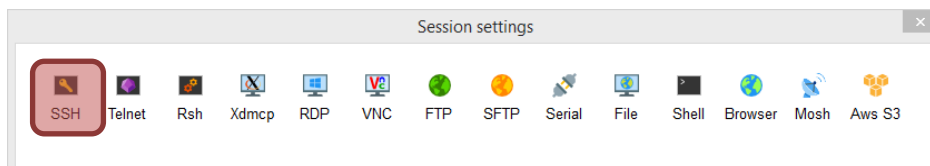
Connect the power and I/O cable to the M12 8-pin connector of the camera. Then connect the green terminal connector of I/O cable to the green terminal connector of the power supply. Now you can power on the camera and continue with the next step "First login via SSH".

First login via SSH

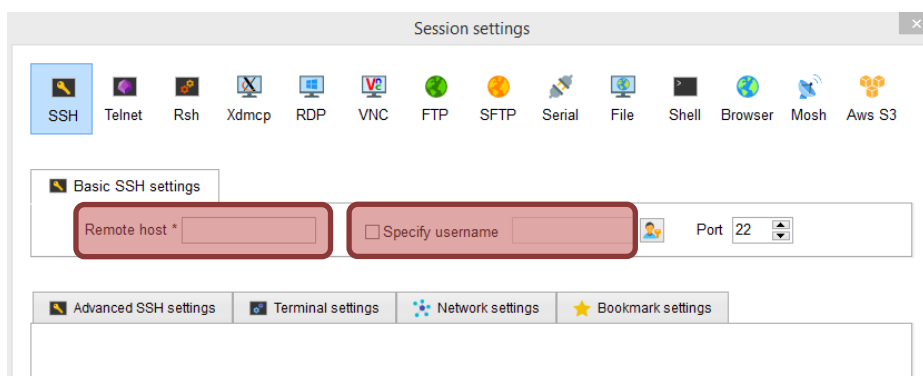
Now we will login via SSH. For your Windows PC you must install a SSH client program. We recommend using MobaXterm <https://mobaxterm.mobatek.net/>, which is an enhanced terminal for Windows with included X11 server, SSH and serial session management. After the installation is completed, set up the SSH connection. Run MobaXterm and click on the “Session” button.



Next, select “SSH” as session type.



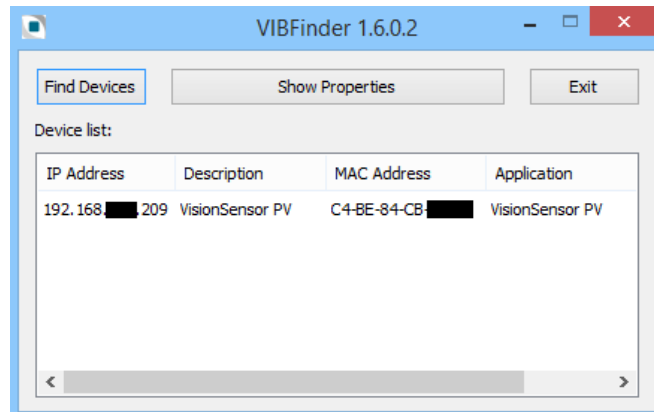
You will see the following menu:



In the text field “Remote host”, enter the serial number of the camera without the hyphen and add the domain “.local”. You can find the serial number on the camera.

Example: If the serial number of the camera is “VSPV-1904-000315” you must enter “VSPV1904000315.local” into the text field “Remote host”.

Instead of serial number you can also enter the IP address of the camera in the text field "Remote host". To find out the IP address of the camera you can use the IMAGO VIBFinder program (only available for Windows PC, see chapter "What's next?" for download details). This program sends a broadcast via SNMP and shows all IMAGO devices and their corresponding IP addresses. In this example, the camera has the IP address 192.168.0.209.



For the login, you need to know the username and password. This device is preconfigured with two user accounts, namely "root" and "visionsensor". The password for both is "vision".

| Usernames and passwords VisionSensor PV2 / PV3 | |
|---|----------|
| Username | Password |
| root | vision |
| visionsensor | vision |

You can connect either as user "visionsensor" or as "root". In this example, we log in as user "root". Enable the checkbox "Specify username" in MobaXterm. Enter the username "root" in the corresponding text field. Confirm all settings with "OK". Now the SSH connection should be established and you will be asked for the password. After successful login, you can continue with the next step "Set up your system".

If you have a Debian GNU/Linux PC you first have to install following package:

```
apt-get install libnss-mdns
```

Now you can use the "ssh" program to establish the SSH connection. As already mentioned you can connect either as user "visionsensor" or as "root". The password for both accounts is "vision" (see table above). Enter the serial number of the camera without the hyphen and add the domain ".local" as SSH destination. You can find the serial number on the camera.

Example: If the serial number of the camera is "VSPV-1904-000315" you must enter "VSPV1904000315.local" as SSH destination.

```
ssh root@VSPV1904000315.local
```

Now the SSH connection should be established and you will be asked for the password. After successful login, you can continue with the next step "Set up your system".

Set up your system

After the first login, you should proceed with the following steps to set up your system:

Update the package list

If the VisionSensor PV2 / PV3 is connected to the internet, you can update the package list with the following command:

```
apt-get update
```

Change your password

We recommend changing the password of both accounts. You can do this with “passwd”:

```
passwd
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
```

Set up your network configuration

The network interface of the VisionSensor PV2 / PV3 is set to DHCP. You can change this by editing the file “/etc/network/interfaces”. For example, if you want to set the camera to the static IP address 192.168.0.2 and your gateway is 192.168.0.1, you can do this with the following lines:

```
#auto eth0
#iface eth0 inet dhcp

auto eth0
iface eth inet static
address 192.168.0.2
netmask 255.255.255.0
gateway 192.168.0.1
```

Remove SNMPD if not needed

An SNMPD (Simple Network Management Protocol Daemon/service) runs on this system. This service provides some information about the VisionSensor PV2 / PV3 in the network, for example hostname, uptime or IP address of the camera. It is useful in combination with the IMAGO VIBFinder program (Windows only) which can be downloaded on our IMAGO Download Portal. If you don't need it anymore, you can remove this service with the following command:

```
apt-get purge snmpd
```

Good to know...

The operating system (OS) of the VisionSensor PV2 / PV3 is based on Debian GNU/Linux. The OS was built with a VisionSensor PV2 / PV3 specific

- Linux kernel
- U-Boot
- Configuration files
- Firmware.

IMAGO releases the OS of the VisionSensor PV2 / PV3 as a complete preconfigured image. Each image has a unique version number. The version number can be found in the file name of the image and in the OS hostname. Here is a little example. The file name of the image is

`deb10_vspv_v1.0_a.tar.gz`:

```
Deb10 -> Debian GNU/Linux 10 "Buster"
vspv   -> IMAGO VisionSensor PV / VisionSensor PV2
vspv3  -> IMAGO VisionSensor PV3
v1.0   -> Image version
a      -> Image variant
```

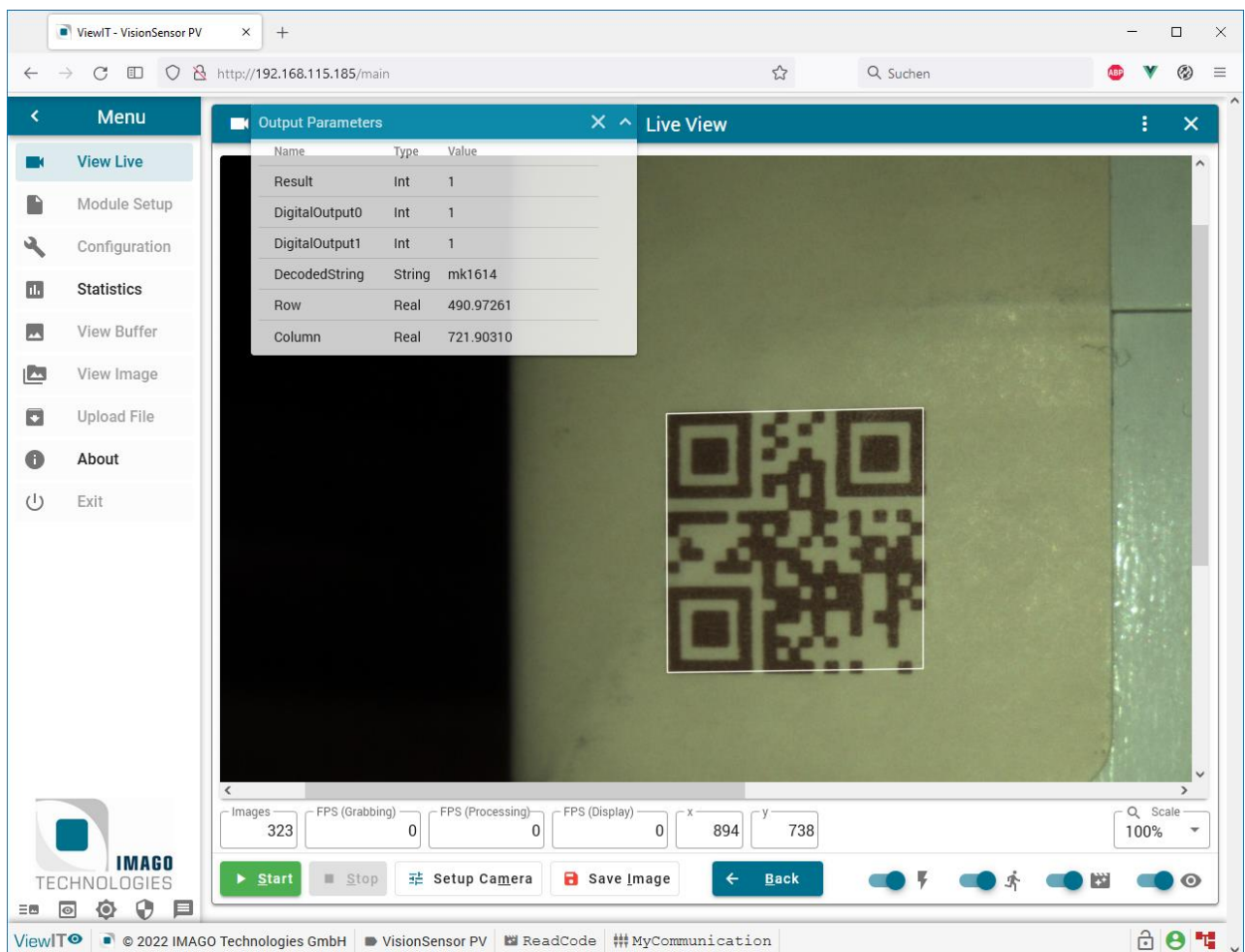
The corresponding OS hostname for this example is `Deb10VSPVv1-0a`.

For further information about the operating system's version history, please have a look at the corresponding release notes.

ViewIT

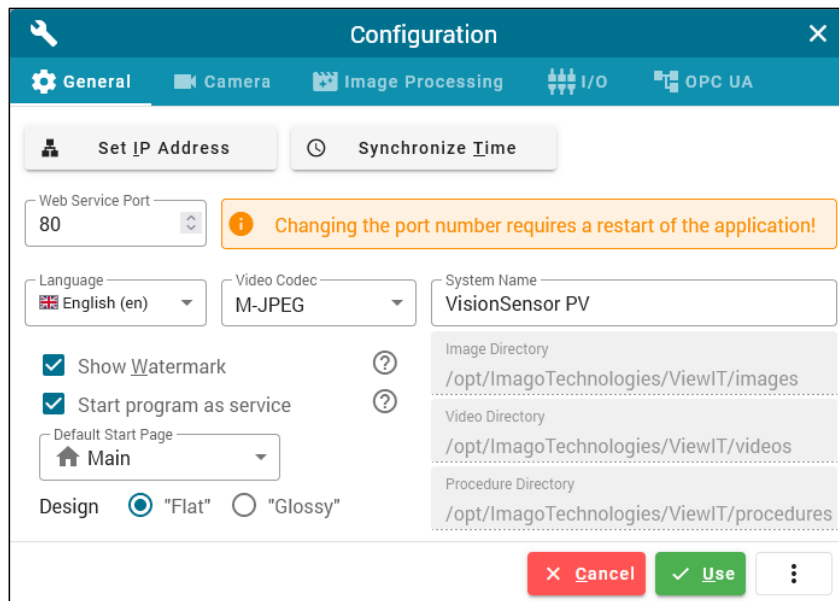
By default, a VisionSensor PV2 / PV3 is delivered with an application called **ViewIT**. It is a framework for easily handling image processing functions on IMAGO Technologies devices. The framework gives access to the live view from the camera, acquisition parameters, general purpose digital inputs and outputs and allows using self-designed image processing algorithms.


ViewIT is automatically started when switching on the VisionSensor PV2 / PV3. Interaction with the human user is done by a web interface which can be opened by every modern browser. Enter the IP address or the serial number followed by “.local” into the address field of your web browser to open the main screen. Select “View Live” to visualize image data.



The application starts with normal user rights. To get access to all features press the shield icon at the bottom of the menu panel. The “Administrator Login Dialog” will open. The password is “admin”.

As long as **ViewIT** is running, no other application can acquire images from the sensor. Therefore, you must stop it before starting your own image processing application. To disable the automatic start after power on or a reboot, open the “Configuration” dialog, switch off the “Start program as service” option, move the mouse pointer to the button at the right bottom containing the three dots and select “Save”.



Type “/root/ViewIT.sh” in a SSH console to start **ViewIT** again.
For more information see the own documentation of **ViewIT**. Open the “About” dialog and press the  button.

What's next?

Register at our IMAGO Download Portal:

- <https://www.imago-technologies.com/support>

Read the VisionSensor PV2 / PV3 Hardware Manual:

- VisionSensor PV2: <https://imago-technologies.sharefile.com/f/fo899e4f-c408-4139-b5e5-8a8df48eeb42>
- VisionSensor PV3: <https://imago-technologies.sharefile.com/f/fo721dac-46d5-4a70-84f5-c88f32fb7d77>
- Get more technical data about your new VisionSensor PV2 / PV3

Read the SDK Documentation:

- <https://api.imago.tech/>

Learn how to use the I/Os of your new camera using the VisionBox Interface Library:

- https://api.imago.tech/VIB_Interface/
- A little example program can be found on the camera under: `\opt\ImagoTechnologies\SDK\examples\FirstTest_Linux\`

Learn how to grab images with your new camera using the FG Camera Library:

- <https://api.imago.tech/FGCamera/>
- A little example program can be found on the camera under: `\opt\ImagoTechnologies\SDK\examples\FGExample_Linux\`

Access further files and tools (Documentation, Linux Images, Linux Sources, IMAGO VIBFinder) for the VisionSensor PV2 / PV3 on the IMAGO Download Portal:

- VisionSensor PV2: <https://imago-technologies.sharefile.com/f/foae8c76-899f-45d6-a52c-ad5007ee5f91>
- VisionSensor PV3: <https://imago-technologies.sharefile.com/f/fo34eda9-9368-416a-a7f3-98c2156378de>

Finally, if you have any open questions, the IMAGO support team is happy to assist you in any cases. For direct contact to the support, please use our ticket system:

- <https://imago.freshdesk.com>

Document History

| Revision | Date | Changes | Initials |
|----------|----------|--|----------|
| 1.0 | Jun-2018 | First version, valid for all images >= deb9_vspv_v1.0_a | av |
| 1.1 | Jun-2018 | Text revision | vm |
| 1.2 | Jan-2019 | Added chapter "Prepare the Ethernet connection", valid for all images >= deb9_vspv_v1.1_a | av |
| 1.3 | Jan-2019 | Text revision | vm |
| 1.4 | Feb-2019 | Removed chapter "Attach the cables to the VisionSensor", minor improvements | av |
| 1.5 | Jun-2019 | Added information for VisionSensor PV2 | av |
| 1.6 | Mar-2020 | Updated chapter "First login via SSD", valid for all images >= deb10_vspv_v1.0_a | av |
| 1.7 | Apr-2020 | Added VisionSensor PV3", valid for all images >= deb10_vspv3_v1.0_a deb10_vspv_v1.0_a | av |
| 1.8 | Jun-2020 | Added pictures of PV2 / PV3 starter kit, text revision, update of all chapters | av |
| 1.9 | Mar-2022 | Removed PV, added ViewIT section | gs |