

AUTOMATIC NUMBER PLATE RECOGNITION AND INDUSTRIAL CODE RECOGNITION

Install Guide

For Carmen®



AN PR 999

NUMBER PLATE:	AN PR 999
NATIONALITY:	EU-DENMARK
SPEED:	190 MPH / 177 KMH
BLACKLIST:	NO
COLOR:	RED
RECOGNITION TIME:	2023-01-01T15:19:20+00:00



CARMEN® ANPR / OCR

INSTALL GUIDE

For Versions 7.3.1.18 and above on ANPR side
For Versions 7.3.1.10 and above on OCR side

Document date: 2021-04-16



Table of Contents

INTRODUCTION	4
HANDLING PRECAUTIONS	4
PACKAGE CONTENTS	5
SYSTEM REQUIREMENTS.....	6
HARDWARE INSTALLATION.....	7
1. Installation of the PCIe (X1) NNC	7
2. Installation of the USB port NNC	7
INSTALLATION ON WINDOWS.....	8
0. Pre-requisites.....	8
1. Installing CARMEN®	8
2. Uninstallation.....	9
INSTALLATION ON LINUX.....	10
0. Pre-requisites.....	10
1. Installing CARMEN®	10
1.1. Contents of the Installer Package.....	11
1.2. The Installation Procedure	12
1.2.1. Installation from tar.gz files	12
1.2.2. Compile/install/autoload kernel modules via make_kerneldrivers script	12
1.2.3. Compiling kernel modules manually	13
1.2.4. Installing new kernel modules manually	14
1.2.5. Check GXSD.dat file.....	14
2. When installation is done	15
2.1 Custom installer	15
2.2 If you are using JAVA	16
2.3 Minimal installation for embedded systems.....	17
3. Uninstallation.....	17
AFTER INSTALLATION.....	18
1. License Upload / Update	18
2. Installation of ANPR / OCR Engine(s)	18
INPUT IMAGE REQUIREMENTS	19
1. Character size	19
2. Image Quality Requirements	21
2.1 Images Adequate for ANPR / OCR	21
2.2 Examples to avoid.....	22
CONTACT INFORMATION.....	23



INTRODUCTION

This documentation contains a step-by-step guide on how to install both the hardware and software components of CARMEN® ANPR / OCR. It also gives a brief description on input image requirements.

This guide details the installation procedure for **Windows** and **Linux** based operating systems as well.

If you would like to read more about the demo software's that are provided with the software package, please follow these links below:

- [ANPR Demo for Images \(ADI\) User Manual](#)
- [ANPR Demo for Videos \(ADV\) User Manual](#)
- [OCD DEMO for Images \(ODI\) User Manual](#)

HANDLING PRECAUTIONS

There are some standard precautions that should be followed when handling the Neural Network Controller (NNC) card or any other electronic hardware component:

1. Keep the card in its anti-static bag until it is ready to be installed.
2. Protect the card from static electricity by grounding your body and the equipment during installation. Wear a grounded wrist strap, or touch the metal case or chassis of the PC before touching the card.
3. Always grasp the card by its edges.
4. Do not touch the components on the card or the "gold finger" connectors plugged into the expansion slot. Instead, grasp the card by its mounting bracket.
5. Ensure the system power is completely turned-off before doing any installation work. In case of PCs with ATX power supplies, it is recommended to unplug the power cord before installation.

! Important

During hardware installation, exercise caution when handling hardware components as these might have sharp edges or protruding parts that can cause hand injuries.

PACKAGE CONTENTS

A CARMEN® ANPR / OCR license has both hardware and software components. Hardware components are shipped physically via a courier service, software components are downloaded via the Adaptive Recognition Technical Support System ([ATSS](#)) after registration.



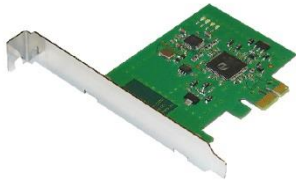
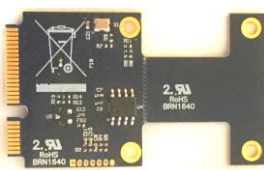
Software Components:

- Software development libraries
- Sample codes for some supported programming languages:
 - C/C++, C#, VB.NET and Java for Windows
 - C/C++ and Java for Linux
- Manual for the API in electronic format
- Drivers for our Neural Network Controllers (NNC)
- Demo applications, Utilities and “general” engines which are installed together with the package:

	CARMEN® ANPR	CARMEN® OCR
Demo application(s)	<ul style="list-style-type: none"> - ANPR Demo software for Images (ADI) - ANPR Demo software for Videos (ADV) 	<ul style="list-style-type: none"> - OCR Demo software for Images (ODI)
Utilities	<ul style="list-style-type: none"> - License Manager - Engine Manager - Credit Information - Time Credit Information 	<ul style="list-style-type: none"> - License Manager - Engine Manager
“General” engine	<ul style="list-style-type: none"> - General engine 	<ul style="list-style-type: none"> - ISO engine

Hardware components:

- One of the following Neural Network Controllers (NNC)

			
FXMC USB	FXMC Internal USB	FXMC PCIe	FXMC miniPCle

SYSTEM REQUIREMENTS

Minimum system requirements:

- Intel Pentium III 1GHz CPU or higher (or any other fast x86 or x64 compatible CPU)
- 512 Mbytes of RAM or more
- Free PCIe or miniPCIe slot with bus mastering option or USB port
- Windows 8, 8.1, 10 (32- /64-bit operating system)
- For CARMEN®: image files (.jpg, .bmp, .png, .jpeg2000) loaded from a mass storage drive or directly from memory as input

In order to run CARMEN® you should either have a USB port / internal USB NNC or PCIe / miniPCIe NNC. This is a form of HW protection for the software, the dongle includes the license.

! Important

32-bit version from CARMEN® is available before CARMEN® ANPR 7.3.1.23 and CARMEN® OCR 7.3.1.14, we are not supporting x86 architecture from these releases!

HARDWARE INSTALLATION

1. INSTALLATION OF THE PCIE (X1) NNC

0. Please see [HANDLING PRECAUTIONS!](#)
1. Turn the computer off and unplug the power cord.
2. Remove the cover from the computer (refer to the user's manual of the PC for specific instructions).
3. Locate an available empty PCIe expansion slot.
4. Remove the slot cover screw and slot cover if possible.
5. Open the antistatic protective sleeve of the CARMEN® NNC card, grasp the circuit board by the edge of its mounting bracket and take it out from the sleeve.
6. Insert the card into the empty PCIe expansion slot by its gold finger connectors and gently press down on the top edges of the board to ensure that all connecting points are seated securely. Fasten the mounting bracket of the board using the screw removed earlier.
7. Reinstall the cover of the PC and reconnect the power cord.
8. Turn the computer on.
9. During system boot, enter the BIOS setup program of the computer and check whether the **Bus mastering** option is enabled. If not, enable it. Save and exit setup. (This option is not available in every BIOS setup program; check the user's manual of the PC for specific information).
10. When the New Hardware Found wizard starts, click on **[Cancel]**.

2. INSTALLATION OF THE USB PORT NNC

1. Connect the NNC to one of the USB ports of the computer.
2. The key will only be detected and recognized once the software package has been installed.

INSTALLATION ON WINDOWS

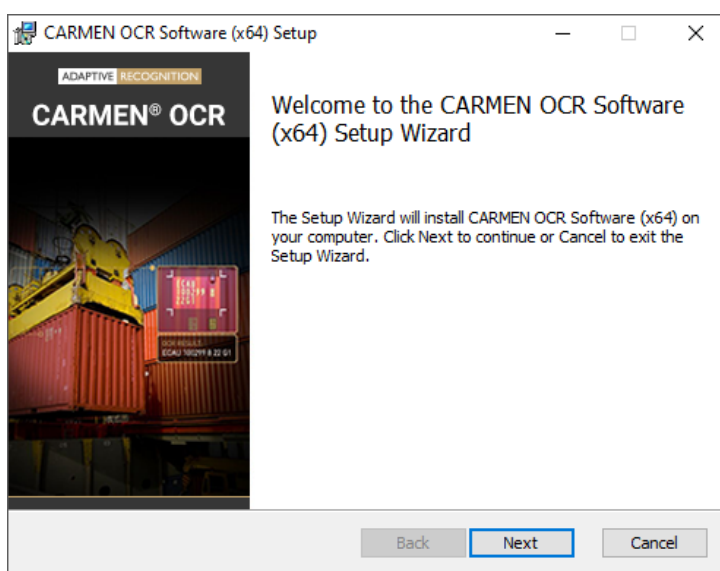
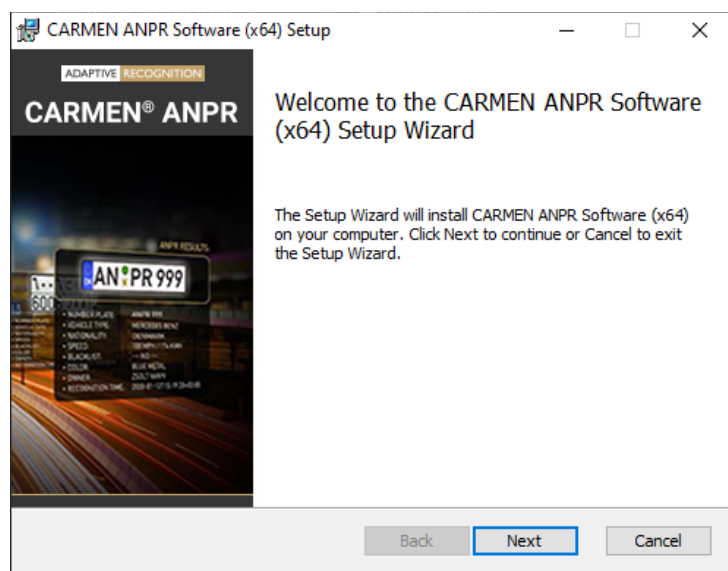
0. PRE-REQUISITS

- A) Remove all previously installed CARMEN® product from your computer!
- B) Turn off these options if supported on your system
 - a. Secure Boot ([link](#) on how to do that)
 - b. Fast Startup ([link](#) on how to do that)

1. INSTALLING CARMEN®

Download links for the CARMEN® Installation Package are distributed via the Adaptive Recognition Technical Support System ([ATSS](#)). The links are sent out automatically once your order is processed. If you did not receive a download link, please open a ticket in [ATSS](#).

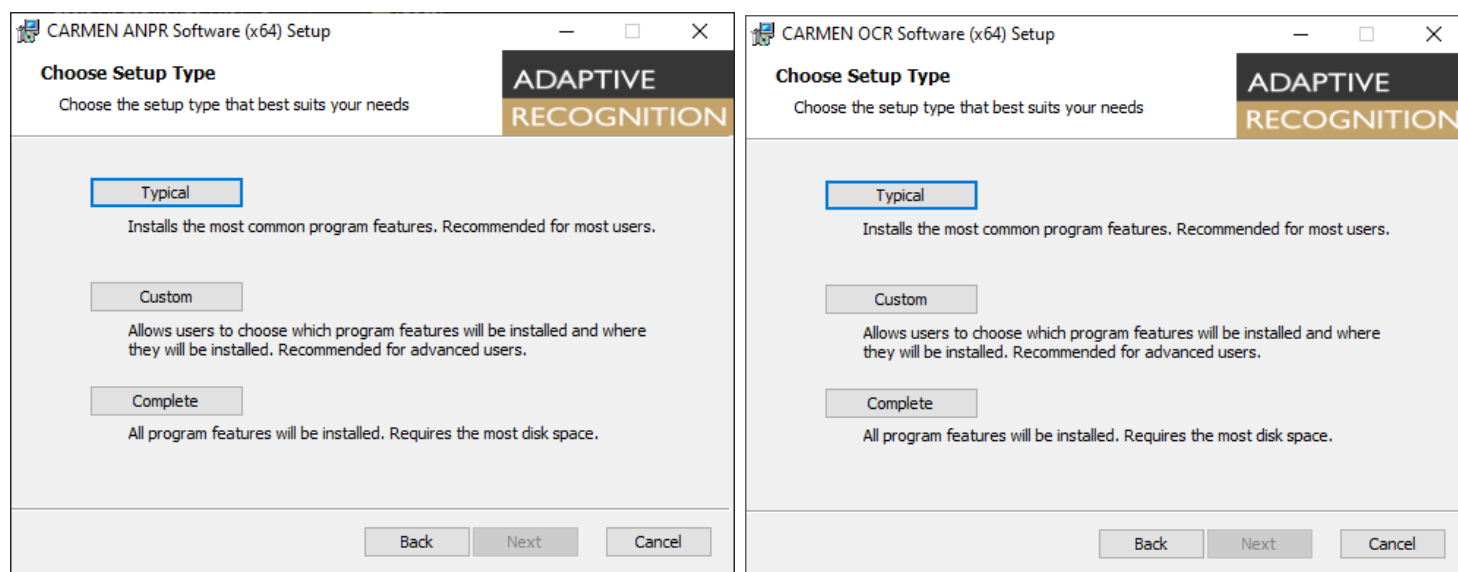
1. Extract the received zip file to a folder on the hard disk of your computer.
2. CARMEN® setup does not start automatically; locate and double-click
ANPR: "CARMEN ANPR-7.3.X.XX-x86.msi" (32-bit version) or "CARMEN ANPR-7.3.X.XX-x64.msi" (64-bit version)
OCR: "CARMEN OCR-7.3.X.XX-x86.msi" (32-bit version) or "CARMEN OCR-7.3.X.XX-x64.msi" (64-bit version)
within the Installation Package to start the installation.



! Important

32-bit version from CARMEN® is available before CARMEN® ANPR 7.3.1.23 and CARMEN® OCR 7.3.1.14, we are not supporting x86 architecture from these releases!

3. Follow the installation steps and accept the END-USER LICENSE AGREEMENT
4. Once this is done, select the method of installation in the pop-up window.



Three options are available:

- a) Typical: Recommended for most users, installs the most common program features.
 - b) Custom: Allows users to select or deselect components for installation.
 - c) Complete: recommended for developers. Selecting this option will install the entire package on the PC. (we are suggesting to use this option)
5. Click on **[Next]** to start copying files to your computer.
 6. After installation is done there is a possibility to run our Demo for Images application automatically after the window is closed.
 7. Connect the USB or Express Card Hardware Key into the computer.

Please read [after installation](#) chapter to see what have to be done still.

2. UNINSTALLATION

You can remove CARMEN® from your computer by opening the installation file and then click on the “Remove” button, or by removing it from Apps & features from the Windows Settings menu, or from Control Panel / Programs and Features section.

Note

The uninstall process will delete only those files which are installed with the CARMEN®, so you have to manually uninstall the engines one-by-one.

INSTALLATION ON LINUX

0. PRE-REQUISITS

- A) Remove all previously installed CARMEN® product and restart your computer!
- B) For the installation you need "GNU Make" (tested with "GNU Make 3.82"), "GNU C/C++" compiler (tested with "GNU C/C++ 4.5.1") and the corresponding GLIBC. (It is also good if you install "build-essential".)
- C) Since the kernel drivers are provided as source code, you need to compile the kernel objects (.ko) from them. For this, you need to have the kernel headers and configuration files installed.
- D) "Swig" has to be installed, if Java support is required.
- E) You will need admin rights to be able to successfully install CARMEN® on your computer.

Note

Read the license agreement before installing the packages.

1. INSTALLING CARMEN®

Tested under the latest Ubuntu, Fedora and Debian. This package contains source codes, documentation, shared libraries and utilities for various architectures. The available scripts for installation and uninstallation are the following:

- `_install_all-x86.sh` (supported before CARMEN® ANPR 7.3.1.23 and CARMEN® OCR 7.3.1.14)
- `_install_all-x86_64`
- `_install_all-arm64.sh`
- `_install_all-armv7.sh`
- `_remove_all.sh`: removes all CARMEN® related files from your system

! Important

x86 version from CARMEN® is available before CARMEN® ANPR 7.3.1.23 and CARMEN® OCR 7.3.1.14, we are not supporting x86 architecture from these releases!

1.1. CONTENTS OF THE INSTALLER PACKAGE

A module may consist of the following files (not every module includes all of them):

Module- <i>x.x.x-x</i> -x86.tar.gz	32-bit runtime libraries
Module- <i>x.x.x-x</i> -x86_64.tar.gz	64-bit runtime libraries
Module- <i>x.x.x-x</i> -sdk.tar.gz	Examples, documentations and development libraries

- GX system
 - gx-*x.x.x-x*-sdk.tar.gz – sample codes for device handling
 - gx-*x.x.x-x*-x86_64.tar.gz – base system (core libraries, image, property and device handling functions)
 - gx-kernel-src-*x.x.x-x*-noarch.tar.gz – source of the gxsd kernel driver
- FXMC_USB NNC (if you have an USB NNC device)
 - fxmc_usb-kernel-src-*x.x.x-x*-noarch.tar.gz – source of the fxmc_usb kernel driver
- FXMC_PCIE (if you have a PCIE NNC device)
 - fxmc_pcie-kernel-src-*x.x.x-x*-noarch.tar.gz – source of the fxmc_pcie kernel driver
- CMANPR
 - cmanpr-*x.x.x-x*-sdk.tar.gz – sample code for CARMEN® ANPR libraries
 - cmanpr-*x.x.x-x*-x86_64.tar.gz – binary runtime packages of CARMEN® ANPR
 - cmanpr-general-*x.x.x-x*-x86_64.tar.gz - CARMEN® ANPR engine
- CMOCR
 - cmaccr-*x.x.x-x*-sdk.tar.gz – sample codes for CARMEN® OCR libraries
 - cmaccr-*x.x.x-x*-cmn.tar.gz – binary runtime packages of CARMEN® OCR - cmaccr-*x.x.x-x*-x86_64.tar.gz - CARMEN® ACCR engine

1.2. THE INSTALLATION PROCEDURE

1.2.1. Installation from tar.gz files

The files of the install package are arranged into the same directory structure as the installed files on Linux systems. When simply extracting the files of the install pack, they will be unpacked to appropriate directories (no further copying/renaming needed).

The installation can be executed according to the following:

Use the `_install_all-x86-sh` or `_install_all-x86_64.sh` script. These scripts copy the appropriate files to the `/usr/lib32` (32-bit modules) and `/usr/lib64` (64-bit modules) directories installed on the Linux system.

Note

The setup scripts extract and copy all files from the corresponding directory, so leave only those files in the directory which are to be installed.

Dependencies:

- GX: none
- FXMC_USB: GX
- FXMC_PCIE: GX
- CMANPR 7.x: GX
- CMANPR 7.x.x.x: CMANPR 7.x, GX
- CMACCR 7.x.x.x GX

1.2.2. Compile/install/autoload kernel modules via `make_kerneldrivers` script

After you installed CARMEN® on your computer you can locate `make_kerneldrivers.sh` script in this folder: `/usr/src/gx/kernel/`

The script can run 3 different way:

- A) `./make_kerneldrivers.sh`: just compiling the drivers (you have to manually install/start them)
- B) `./make_kerneldrivers.sh start`: compiling the drivers and then installing/starting them (you have to do that after every system restart, or you have to manually make it auto loaded)
- C) `./make_kerneldrivers.sh stop`: stop the currently running drivers
- D) `./make_kerneldrivers.sh autostart`: compiling, installing/starting the drivers and then make them automatically load when system is restarted
- E) `./make_kerneldrivers.sh remove`: stop the currently running drivers and remove them from autostart

Note

The script is working on the `gx`, `fxmc_usb` and `fxmc_pcie` drivers at the same time.

Note

You need admin rights to be able to run the scripts!

1.2.3. Compiling kernel modules manually

You can use the configured kernel source package of your distribution. It is to be found here: `/lib/modules/"kernel_version"/build` - ("kernel-devel" or "kernel-headers" package in most distributions).

If you have an older GX version in the kernel tree then remove it manually by using the `_remove_all.sh` script.

Or make sure that the kernel config files are installed and check the following directory: `/lib/modules/${KERNEL_VERSION}/build`

Note

In previous versions, you may have been using a user space driver. This option was removed in order to achieve stability, reliability and to enhance performance. You do need the kernel driver to run CARMEN®.

Note

The running kernel has to have exactly the same version number as the kernel source which the drivers are compiled under, otherwise the binaries cannot be loaded with `insmod`.

1. First, enter the `/usr/src/gx/kernel/gxsd` directory and enter the 'make' command.

Note

If the gxsd driver does not compile, edit the `gxsd.c` and remove the comment from the following line: `#define get_current() current`.

2. After the gxsd kernel driver has compiled, you can compile the other drivers according to your hardware key:
 - `/usr/src/gx/kernel/fxmc_usb`
 - `/usr/src/gx/kernel/fxmc_pcie`

1.2.4. Installing new kernel modules manually

- For FXMC_PCIE:
 - `/sbin/insmod /usr/src/gx/kernel/gxsd/gxsd.ko`
 - `/sbin/insmod /usr/src/gx/kernel/fxmc_pcie/fxmc_pcie.ko`
- For FXMC_USB:
 - `/sbin/insmod /usr/src/gx/kernel/gxsd/gxsd.ko`
 - `/sbin/insmod /usr/src/gx/kernel/fxmc_usb/fxmc_usb.ko`

Note

Do not forget to start the kernel drivers after each boot up (you can copy them from a fully installed system compiled on the same kernel version):

- `gsd`
- `fxmc_usb` (if you use an USB NNC device)
- `fxmc_pcie` (if you use the FXMC PCI-E card)

1.2.5. Check GXSD.dat file

under `/var/gx`. It should contain these lines:

```
<?xml version="1.0" ?>
<!-- GX PROPERTY FILE -->
<gxproperty>
  <default>
    ...
    <cmanpr value="cmanpr-7.3.10.242:gen"/>
  </default>
  <gen>
    <cmanpr value="cmanpr-7.3.10.242:gen" />
    <cmanpr-7.3.10.242>
      <size value="" />
      <size_max value="" />
      <size_min value="" />
      <slant value="" />
      <slant_max value="" />
      <slant_min value="" />
      ...
      <datafile value="cmanpr-10.242-gen.dat" />
    </cmanpr-7.3.10.242>
  </gen>
</gxproperty>
```

If the example above, `cmanpr-7.x.x.x` is the name of the `cmanpr` engine included in the install package. This package also includes a `cmanpr-7.x.x.x-x86.tar.gz` or `cmanpr-7.x.x.x-xx86_64.tar.gz` archive. If you find something else, rename the `gsd-cmanpr.dat` to `gsd.dat`.

2. WHEN INSTALLATION IS DONE

After installation, you can find the manual for the GX system under `/usr/share/doc/gx`. The header files can be found in `/usr/include/gx`, the library files in `/usr/lib32/gx` (under 32-bit systems) and `/usr/lib64/gx` (under 64-bit systems).

The basic GX library is in `/usr/lib32` and `/usr/lib64` (`libgxsd.so.7`). The file containing the property data is `/var/gx/gxsd.dat`.

After the kernel modules have started, you can check the state of the running drivers under `/proc/gx`. Sample programs can be found in `/usr/src/gx/examples` directory.

! Important

Samples are instructional and may not include all security mechanisms required for a production environment.

2.1 CUSTOM INSTALLER

If the packages have not been installed to the default directories (but e.g., to the home directory of the user) then the following environmental variables have to be defined by the user for the appropriate operation of the system.

- `LD_LIBRARY_PATH:` for shared objects (*.so)
(`/usr/lib`, `/usr/lib64`, `/usr/lib/gx`, `/usr/lib64/gx`)
- `GX_VAR_PATH:` for properties (`gxsd.dat`) and global locks
(`/var/gx`)
- `GX_SHARE_PATH:` for shared data (`cmanpr-xx.dat`)
(`/usr/share/gx`)

2.2 IF YOU ARE USING JAVA

Please follow these steps:

1. First, install the `default-jdk` java development kit.
(To check whether it is installed properly, enter the “`java -version`” command.)
2. Make sure that `swig` is installed as well.
3. Go to `/usr/src/gx/swig` folder and run `make.sh` then `install.sh`.

Note

If not working, check `/usr/lib/jvm/` folder, if there is no “`java`” folder but “`default-java`”, then hit this command in `/usr/lib/jvm/` folder: `sudo ln -s default-java java` then go back to the `swig` folder and run those 2 scripts again and after that you would be able to compile and run java example codes.

The `JAVA_INC_PATH` contains the actual path to the folder that includes the java files used by CARMEN®.

Note

The `Readme.txt` file contains the instructions on how to compile and run Java sample codes.

2.3 MINIMAL INSTALLATION FOR EMBEDDED SYSTEMS

Files for minimal installation:

- **Property data**
 - `/var/gx/gxsd.dat`
- **The base GX library**
 - `/usr/libxx/libgxsd.so.7`
- **Other GX libraries**
 - `/usr/libxx/gx/*.so`
- **Required shader libraries:**
 - `gxproperty.so`, `gxpropfile.so`: for property handling
 - `gximage.so`: for image handling
- **Other libraries (not needed for minimal system):**
 - `gxbmp.so`, `gxpng.so`, `gxjpeg2k.so`: for BMP, PNG and JPEG-2000 handling
 - `gxjpeg8.so`: for 8-bit JPEG handling
 - `gxjpeg12.so`: for 12-bit JPEG handling
 - `gxwatchdog.so`: for watchdog handling
 - `gxlog.so`: for logging
 - `gxmotdet.so`: for motion detection
 - `gxtrafo.so`: for transformation (required for passport reader)
 - `gxzlib.so`: for compression/decompression

ENGINE FILES

`/usr/libxx/gx/cmanpr-7.3.9.55.so`
`/usr/share/gx/cmanpr-7.3.xx.xxx.dat`
`libinfo.so`, etc...

Note

Do not forget to start the kernel drivers after each boot up (you can copy them from a fully installed system compiled on the same kernel version):

- `gxsd`
- `fxmc_usb` (if you use an USB NNC device)
- `fxmc_pcie` (if you use the FXMC PCI-E card)

3. UNINSTALLATION

If you want to uninstall the CARMEN® files then just run this file which is located in the installer package: `_remove_all.sh`

AFTER INSTALLATION

Once the installation is done you have to set up your system to allow CARMEN® to do what it was built for.

1. LICENSE UPLOAD / UPDATE

If you purchase CARMEN® ANPR / OCR software from us we will provide the licenses already on your dongle (Neural Network Controller) and also, we will send you the licenses in a file (ukeys file). Once you need an update after your free period is over you will receive the updated licenses also in a ukeys file.

Please check our [License Manager User Manual](#) to see how you could be able to upload / update your licenses on your dongle.

Also, you can see [these](#) videos about how to do the license upload / update.

2. INSTALLATION OF ANPR / OCR ENGINE(S)

CARMEN® software package comes with a general engine installed. For exact license plate type (including country and state recognition) / code (ACCR, UIC, USDOT, etc.) don't forget to install your ANPR / OCR engine(s).

For detailed instructions please check the [Engine Manager Pro](#) user manual.

! Important

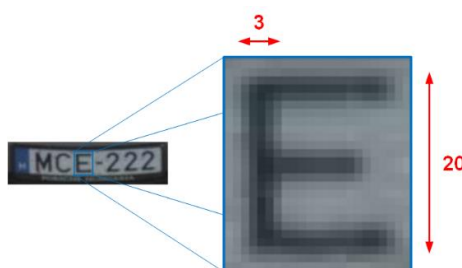
From 20Q3 engines vcaredist (for Visual Studio 2015, 2017 and 2019) is a must on windows systems. You can download it from [here](#).

INPUT IMAGE REQUIREMENTS

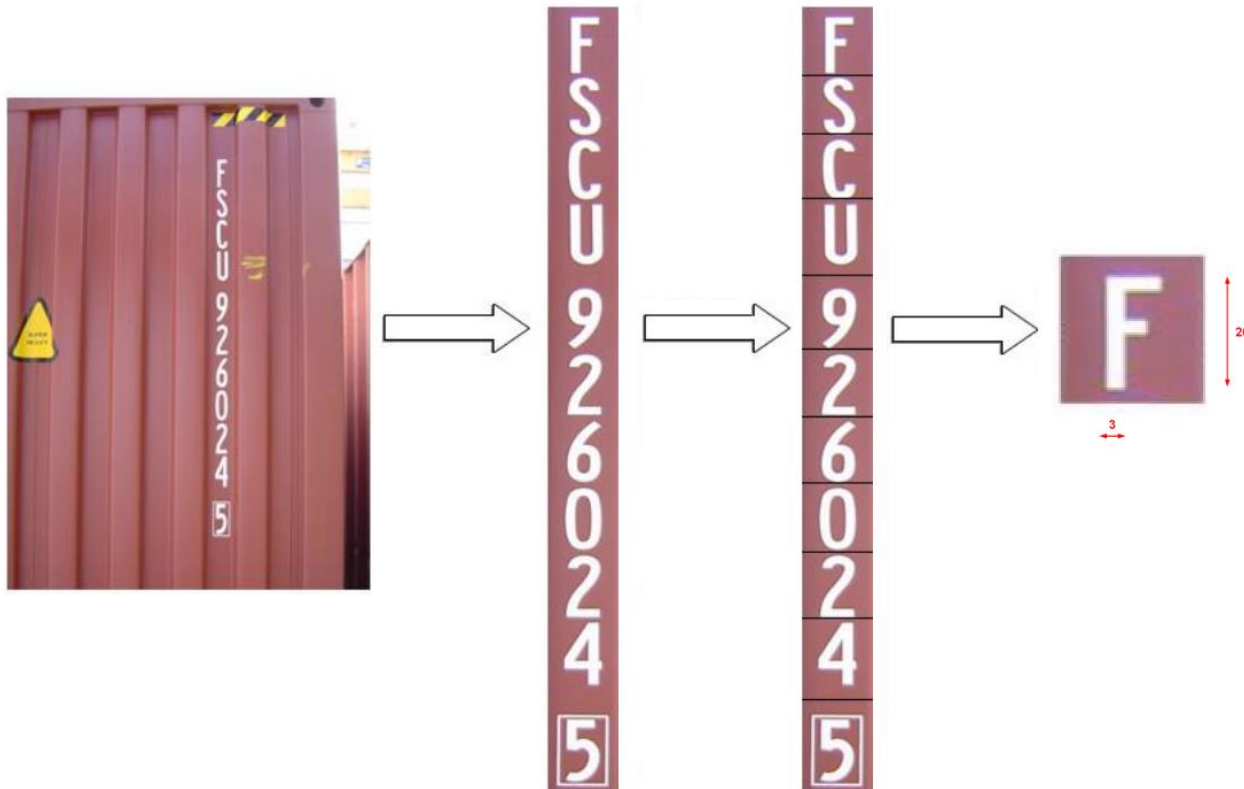
1. CHARACTER SIZE

For optimal ANPR / OCR results, the most important factor is the size of the characters on the image. For Latin characters it is recommended to have an average character height of at least 16 pixels. For optimum results, it is recommended to have characters that are at least 20 pixels in height.

Very low-resolution images are unusable for ANPR / OCR, but so are very high-resolution images as well. Therefore, avoid settings where the character height is greater than 80 pixels. The line width of a character on the image should be at least 2-3 pixels.



Proper character sizes (in pixels) on a sample image of a License Plate

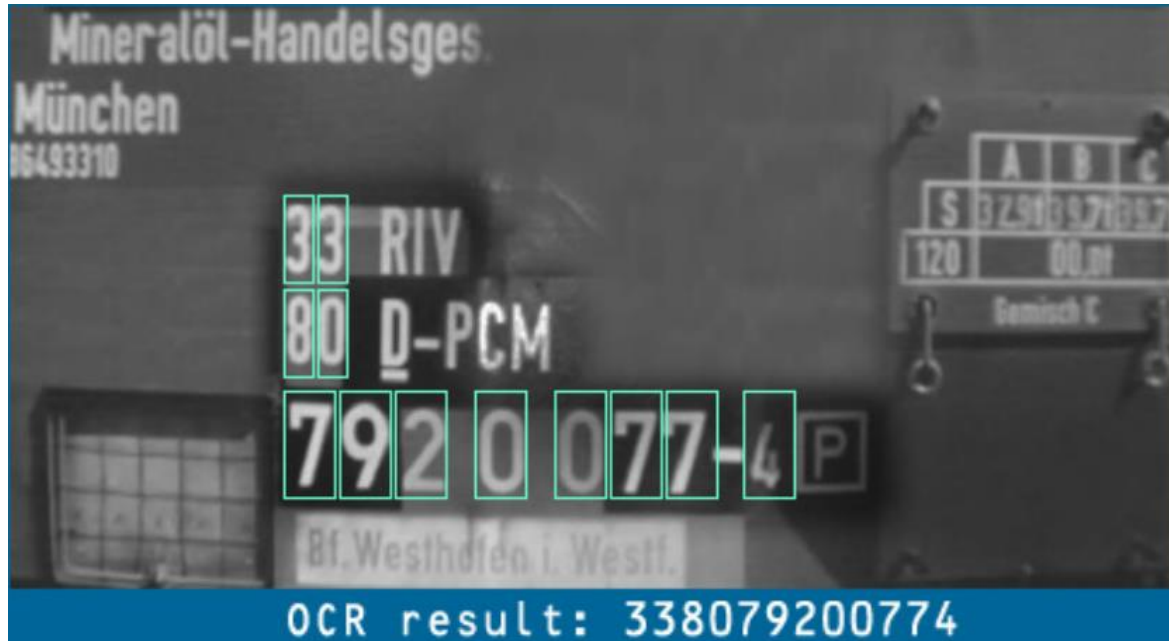


Proper character sizes (in pixels) on a sample image of a container code (ISO)

Recommended character sizes in pixels:

- Height, Latin characters: 10-80 pixels (optimal 20-50)
- Height, Non-Latin characters: 20-80 pixels (optimal 30-60)
- Line width: min. 2-3 pixels

Same character size requirements apply to all CARMEN® related engines.



Proper character sizes on a sample image of an UIC code



Proper character sizes on a sample image of an US DOT code

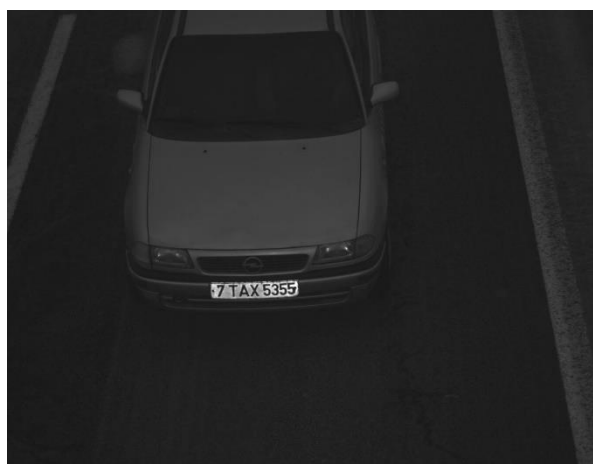
2. IMAGE QUALITY REQUIREMENTS

In order to expect the most accurate result from CARMEN® ANPR / OCR software, the processed images should contain a plate or a code (ACCR, UIC, USDOT, etc.):

- with reasonably good spatial resolution (the minimum character height is 16 pixels for Latin and 20 pixels for Non-Latin characters, 2 pixels line-width on the image),
- with reasonably good sharpness,
- with reasonably high contrast,
- under reasonably good lighting conditions,
- in a reasonably good position and angle of view.

Although “reasonably” is not an exact definition, it can still be easily understood if you look at the sample images below. The following images can be properly used for ANPR / OCR, but the last chapter contains six images which are NOT usable for that.

2.1 IMAGES ADEQUATE FOR ANPR / OCR



- GOOD SPATIAL RESOLUTION
- GOOD SHARPNESS
- HIGH CONTRAST
- GOOD LIGHTING CONDITIONS
- GOOD POSITION AND GOOD ANGLE OF VIEW

2.2 EXAMPLES TO AVOID



LOW SPATIAL RESOLUTION



LOW CONTRAST



HIGH DISTORTION



BLURRED IMAGE



OVEREXPOSURE



BAD LIGHTING CONDITIONS
(SHADOW AND STRONG LIGHT)

For a more detailed description about image requirement, please check [this](#) document.

CONTACT INFORMATION

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Adaptive Recognition Technical Support System ([ATSS](#)) is designed to provide you the fastest and most proficient assistance, so you can quickly get back to business.

For further technical information about our products, please visit our official website.

Information regarding hardware, software, manuals and FAQ are easily accessible for customers who previously registered to enter the dedicated ATSS site. Besides offering assistance, the site is also designed to provide maximum protection while managing your business information and technical solutions utilized.

New User

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