CMS 356

Getting Started

Manual version: ENU 1114 03 04

Contents

About this manual

This Getting Started with *CMS 356* manual provides information on how to get started with the *CMS 356*. The Getting Started contains brief safety instructions, designated use, system requirements, and first steps to set up the working environment and start using the device.

The *CMS 356* configuration is based on an example, which explains all steps in detail. The operations with the web interface are mentioned in the web interface Help.

The Getting Started with *CMS 356* ends with troubleshooting, frequently asked questions, and software license information.

Safety symbols used

In this manual, the following symbol indicates safety instructions for avoiding hazards.

WARNING
Death or severe injury can occur if the appropriate safety instructions are not observed.

1   Safety instructions

<table>
<tr><td>⚠️</td><td>

WARNING

The CMS 356 can output life-hazardous voltages and currents.

VOLTAGE OUTPUTS and CURRENT OUTPUTS of *CMS 356* can conduct life-hazardous voltages and currents.

Before operating the *CMS 356*, carefully read the following safety instructions. Only operate (or even turn on) *CMS 356* after you have read this Getting Started including the "Technical data" chapter in the User Manual and fully understood the instructions herein.

Safety instructions of accompanying accessories are described in their respective documentation.

</td></tr>
</table>

1.1   For your safety

The OMICRON documentation is to be supplemented by existing national safety standards for accident prevention and environmental protection. Keep the documentation available at the site where the OMICRON device is used. It should be read by all personnel operating the device.

In addition to the manual and the applicable safety regulations in the country and at the site of operation, pay attention to the usual technical procedures for safe and competent work.

The *CMS 356* must be operated by trained personnel only. Any maloperation can result in injury to persons and/or damage to property.

FOR YOUR OWN SAFETY

Always follow the five basic safety rules:

1. Insulate

2. Secure to prevent reconnecting

3. Check isolation

4. Earth and short-circuit

5. Cover or shield neighboring live parts

1.2 Rules for use

- *CMS 356* must be used only when in a technically sound condition. Its use must be in accordance with the safety regulations for the specific job site and application. Always be aware of the dangers of high voltages. Pay attention to the information provided in the *CMS 356* Getting Started and Reference Manual.

- The instructions provided in the *CMS 356* Getting Started and Reference Manual are considered part of the rules governing proper usage.

1.2.1 Orderly practices and procedures

- Keep the *CMS 356* Getting Started and Reference Manual, which contains printed safety instructions, available on site where *CMS 356* is used.

- Personnel assigned to using *CMS 356* must have read the *CMS 356* Getting Started and fully understood the instructions therein.

- Do not carry out any modifications, extensions, or adaptations at *CMS 356*.

1.2.2 Operator qualifications

- Installation and configuration of *CMS 356* should only be carried out by authorized and qualified personnel.

- Personnel receiving training, instruction, direction, or education on *CMS 356* should remain under the constant supervision of an experienced operator while working with the device.

1.2.3 Safe operation procedures

- Before wiring the terminals, verify that the conducting parts are de-energized. The terminal connectors have hazardous live parts.
- Do not operate *CMS 356* under wet or moist conditions (condensation).
- Do not operate *CMS 356* when explosive gas or vapors are present.
- When setting up *CMS 356*, make sure that the ventilation holes on the rear of the device remain unobstructed.
- Do not open *CMS 356*. There are no user serviceable parts inside. If *CMS 356* is opened by unauthorized personnel, all guarantees are invalidated.
- If *CMS 356* seems to be functioning improperly, please contact the OMICRON Technical Support (→ "Support" on page 31).

2   Introduction

The *CMS 356* is a voltage and current amplifier for analog low level signals or sampled values provided by a CMC test set or by any other signal source, such as a digital real-time power system simulator. When used in combination with a CMC test set, the amplifier extends the capabilities of the CMC test set to provide additional output channels and higher amplitudes.

The high-amplitude and high-power current outputs make it equally suitable for testing modern numerical relays as well as high-burden electromechanical relays. The outputs of the voltage amplifier and the current amplifier are galvanically separated from each other and also from the power supply. Configuring and monitoring the device status of the *CMS 356* amplifier is done via the easy-to-use web interface.

2.1   Key features

- 6 analog low level inputs or signals received as sampled values
  (selectable range for analog low level inputs: ±7.071 V_{peak} or ±10 V_{peak})

- Numerous output configurations, for example 3 x 300 V + 3 x 64 A or 6 x 32 A

- Calculation and output of residual voltage and current

- Parallel connection of several *CMS 356* units for even higher current amplitudes

- All current and voltage outputs are fully overload and short circuit proof

- Protection against voltage transients and over-temperature

2.2   System requirements

- Physical computer with x86 or x64 architecture

- DVD drive

- Ethernet port 10/100/1000Base-TX (RJ45), USB or WiFi to connect the amplifier

- Administrative privileges (installation)

- Operating system: Microsoft Windows 7, 8/8.1, or 10

- Web browser: Microsoft Internet Explorer 9 or higher, Mozilla Firefox, or Google Chrome

3 First steps to get started

In this chapter, you follow the steps to get started with the application and learn its workflow and features. You start by installing the *Device Link*, then connecting *CMS 356* to your computer, opening the web interface from the *Device Link*, and follow two configuration examples.

3.1 Installation

1. Exit all major programs running on your computer.

2. Insert the DVD into your computer's DVD drive and click **Install CMS 356 Software** on the start page. Should the start page not appear automatically a few seconds after the DVD has been inserted into the DVD drive, change to **Windows Explorer** and, on the DVD, double-click **autorun.exe**.

3. Follow the on-screen instructions to complete the installation. Afterwards, to open the *Device Link*, double-click the **OMICRON Device Link** desktop icon.

Note: After installation, the PDF documentation can be found by default at:
C:\Program Files (x86)\OMICRON\CMS 356\Doc.

3.2 Connecting the CMS 356 to your computer

CMS 356 communicates with your computer through the Ethernet network interface (ETH1 or ETH2), USB or WiFi. The ports are located at the rear of *CMS 356*.

To connect *CMS 356* to the controlling computer using the Ethernet interface, you may consider one of two possibilities:

- Connect *CMS 356* directly to the controlling computer Ethernet port.
- Connect both *CMS 356* and controlling computer Ethernet port to the Ethernet network.

3.3 Opening the CMS 356 web interface

To open the *CMS 356* web interface:

1. Launch the OMICRON *Device Link*.
   OMICRON *Device Link* will automatically find your *CMS 356*.
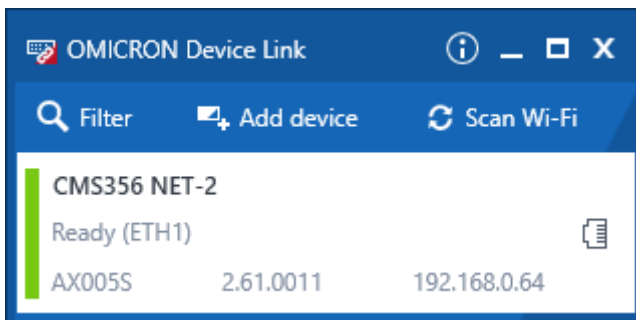
The vertical bar on the left displays the device status:

- Green bar: The device is online and ready for operation.

- Gray bar: The device is offline. Connect your *CMS 356* to the Ethernet network.

- Red bar: The device is online but not accessible due to incorrect IP configuration.

The *CMS 356* is usually configured to obtain the IP address automatically. However, it is also possible to assign a static IP address.

To configure an IP address for your device proceed as follows:

- Click the *CMS 356* entry and select **Configure IP**.
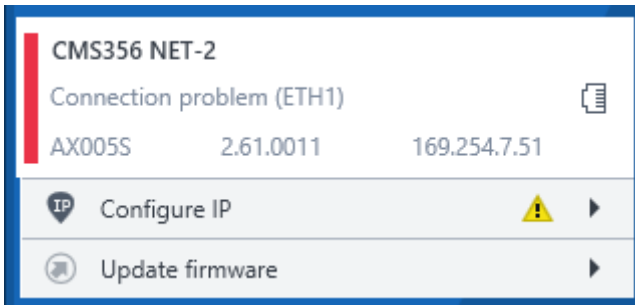
OMICRON *Device Link* will then display an IP configuration page. In this page, select **Use the following IP address** and enter the IP address of your *CMS 356*, or enter an IP address of your choice to assign a new IP adress to your *CMS 356*. Click the **Subnet mask** field to automatically fill a subnet mask and then click **Apply** to connect to your *CMS 356*.

– or –

- If your device cannot be found automatically, click the **Add device** button and manually enter the IP address assigned to your *CMS 356*.
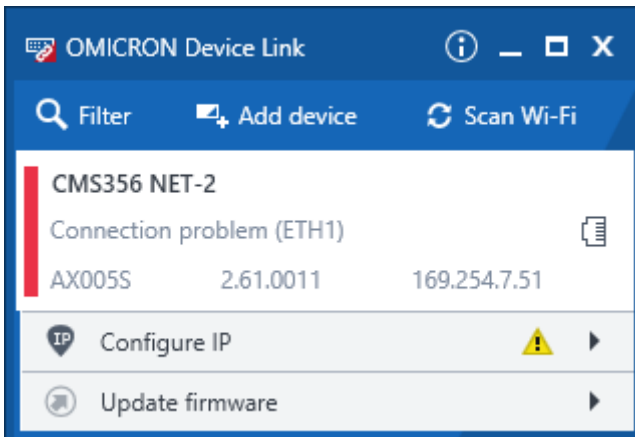
A green vertical bar indicates that OMICRON *Device Link* successfully connected to your *CMS 356*.

2. Select your *CMS 356* and click **Open web interface**.
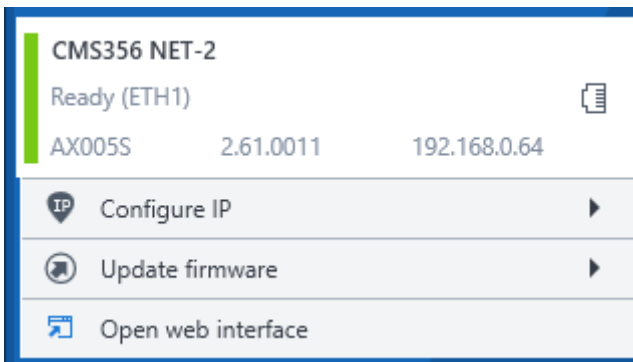
The start page of the *CMS 356* web interface opens.

3.4 Understanding the web interface

The web interface comprises **Configuration**, **Status**, **Discovery**, **Network**, **System**, and **Help** pages.

3.4.1 Configuration
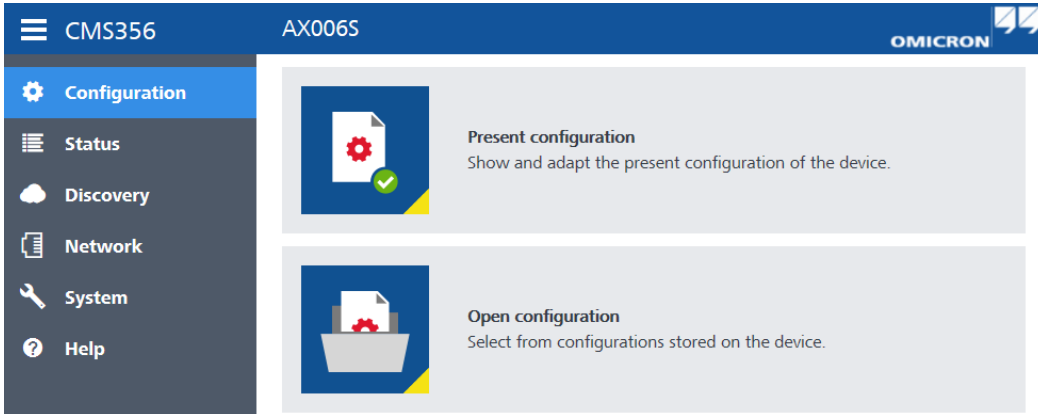
Provides the interface to configure input type, overload sensitivity, voltage and current outputs, and mapping of outputs per input.

3.4.2 Status
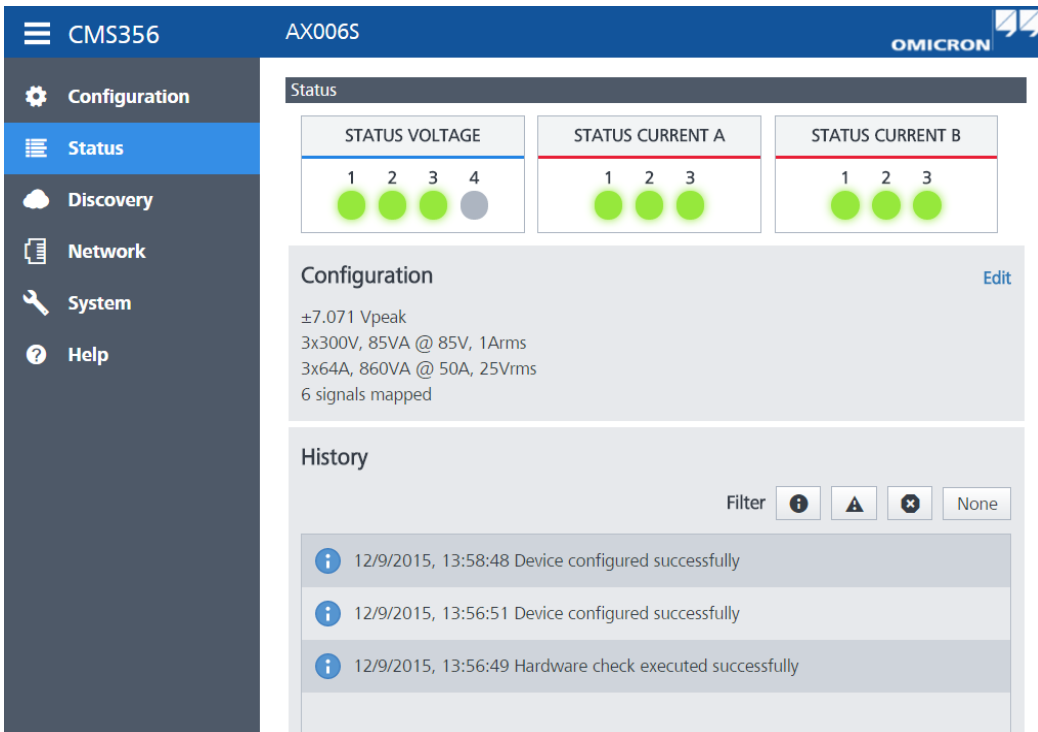
Shows status of voltage and current outputs, just like in the front panel of the device. Shows amplifier configuration settings and amplifier history.

3.4.3 Discovery

Provides a list of OMICRON test sets and/or accessories that are connected to the same Ethernet networks as *CMS 356*. From your *CMS 356* web interface, you can also change the IP configuration of connected devices and open the web interface of a connected device.

3.4.4 Network

Provides local network settings of Ethernet ports. You can select the IP assignment (dynamic or static).

3.4.5 System

Provides device and system information, including MAC and IP addresses of all network ports. You can enter a friendly name, so that the device can be easily identified in the *Device Link*, and select another language. You can also download the system snapshot, which can be useful in case of problems with the device, and comprises system log, *CMS 356* engine startup log, and list of hardware checks.

3.4.6 Help

Opens the web interface Help. It provides instructions and descriptions about using *CMS 356*.

3.5   Configuration example

This configuration example is divided in two parts:

- **Part 1:** Configuring *CMS 356* through its web interface.
- **Part 2:** Configuring the *Test Universe* Hardware Configuration—a necessary task ***only*** when *CMS 356* is used to extend a CMC test set.

You will configure *CMS 356* to provide:

- Three voltage outputs of 300 V (maximum amplitude).
- Three current outputs of 64 A (maximum amplitude).
- An automatically calculated residual voltage put out on VOLTAGE OUTPUT 4.

3.5.1 Part 1: Web interface

To configure *CMS 356*, from the **Navigation** pane, click **Configuration**.
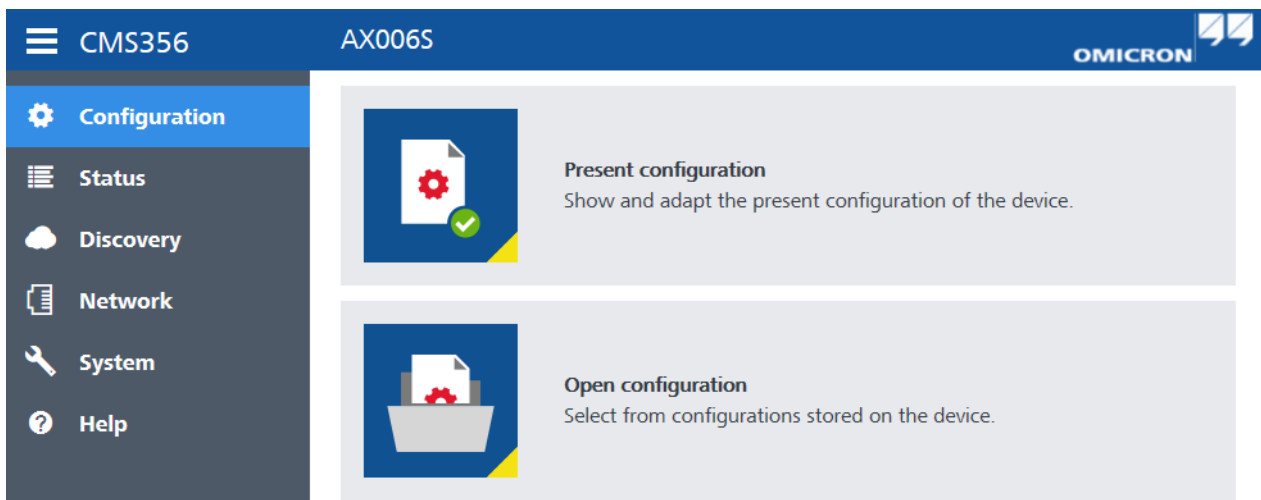
You can start the *CMS 356* configuration in two possible ways:

- Showing the present configuration and adapting the appropriate parts.
- Opening a configuration stored on the device and adapting the appropriate parts. Default configurations are available for the most common tasks. Adapted configurations can also be saved for later use.

The following example, based on "Present configuration", introduces you the *CMS 356* configuration.
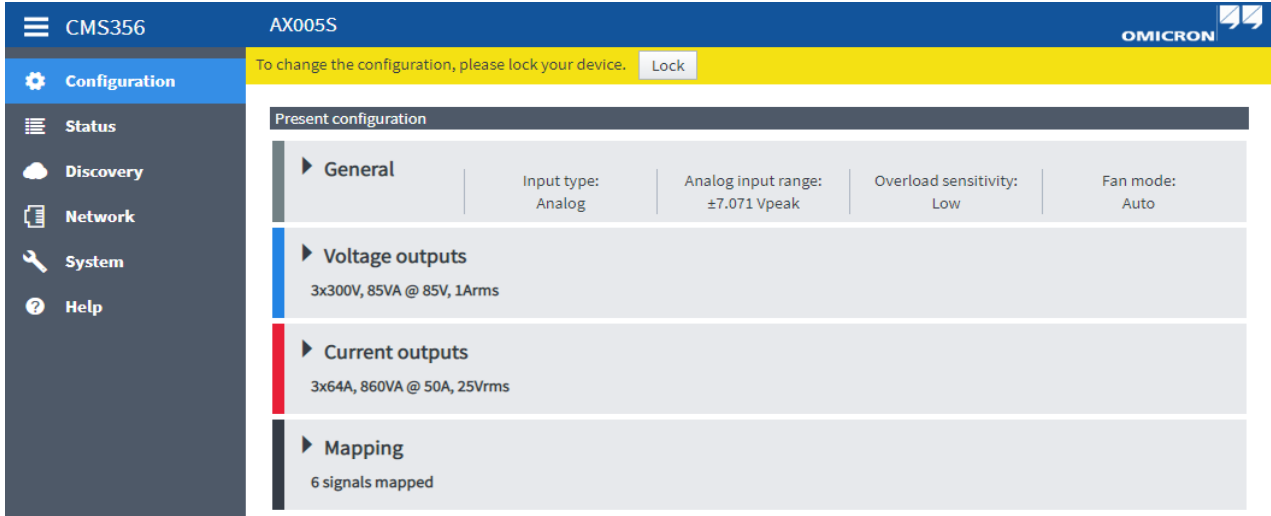
The configuration panes, when collapsed, show summary settings. The yellow bar that appears on the top is the **Notification** bar.

To expand a pane, click the ▶ on its header.

To change the *CMS 356* configuration:

1. On the **Notification** bar, click **Lock**. The device is locked for you and inaccessible to other users.

2. Expand the appropriate pane.

3. Configure the necessary settings.

4. Click **Apply** to make the changed settings effective.

5. (Optional) Click **Unlock** to unlock the device.

General settings

Expand the General pane and select the desired input type and input range, for example **±7.071 Vpeak (5 Vrms)**.
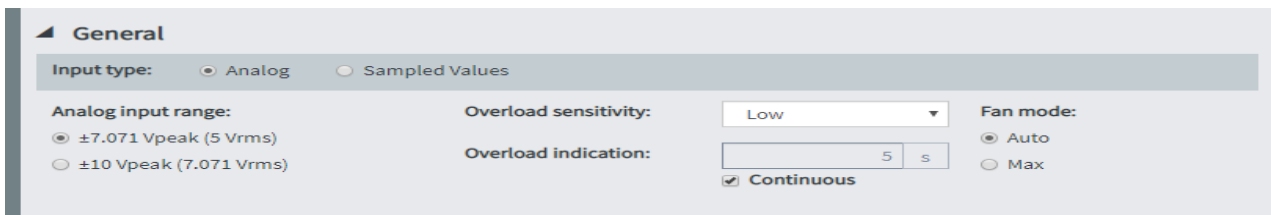
Voltage outputs

To configure the voltage outputs:

1. Expand the **Voltage outputs** pane.

2. Turn on **Enable voltage outputs**.

3. From the list, select the appropriate voltage configuration. In this example, **3x300V, 50VA @ 75V, 660mArms, VE automatically calculated**. The figure shows the output connections for the selected configuration.

4. (Optional) Select **Limit voltage output**.

   NOTE

   You gain two benefits by limiting the voltage output:

   ► Preventing damage to the equipment under test.

   ► Increasing available power at the voltage outputs at lower amplitudes.

   Therefore, you are recommended to always limit the voltage output to the lowest possible voltage for the test. If enabled, output signals above the limit are clipped and the amplifier indicates "Overload" at the respective output.

5. In **Residual voltage factor** enter an appropriate value. (The default value of $1/\sqrt{3}$ = 0.5773 V is used in this example.)

Current outputs

To configure the current outputs:

1. Expand the **Current outputs** pane.

2. Turn on **Enable current outputs**.

3. (Optional) Filter the configurations list using the Filter. In this example, **64 A**.

4. From the list, select the appropriate current configuration. In this example, **3x64A, 860VA @ 50V, 25Vrms**. The figure shows the output connections of the selected configuration.

   NOTE

   Limiting the current output

   You are recommended to limit the current output to the lowest possible current for the test as it can prevent damage to the equipment under test. If enabled, output signals above the limit are clipped and the amplifier indicates "Overload" at the respective output.

5. (Optional) Select **Limit current output**.

Mapping

The Mapping table shows a list of available logical output signals according to selected configurations. Each output signal can be mapped to an input. You only need to map the output signals required for the test. Output signals that are not mapped to an input remain inactive.

NOTE

Since residual voltage (VE) and residual current (IE) are automatically calculated from V1, V2, V3 and I1, I2, I3, they do not appear in the mapping table.

◢ Mapping

		Output signals					
		V1	V2	V3	I1	I2	I3
Inputs (AMP. IN)	1	✓					
	2		✓				
	3			✓			
	4				✓		
	5					✓	
	6						✓

◢ Clear mapping

Applying changes

Configuration has been changed. To make it effective, please apply it to the device.   Unlock   Apply

To send the changed configuration to the *CMS 356*, on the **Notification** bar, click **Apply**. After a short self-test, the new configuration becomes effective.

3.5.2   Part 2: Test Universe Hardware Configuration

When you extend a CMC test set with a *CMS 356* amplifier, use the *Test Universe* **Hardware Configuration** to configure your test setup.

> **NOTE**
>
> **Amplifier configuration files on the CMS 356 installation DVD**
>
> The *CMS 356* installation DVD includes a file containing amplifier configurations for the *Test Universe* Hardware Configuration. These configurations match the default *CMS 356* configurations. To make them available, copy the file from **TestUniverse\CMS356.AMP** to **C:\Program Data\OMICRON\Test Universe\Hardware Configurations_OHC**.

Amplifiers are always defined as a set of three outputs, so you must define two amplifiers (voltage and current).

To configure voltage and current amplifiers:

1. Launch the *Test Universe* **Hardware Configuration** from the test module or from your OMICRON *Control Center* (OCC) document.

2. On the **General** tab, at **Amplifier(s) / Low Level Outputs / Sensor Simulation**, select **Add voltage amplifier** from the drop-down list.
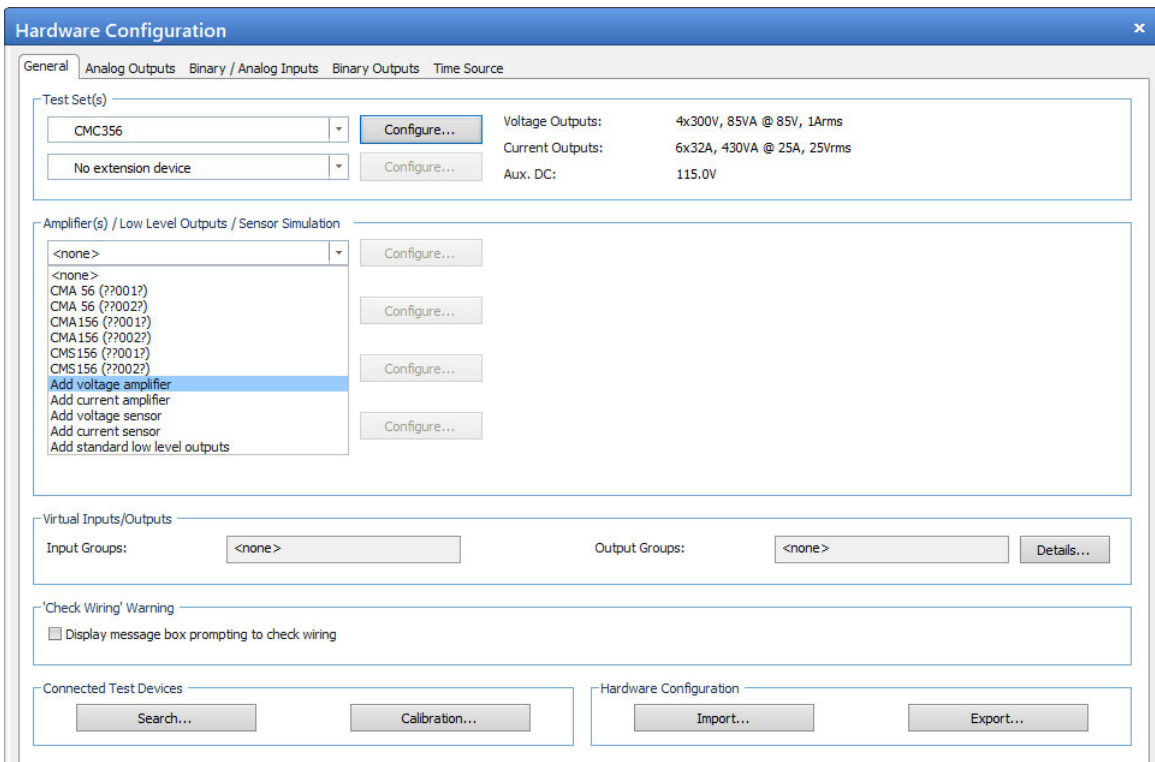
The **Configure Amplifier** window opens.

3. In the **Configure Amplifier** window, configure the voltage amplifier settings to your liking.

Low level output	"LL out 1-3" because the voltage outputs are mapped to the inputs 1-3.
Amplification	The amplifier's analog input range is 5 Vrms, thus the amplification factor is 300 V/5 V = 60 V/V.
Propagation delay phase 1-3	The propagation delay of a *CMS 356* amplifier is 500 µs. The propagation delay is factory-calibrated and identical for all units. **Hint:** You can type 500u to set 500 µs.

4. Click **OK**.

5. At **Amplifier(s) / Low Level Outputs / Sensor Simulation**, select **Add current amplifier** from the drop-down list. The **Configure Amplifier** window opens.

6. In the **Configure Amplifier** window, configure the current amplifier settings to your liking.

Low level output	"LL out 4-6" because the current outputs are mapped to the inputs 4-6.
Amplification	The amplification factor for this configuration is 64 A/5 V = 12.8 A/V.
Propagation delay phase 1-3	The propagation delay of a *CMS 356* amplifier is 500 µs. The propagation delay is factory-calibrated and identical for all units. **Hint:** You can type 500u to set 500 µs.

7. Click **OK**. All amplifier outputs are available on the **Analog Outputs** tab and can be assigned for testing.

4 Troubleshooting

This chapter provides suggestions for troubleshooting. Follow the list of steps on chapter 4.1 "How to proceed in case of operational problems".

4.1 How to proceed in case of operational problems

There are several options to handle operational problems with *CMS 356*:

1. Check whether your problem is documented on chapter 4.2 "Device Link does not list your CMS 356 as "Ready"" on page 23.

2. Check the web interface Help.

3. Check whether the malfunction is reproducible. If yes, document it by taking note of the exact wording of any error message or unexpected conditions.

4. Contact the Technical Support. Please provide:

   - Your full contact details.

   - Serial number of your *CMS 356*.

   - Screenshots or the exact wording of possible error messages.

   - System snapshot. Please refer to chapter 5 "Frequently asked questions" on page 28.

Note: Make sure that your computer and test setup are available and be prepared to repeat the steps that caused the problem.

The OMICRON Technical Support contact details are available in chapter → "Support" on page 31.

4.2 Device Link does not list your CMS 356 as "Ready"

There are several causes for communication failures between your *CMS 356* and your computer. The following steps help to narrow down the problem to its root cause:

1. ETH connection and WiFi: To simplify troubleshooting, reduce the complexity of your test setup as much as possible. Use a direct point-to-point Ethernet connection between your *CMS 356* and your computer. This is to prevent impacts of the network topology and/or configuration.

2. USB connections: Unplug the USB cable from your computer. Plug it in again after a few seconds. If your computer still will not detect your *CMS 356*, try another of your computer's USB ports. To ensure the required EMC compatibility, we strongly recommend using the OMICRON-supplied USB cables only. However, to verify the cable's intactness, you may want to try another USB cable.

3. To rule out incompatibilities, close other programs that are currently running on your computer.

4. If you are using an Ethernet connection, swap to USB, or vice versa. Then try again.

5. If possible, replace your *CMS 356* by another one. This is to find out whether the problem is related or not to the actual *CMS 356*.

6. If possible, replace the computer by another one with an installed *Device Link* of the same version. This is to find out whether the problem is related to the computer and/or its installation.

4.2.1 Power supply problems? Check the ON/OFF power switch of CMS 356

1. Does the ON/OFF switch light up? If so, continue with → "Check the status LEDs at the rear side of CMS 356". Else, → item 2 below.

2. If the ON/OFF switch does not light up, verify the *CMS 356* power supply. Unplug the power cord and check the fuse of *CMS 356* (→ *CMS 356* Reference Manual). If needed, exchange the fuse and try again.
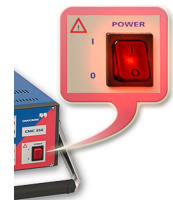
If all of this does not work and the ON/OFF switch remains dark, please contact your regional Service Center or the Technical Support (→ "Support" on page 31).

4.2.2 Check the status LEDs at the rear side of CMS 356

The LEDs at the rear side of *CMS 356* inform you about the operational status of the device.

LED A indicates that *CMS 356* is ready to be controlled by a computer. The hardware checks of *CMS 356* are finished, and *CMS 356* is properly connected to a computer or a network.

LED B lights while powering-up *CMS 356* and during a hardware self-test.

Does the LED A light up once *CMS 356* is powered-up?

1. If so, continue with → "Check the physical connection between CMS 356 and your computer". Else, → item 2 below.

2. *CMS 356* is not ready for operation. This could, for example, be due to an unsuccessful firmware up-/downgrade. In rare cases the *CMS 356* firmware can get corrupted during this process.

To recover from such situation, reset the firmware using the "**!**" button. The "**!**" button enables you to recover from unsuccessful software image downloads or other emergency situations:

a) Turn off *CMS 356*.

b) Press the "**!**" button with a pointed tool or a paper clip while powering-up *CMS 356*.

c) Wait for approximately 10 seconds before releasing the "**!**" button.

d) LED A remains off and LED B blinks slowly to indicate that *CMS 356* waits for a new software image download.

Launch *Device Link*. Your *CMS 356* should be visible now.

If this does not work and your *CMS 356* is still not listed, please contact your regional Service Center or the Technical Support (→ "Support" on page 31).
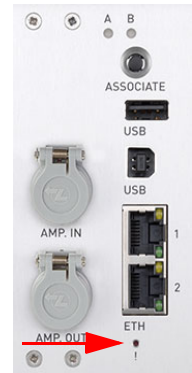
4.2.3   Check the physical connection between CMS 356 and your computer
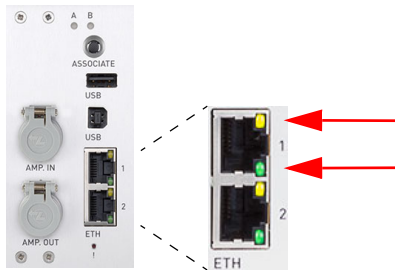
Depending on the transfer rate, the status LEDs behavior varies (→ table below).

A physical link of the communication port to the computer or a network is established; port is active:

Transfer rate	Active LED ON
10 Mbit/s	yellow
100 Mbit/s	green
1000 Mbit/s	yellow + green

If there is traffic via an ETH port, the active LED starts blinking.

Is the active LED of the Ethernet port ON?

1. If yes, continue with → "Disable unused network connections".
   Else, → item 2 below.

2. If no LED is ON, your *CMS 356* does not seem to be physically connected to the Ethernet:

   a) Try the other Ethernet port on *CMS 356*.

   b) Replace the Ethernet cable with another one known to be working.

   c) Some laptops turn off the network interface when running on battery. Please connect the AC adapter to the laptop.

If the above procedure does not work and the active LED remains off, please contact your regional Service Center or the Technical Support (→ "Support" on page 31).

4.2.4 Disable unused network connections

Most computers hold more than just one network interface. This may be useful to, for example, connect to a *CMS 356* via Ethernet and at the same time to the Internet via Wireless LAN. However, there are cases where the configuration of the individual network interfaces interfere and consequently block the communication with *CMS 356*.

Disable any network connection other than the Ethernet connection that is used to control *CMS 356*.

If *Device Link* still does not list your *CMS 356* → "Firewall configuration".

4.2.5 Firewall configuration

A proper firewall configuration is essential to successfully establish a communication between your *CMS 356* and your computer.

Windows Firewall

The configuration of the Windows Firewall is carried out automatically during the installation of *Device Link*. However, in certain cases this may have no immediate effect.

To exclude the Windows Firewall from being the cause of blocked communication, you should (temporarily) disable it in the Windows Control Panel.

> **NOTE**
>
> **Is your CMS 356 listed at Device Link after disabling the Windows Firewall?**
>
> ► If so, the Windows Firewall blocked the communication between your *CMS 356* and your computer. You need to reconfigure the Windows Firewall in order to enable a permanent use of the *CMS 356* without the need of having to disable the Windows Firewall. To implement the necessary exceptions into the Windows Firewall configuration, run the **C:\Program Files\Common Files\OMICRON\OMFwCfg\ConfigureFirewall.bat** or **C:\Program Files (x86)\Common Files\OMICRON\OMFwCfg\ConfigureFirewall.bat** batch file, respectively, in a 64-bit or 32-bit operating system.
>
> ► Running the batch file requires Administrator rights on your computer.

If your *CMS 356* is **still not** listed in *Device Link* after disabling the Windows Firewall, → "Third-party firewall" below.

Third-party firewall

If you are using a firewall other than the Windows Firewall, temporarily disable it to see if this firewall may be the cause for the blocked communication.

How to configure such a third-party firewall to allow a permanent communication between *CMS 356* and your computer, → "Manual firewall configuration for ETH connection" on page 26 and → "Manual firewall configuration for USB connection" on page 27.

> **NOTE**
>
> **Disabling antivirus software**
>
> ► Please note that numerous computer security programs or antivirus packages often contain an integrated firewall function! Double-check and, if applicable, disable all such programs that may be installed on your computer.

Manual firewall configuration for ETH connection

If you would like to manually configure your firewall settings, please note that the following ports/services have to be open in order to get a functional communication.

Program/service name	Rule name	Protocol & ports				Scope		
		Traffic direction	Protocol type	Protocol numbers	Local port	Remote port	Local IP	Remote IP
OMFind.exe[1]	OMICRON Device Link [2]	inbound	UDP	17	4987	all	any	any
	OMICRON OMFind (UDP 4988)	inbound	UDP	17	4987	all	any	any
	OMICRON OMFind (UDP-in 4988)	inbound	UDP	17	4988	all	234.5.6.7	any
	OMICRON OMFind (UDP-out 4988)	outbound	UDP	17	all	4988	any	234.5.6.7
	OMICRON OMFind (ICMPv4-Out)	outbound	ICMPv4	1	all	all	any	any
	OMICRON Wi-Fi (TCP-Out)	outbound	TCP	6	any	2203	any	any
	OMICRON Wi-Fi (TCP-In)	inbound	TCP	6	any	2203	127.0.0.1	127.0.0.1
CMS 356 communication	OMICRON CMEP (Out)	outbound	TCP	6	all	2200	any	any
	OMICRON LAP (Out)	outbound	TCP	6	all	2201	any	any
Web Interface	OMICRON Web Interface (HTTP)	outbound	TCP	6	all	80	any	any
	OMICRON Web Interface (HTTPS)	outbound	TCP	6	any	443	any	any
OMICRON Device Link [2]	OMICRON Device Link TFTP (UDP-Out)	outbound	UDP	17	all	69	any	any

[1] Installation path: C:\Program Files\Common Files\OMICRON

         (On a 64 bit operating system the default installation path is C:\Program Files (x86))

[2] Installation path: C:\Program Files\OMICRON\Device Link

Manual firewall configuration for USB connection

If you would like to manually configure your firewall settings, please note that the following ports/services have to be open in order to get a functional communication.

Description	Action	Protocol & ports				Scope		
		Traffic direction	Protocol type	Protocol numbers	Local port	Remote port	Local IP	Remote IP
OMUsbDevice Service Control (TCP)	allow	in, out	TCP	6	8480 [1]	any	127.0.0.1 [1]	127.0.0.1
OMUsbDevice Service Device (TCP)	allow	in, out	TCP	6	8481–8483 8485–8490 [1]	any	127.100.0.1– 127.100.0.254 [1]	127.0.0.1
OMUsbDevice Service Device (UDP)	allow	in, out	UDP	17	8484 [1]	any	127.100.0.1– 127.100.0.254 [1]	127.0.0.1
OMUsbDevice Client Rule Control (TCP)	allow	in, out	TCP	6	any	8480 [1]	127.0.0.1	127.0.0.1 [1]
OMUsbDevice Client Rule Device (TCP)	allow	in, out	TCP	6	any	8481–8483 8485–8490 [1]	127.0.0.1	127.100.0.1– 127.100.0.254 [1]
OMUsbDevice Client Rule Device (UDP)	allow	in, out	UDP	17	any	8484 [1]	127.0.0.1	127.100.0.1– 127.100.0.254 [1]

[1] Indicates that the value can be configured in the **omusbdevice.ini** file.
(path: `%commonprogramfiles%\omicron\omusbdevice\omusbdevice.ini`)
If another default value is configured, the firewall rules have to be adapted to the new values.

5 Frequently asked questions

5.1 What is the meaning of the status LEDs on CMS 356?

LED status	LED color	Description
Off	None	Output has not been configured via the web interface.
On	Green	Output has been configured and is active (delivers output signals).
On	Red	Output is overloaded (desired output signal cannot be generated).
On	Yellow	Output has been overloaded. After a certain amount of time, the LED turns green again. You can increase the indication time for the yellow LED via the web interface. The advantage of this is that you do not need to constantly monitor the status LEDs on the front panel.
Blinking	Green	Output has been switched off because there is a fault situation at another output.
Blinking	Red	Output has an overtemperature error. All other *CMS 356* amplifier outputs have also been switched off (LED blinks green).
Blinking	Red/green	Error situation at the output, for example, because the current on CURRENT OUTPUT N is too high or the internal hardware check detected an error. All other *CMS 356* amplifier outputs have also been switched off (LED blinks green).

5.2 How can I obtain a system snapshot for the Technical Support?

To aid the OMICRON Technical Support, please attach a system snapshot of your *CMS 356*:

1. Open the *CMS 356* web interface.
2. Go to **System**.
3. Navigate to section **System information**, and click **Download**. The download of the system snapshot starts (.zip file). This file contains internal log files and results of hardware self-checks performed during start-up and whenever the *CMS 356* configuration changed.

5.3 How does the CMS 356 calculate residual voltage?

Using the configuration "3 x 300 V, 50 VA @ 75 V, 660 mArms, VE automatically calculated" the voltage VE is generated between terminals 4 and N of the voltage outputs.

VE represents the vectorial sum of the three phase voltages V1-N, V2-N, V3-N and is scaled by the residual voltage factor.

The default value for the residual voltage factor is $1/\sqrt{3}$ = 0.57735.

For a voltage transformer with a secondary nominal voltage of 110 V/$\sqrt{3}$, the windings that form the residual voltage in an open-delta connection are typically rated 110 V/3. Then, the residual voltage factor must be set to $\sqrt{3}/3$ = $1/\sqrt{3}$.

Residual voltage VE = 3 x V0 (= zero sequence voltage) x residual voltage factor.

5.4 How does the CMS 356 calculate residual current?

Using the configuration "3 x 32 A, 430 VA @ 25 A, 25 Vrms, IE automatically calculated", the IE current is generated between terminals 1 and 2 of current output B. IE represents the vectorial sum of the three phase currents I1, I2, I3 and is scaled by the residual current factor. Using phase CTs with a ratio of 200:1 and a residual CT with a ratio of 60:1, the residual current factor is 200/60 = 3.3333.

Residual current IE = -3 x I0 (= zero sequence current) x residual current factor.

Open Source Software License Information

Parts of the *CMS 356* software are under OMICRON license, other parts are under open source software licenses.

Both the open source license texts and the necessary source code are provided in the OMICRON Open Source Download Area at **www.omicronenergy.com/opensource/**.

Open this address in your Internet browser, click the **Download Software** button, and navigate to the **CMS 356/** directory.

Look for the file containing your corresponding version in the file name (for example, **Open Source CMS 356 2.52.zip**). In addition to some open source code packages, the archive contains an overview of all license information of *CMS 356*.

Support

When you are working with our products we want to provide you with the greatest possible benefits. If you need any support, we are here to assist you!

24/7 Technical Support – Get Support

www.omicronenergy.com/support

At our technical support hotline, you can reach well-educated technicians for all of your questions. Around the clock – competent and free of charge.

Make use of our 24/7 international technical support hotline:

Americas: +1 713 830-4660 or +1 800-OMICRON

Asia-Pacific: +852 3767 5500

Europe / Middle East / Africa: +43 59495 4444

Additionally, you can find our Service Center or Sales Partner closest to you at www.omicronenergy.com/addresses.

Customer Portal – Stay Informed

www.omicronenergy.com/customer

The **Customer Portal** on our website is an international knowledge exchange platform. Download the latest software updates for all products and share your own experiences in our user forum.

Browse through the **Knowledge Library** and find application notes, conference papers, articles about daily working experiences, user manuals and much more.

OMICRON Academy – Learn More

www.omicronenergy.com/academy

Learn more about your product in one of the training courses offered by the **OMICRON Academy**.

Index