

APPLICATION NOTE

```
// Create an instant camera object with the first
Camera_t camera( CT1Factory::GetInstance().Creat

// Register an image event handler that accesses
camera.RegisterImageEventHandler(_new CSampleIma
Ownership_TakeOwnership);

// Open the camera.
camera.Open();
```

ace IR Cut Filter Holder Removal Procedure

Applicable to Basler ace camera models listed in the document

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1 Introduction

This application note explains how to remove the IR cut filter holder from Basler ace classic and ace U cameras and how to remove and reinstall the IR cut filter holder assembly for Basler ace L and ace 2 cameras.

The filter holder is located inside the camera at the base of the lens mount.

NOTICE

Removing the filter holder may damage the camera.

Make sure it is safe to remove the filter holder from your particular camera model. Only remove the filter holder if your camera model is one of the camera models listed below.

If your camera model is **not** listed below, do not try to remove the IR cut filter holder. If you attempt to do so and damage occurs, you must enter the RMA process. See the Basler website for details about the RMA process: <https://www.baslerweb.com/en/sales-support/after-sales-services/rma-process/>

If the removal of the filter holder is nevertheless required for your application, contact Basler technical support.

1.1 ace classic Camera Models

Removing the IR cut filter holder is possible for the following Basler ace classic camera models:

ace USB 3.0	ace GigE	ace Camera Link
acA640-90um/uc	acA640-90gm/gc	-
acA640-120um/uc	acA640-120gm/gc	
acA1300-30um/uc	acA780-75gm/gc	
acA1600-20um/uc	acA1280-60gm/gc	
acA1920-25um/uc	acA1300-22gm/gc	
acA2500-14um/uc	acA1300-30gm/gc	
acA3800-14um/uc	acA1300-60gm/gmNIR/gc	
acA4600-10uc	acA1600-20gm/gc	
	acA1600-60gm/gc	
	acA1920-25gm/gc	
	acA2500-14gm/gc	
	acA3800-10gm/gc	
	acA4600-7gc	

Table 1: Basler ace classic Camera Models Allowing IR Cut Filter Holder Removal

1.2 ace U Camera Models

Removing the IR cut filter holder is possible for the following Basler ace U camera models:

ace USB 3.0	ace GigE
acA640-750um/uc	acA640-300gm/gc
acA720-520um/uc	acA720-290gm/gc
acA800-510um/uc	acA800-200gm/gc
acA1300-200um/uc	acA1300-75gm/gc
acA1440-220um/uc	acA1440-73gm/gc
acA2040-55um/uc	acA2040-35gm/gc
acA2040-120um/uc	acA3088-16gm/gc
acA3088-57um/uc	acA4024-8gm/gc
acA4024-29um/uc	

Table 2: Basler ace U Camera Models Allowing Filter Holder Assembly Removal and Reinstallation

1.3 ace L Camera Models

Removing and reinstalling the IR cut filter holder assembly is possible for the following Basler ace L camera models:

ace USB 3.0	ace GigE
acA4096-30um/uc	acA4096-11gm/gc
acA4096-40um/uc	acA4112-8gm/gc
acA4112-20um/uc	
acA4112-30um/uc	

Table 3: Basler ace L Camera Models Allowing Filter Holder Assembly Removal and Reinstallation

1.4 ace 2 Camera Models

Removal and reinstallation of the filter holder is possible for **all** Basler ace 2 camera models. The filter holders of color cameras include an IR cut filter. The filter holders of mono cameras don't include an IR cut filter.

2 Removing the IR Cut Filter Holder of ace classic and ace U Cameras

Required Tools

- 2 M2 x 12 mm (or longer) screws
or
- 2 UNC #1-64 x 1/2" (or longer) screws
or
- 2 UTS #1-72 x 1/2" (or longer) screws
- 1 appropriate screwdriver

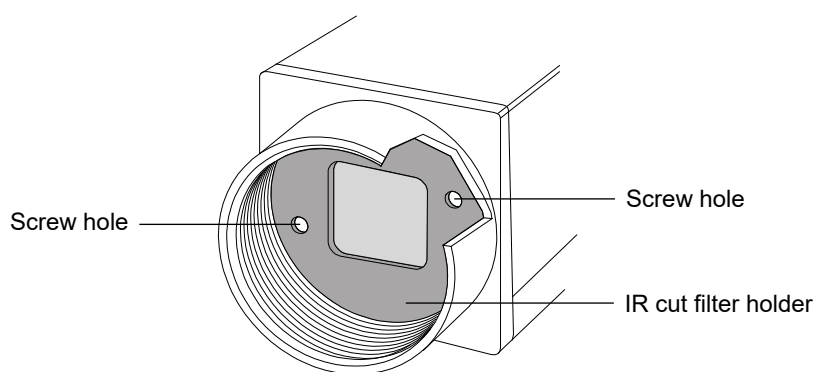


When you are performing the described steps, small plastic particles will fall off. **You must make sure that the camera is pointing down when you perform this procedure.** This will allow the particles to fall out of the camera rather than onto the sensor.

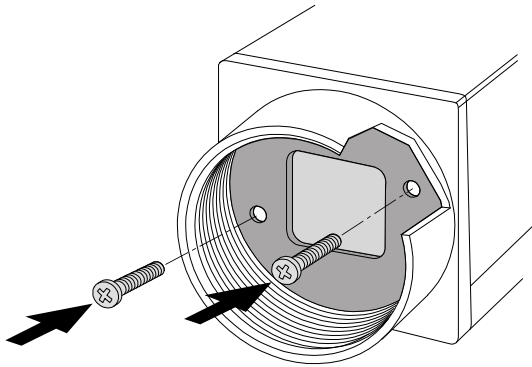
If particles do fall on the sensor, you can clean the sensor by wiping it with a cotton cloth moistened with a small amount of isopropyl alcohol.

To remove the IR cut filter holder of an ace classic or ace U camera:

1. Remove the lens from the camera.
2. Locate the black filter holder assembly at the base of the lens mount and the two screws fastening the filter holder assembly to the camera.



3. While making sure that the camera is pointing down, insert a screw into each screw hole as shown below and turn each screw about three turns. Stop when you feel the screws striking against the camera body.



4. Turn the screws alternately by the same amounts while keeping the camera pointed down.
As you are turning the screws, they will push against the camera body and will begin pushing the filter holder out of its mounting points.



When turning, it is important to **alternate** between the screws in order to push the filter holder out evenly.

When the screws have been screwed into the holder about 5 mm (0.2 inch), the holder will release from its mounting points and will fall out of the camera.

5. Reinstall the lens.

3 Removing and Reinstalling the Filter Holder Assembly of ace L Cameras

The IR cut filter is located between the filter holder and a backing foil. These three parts constitute the filter holder assembly.

NOTICE

Touching the IR cut filter may destroy it.

To avoid damage to the very thin IR cut filter and to avoid introduction of dirt, do not disassemble the filter holder assembly and do not touch the IR cut filter unless you specifically want to remove the IR cut filter.

NOTICE

Removing and reinstalling the filter holder assembly may damage the camera.

The two screws attaching the filter holder assembly to the camera are thread-forming screws. During manufacture, the screws formed their matching threads in the related threaded holes in the camera. The formed threads are very delicate and match closely with the related screws.

During removal and reinstallation of the filter holder assembly, the formed threads must remain intact and each screw must precisely fit into its matching threaded hole. Strictly follow the procedure given below. Otherwise, the formed threads in the camera will most likely be destroyed.

Do not contaminate or damage the filter holder assembly, the camera interior, or the sensor.

Required Tools

- Torque screwdriver that can be set to a torque of 8 Ncm and higher.
- Screwdriver tip that complies with JCIS #0 cross recess screws. Do not use any other tip, e.g., a Philips tip. Otherwise, you may damage the screws.
PH0 Philips screwdriver tips are generally not compatible with JCIS #0 screws. However, screwdriver tips from other manufactures labelled PH0 may be compatible. If in doubt about compatibility with JCIS #0, inquire with the screwdriver manufacturer.
- Tool for handling the filter holder assembly, e.g., suitable tweezers.
- Locking varnish, to be applied if threads were destroyed.

Other Requirements

- A very clean workspace



When performing the steps described below, small plastic particles may fall off. **You must make sure that the camera is pointing down when you remove and reinstall the filter holder assembly.** This will allow the particles to fall out of the camera rather than onto the sensor.

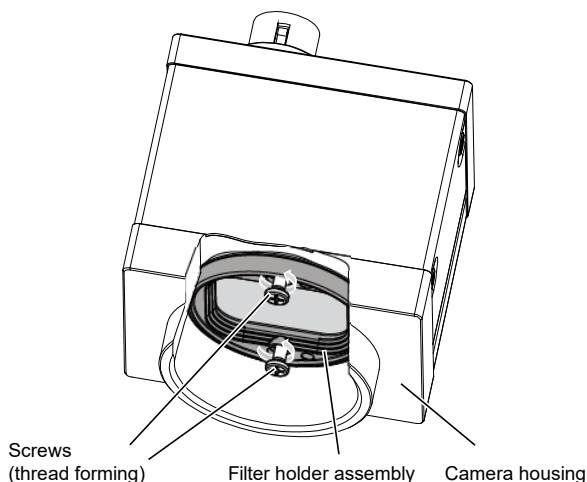
If particles do fall on the sensor, you can clean the sensor by wiping it with a cotton cloth moistened with a small amount of isopropyl alcohol.

3.1 Removing the Filter Holder Assembly of ace L Cameras

The following assumes that the filter holder assembly has never been removed and reinstalled.

To remove the filter holder assembly of an ace L camera:

1. Make sure the lens is removed from the camera and the camera is pointing down.
2. Locate the black filter holder assembly at the base of the lens mount and the two screws fastening the filter holder assembly to the camera.
3. While making sure the filter holder assembly stays in place: Unscrew both screws by turning them in counterclockwise direction and remove the screws. See figure below. The necessary torque setting for the screwdriver will be above 8 Ncm.



When reinstalling the filter holder assembly, it's important to insert each screw into the same threaded hole as before. Therefore, it may be useful to make a note of which screw goes where.

4. Remove the filter holder assembly.
Take care not to contaminate or damage any parts.

3.2 Reinstalling the Filter Holder Assembly of ace L Cameras

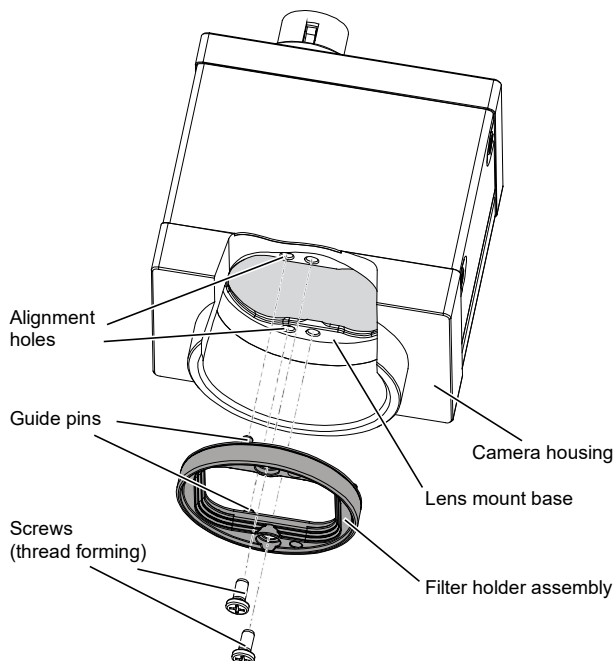
NOTICE

Removing and reinstalling the filter holder assembly may damage the camera.

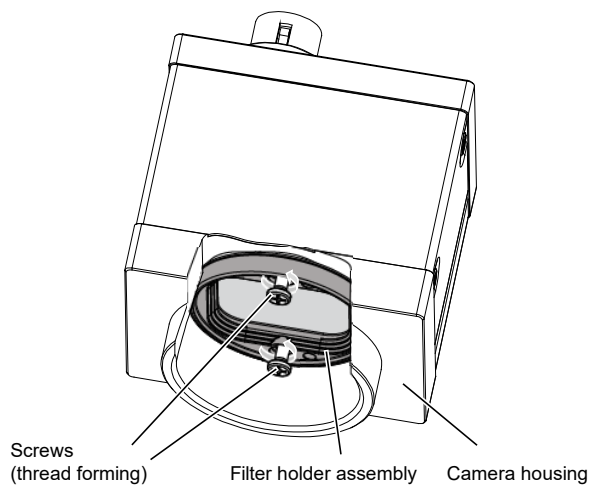
For a correct and successful reinstallation of the filter holder assembly, the threads of the screws **must** engage with their previously formed threads in the threaded holes. Strictly follow the instructions below.

To reinstall the filter holder assembly of an ace L camera:

1. Make sure the lens is removed from the camera and the camera is pointing down.
2. Make sure the screwdriver is set to a torque of 8 Ncm.
3. For the following steps, line up the screws, guide pins, filter holder assembly, and alignment holes in the camera housing as shown below:

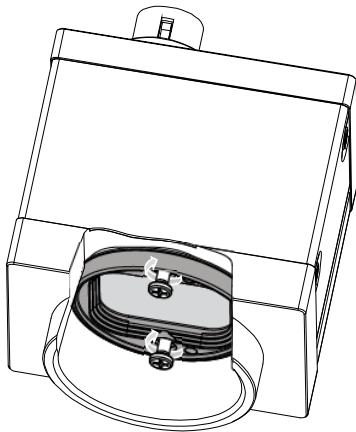


4. Insert the filter holder assembly into the camera housing, making sure that the guide pins engage with the related alignment holes. Also make sure not to contaminate any parts.
5. Find the matching screw for each alignment hole.
6. Insert the screw.
7. Turn the screw slowly and with very little pressure in **counterclockwise** direction, usually up to one revolution, until you notice a “snap”. See figure below.



The threads are engaged.

8. Turn the screw in **clockwise** direction to screw it in. See figure below. This must be possible with ease. Otherwise, you will destroy the formed thread. Continue until the torque limiter becomes active.



If any of the previous steps was not carried out properly, the threads of the threaded hole are now probably destroyed. In this case, as an “emergency solution”, glue in the screw into the damaged threaded hole using locking varnish.

9. Repeat steps 5 to 8 with the other screw.

4 Removing and Reinstalling the Filter Holder of ace 2 Cameras

The procedures included in this chapter describe how to remove a filter holder with its included IR cut filter from a Basler ace 2 camera and how to reinstall the filter holder with IR cut filter.

NOTICE

Removing and reinstalling the filter holder may damage camera components.

- Remove or reinstall the filter holder only when necessary, e.g., when you need to clean the camera's sensor.
- Do not touch the IR cut filter.
- Two M2 screws are used for detaching the filter holder. During removal and reinstallation of the filter holder assembly, the formed threads must remain intact and each screw must precisely fit into its matching threaded hole. Strictly follow the procedure given below. Otherwise, the formed threads in the camera will most likely be destroyed.
- Do not contaminate or damage the filter holder, the camera interior, or the sensor.

Required Tools

- Two M2 screws (not delivered by Basler) with hexagonal socket or Philips screwheads. The minimum required screw length is 16 mm.
The screws will be used for detaching the filter holder and for reinstallation.
- Screwdriver tip that matches the screwheads of the M2 screws
- Tool for handling the filter holder, e.g., suitable tweezers

Other Requirements

- A very clean workspace



When performing the steps described below, small metal and plastic particles may fall off. **You must make sure that the camera is level or pointing down a little when you remove and reinstall the filter holder assembly.** This will allow the particles to fall out of the camera rather than onto the sensor.

If particles do fall on the sensor, you can clean the sensor by wiping it with a cotton cloth moistened with a small amount of isopropyl alcohol.



Glue on the bottom of the filter holder ensures that it stays in place on the base of the lens mount. To detach the glued filter holder, you must use the two M2 screws as described below. Any other attempts will most likely destroy the filter holder.

When reinstalling the filter holder, you must make sure the glue on the filter holder gets in contact with the base of the lens mount.

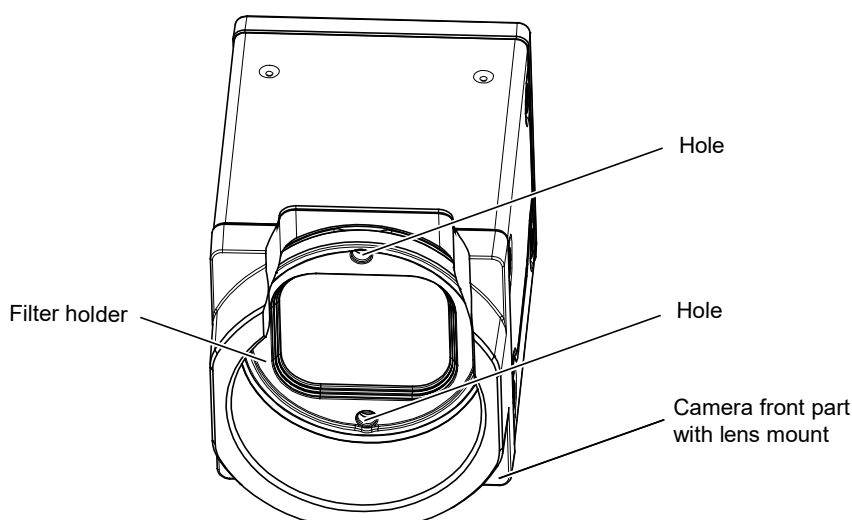
4.1 Removing the Filter Holder of ace 2 Cameras

The following assumes that the filter holder has never been removed and reinstalled.

To remove the filter holder of an ace 2 camera:

1. Make sure the lens is removed from the camera and the camera is level or pointing down a little.

Locate the black filter holder at the base of the lens mount and the two holes in the filter holder as shown below.

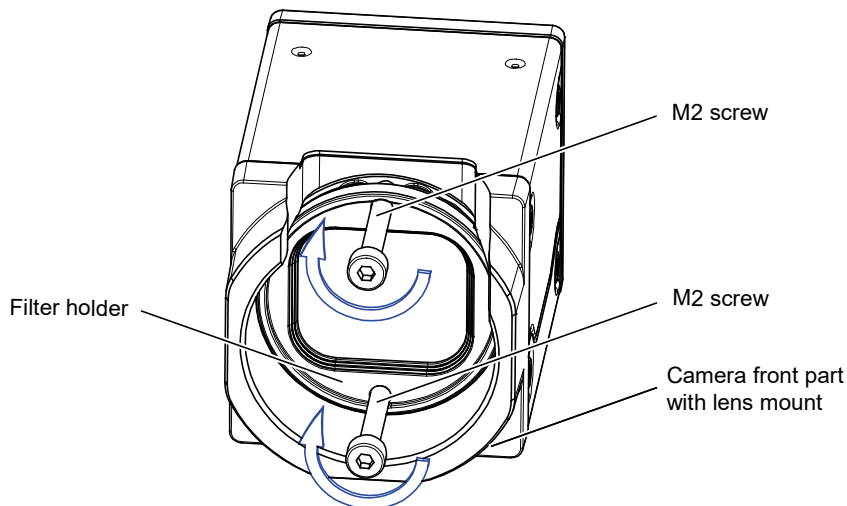


2. Insert the M2 screws into the holes of the filter holder.
When reinstalling the filter holder assembly, it's important to insert each screw into the same threaded hole as before. Therefore, it may be useful to make a note of which screw goes where.



In the following step, threads are formed in the filter holder's holes. For optimum results, make sure to keep the screws perpendicular to the camera's sensor.

3. Slowly turn each screw **clockwise** through the filter holder until you feel the screws striking against the base of the lens mount.



4. Turn both screws **clockwise** and alternately by single complete turns. This will detach and lift the filter holder from the base of the lens mount. Turn each screw by about 8 to 10 turns. Make sure the filter holder is detached and lifted by about 1.5 to 3 mm.



When turning, it is important to **alternate** between the screws in order to lift the filter holder out evenly.

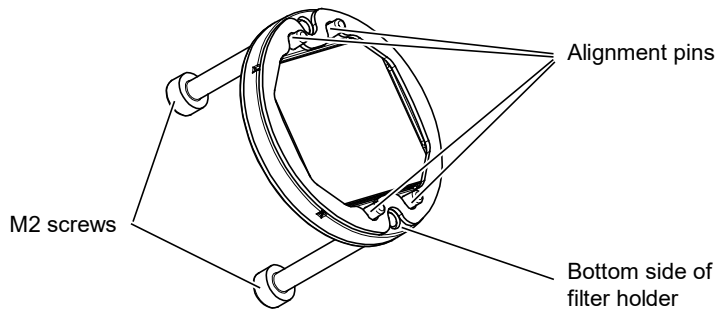
5. Withdraw the screws with the attached filter holder from the lens mount.
6. With the camera and mount facing down, tap lightly on a clean surface to remove any particles produced.

4.2 Reinstalling the Filter Holder of ace 2 Cameras

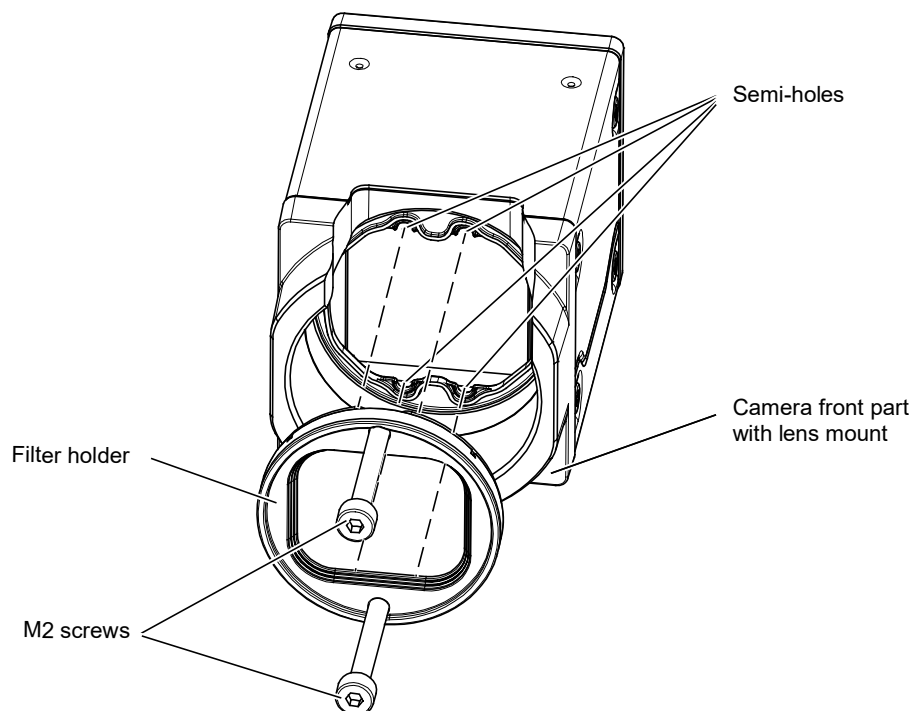
To reinstall the filter holder of an ace 2 camera:

1. Make sure the camera is level or pointing down a little.

2. Locate the four alignment pins on the bottom side of the filter holder:



3. Locate the four semi-holes in the base of the lens mount. The semi-holes will accommodate the four alignment pins on the bottom side of the filter holder:



4. Find the matching M2 screw for each threaded hole.
5. Insert the screws into their matching screw holes in the filter holder.
6. Turn the screws slowly and with very little pressure until the screw bottoms are flush with the bottom side of the filter holder.
7. Insert the filter holder with the M2 screws attached into the lens mount. Make sure the four alignment pins are aligned with the semi-holes in the base of the lens mount.
8. When the bottom of the lens mount is reached:
 - a. Make sure the alignment pins fit into the semi-holes.
 - b. Push the filter holder against the bottom of the lens mount. This will glue the filter holder to the lens mount.
9. Unscrew the M2 screws from the filter holder and remove them from the camera.

Revision History

Document Number	Date	Changes
AW00090601000	10 Mar 2010	Initial release of this document.
AW00090602000	15 Jul 2011	Updated the sizes of the screws needed to remove the filter.
AW00090603000	07 Feb 2013	<p>Updated cover page.</p> <p>Updated Support e-mail addresses in the Contacting Basler Support Worldwide section.</p> <p>Changed the bearer of the copyright to Basler AG in the Contacting Basler Support Worldwide section.</p> <p>Added cautionary note about the removal of the filter holder from certain camera models.</p> <p>Added more details to steps 3 and 4.</p>
AW00090604000	08 Feb 2013	Added NIR versions to the listed cameras.
AW00090605000	18 Oct 2016	Revised the content of the document in such a way that only the ace camera models are listed that allow removing the IR cut filter holder.
AW00090606000	05 Sep 2017	<p>Replaced "User's Manual" by "Basler Product Documentation".</p> <p>Added procedures for ace L cameras.</p>
AW00090607000	07 May 2020	<p>Minor changes throughout the document.</p> <p>Updated Table 1 in Section 1.1.</p> <p>Added Section 1.2 ("ace U camera models").</p> <p>Replaced "window cleaner" by "isopropyl alcohol" in sensor cleaning instructions.</p> <p>Added procedures for ace 2 cameras.</p>
AW00090608000	21 October 2021	Updated Table 2 in Section 1.2.