

Determining Lens Compatibility

This document is intended to help you determine whether a given Fujinon or Canon lens can be controlled by the Ross Robotics system.

It also describe factors that determine whether a given lens is suitable for Augmented Reality and Virtual Set (AR/VS) applications.

To work with Ross Robotics, the lens must be controllable. To work with AR/VS, the lens must be controllable AND be suitable for AR/VS.

The Ross Robotics system controls zoom and focus settings on select Fujinon and Canon broadcast lenses.

Each Fujinon or Canon lens belongs to a lens family. To determine the controllability and AR/VS suitability of a given lens, see the section corresponding to its family:

- “**Fujinon ENG/EFP Lenses**” on page 2
- “**Fujinon Studio/Field Lenses**” on page 5
- “**Canon ENG/EFP Lenses**” on page 8
- “**Canon Studio/Field Lenses**” on page 11

About Augmented Reality and Virtual Set Applications

Ross Video Augmented Reality and Virtual Set (AR/VS) solutions combine Ross Robotics with Ross Video XPression graphics for real-time rendering of artificial 3D visual elements.

Positional data for all axes of robotic motion, including lens focus and zoom motion, is used to calculate telemetry. As the robot and/or lens moves, the artificial graphic elements move and change appearance accordingly, maintaining realistic three-dimensional perspective.

Each type of lens has different optical performance characteristics. To render convincing 3D graphics, Ross Video must test each type of lens to create a “lens curve” for it. A lens curve consists of lens performance data which the AR/VS system uses to calculate the exact virtual position of the lens and to correct for optical distortion at the extreme ends of the lens range.

Lens accessories and features can affect lens curves. We need to know the exact properties of the lens and accessories well in advance of commissioning an AR/VS system.

If a lens curve already exists for the lens and accessories you want to use, no additional testing is required. If no such lens curve exists, Ross Video must borrow the lens and accessories for testing in its facility. For a list of lenses for which lens curves have been developed, contact Ross Video Technical Support.

Fujinon ENG/EFP Lenses



Figure 1 - Fujinon ENG/EFP Lens (HA23x7.6BERD-S6)

This section helps you determine whether a given Fujinon ENG/EFP lens is controllable by the Ross Robotics system, and whether it is suitable for AR/VS applications.

If your Ross Robotics system includes AR/VS, the lenses must be controllable AND suitable for AR/VS.

Lens model numbers contain codes indicating various characteristics of the lens. These codes can help determine lens controllability, and suitability for AR/VS applications. Figure 2 shows an example of a Fujinon ENG/EFP lens model number. The lens characteristics with arrows below them are relevant when determining controllability and AR/VS suitability of the lens.

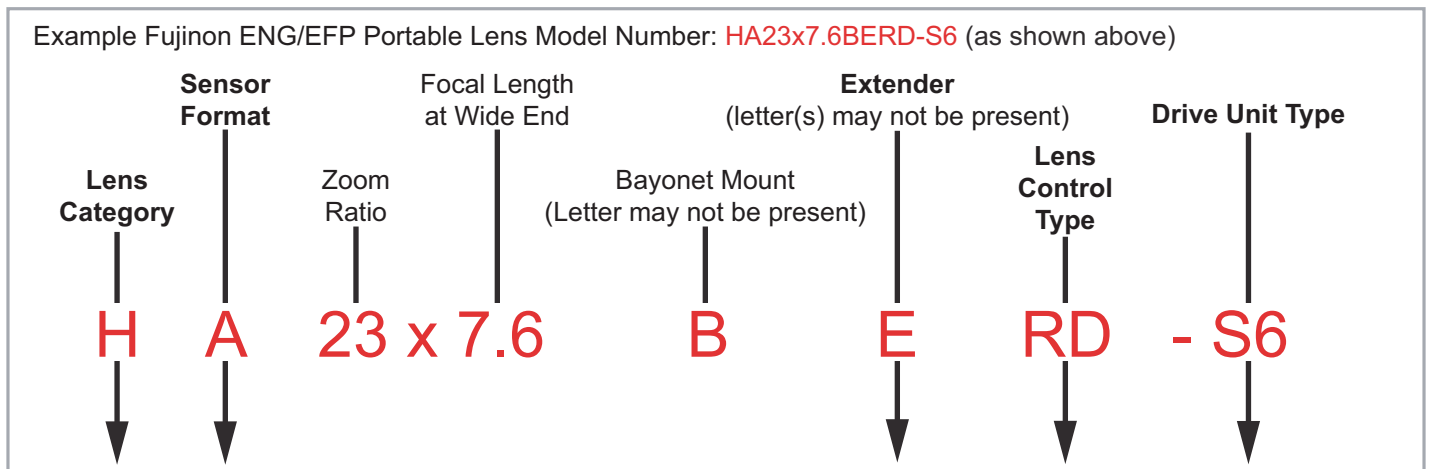


Figure 2 - Understanding Fujinon ENG/ EFP Lens Model Numbers

Fujinon ENG/EFP Lens Controllability

To be controlled by the Ross Robotics system, a given lens must have servo zoom and servo focus. Controllability of a given lens can be determined by its lens control type code (see Figure 2):

Lens Control Type Code	Fujinon Code Description	Controllable by Ross Robotics?
MD	Remote Control	CamBot 500-series and CamBot 600-series heads only. This is an analog lens.
RD	Servo Zoom, Servo Focus	Yes
RM	Servo Zoom, Manual Focus	No Note: Some RM lenses may be made controllable through the addition of a Fujinon FSP-13G external focus drive. Ross Video would need to consult Fujinon on a case-by-case basis to determine whether a given RM lens can be made controllable. Even if the lens is made controllable, it may not be suitable for AR/VS.
ZD	Servo Zoom, Servo Focus	Yes
ZM	Manual Zoom, Manual Focus	No

Fujinon ENG/EFP Lens AR/VS Suitability

The following lens characteristics determine whether a given lens is suitable for AR/VS applications:

- Lens Category
- Sensor Format
- Extender
- Drive Unit Type

For a given lens to be considered suitable for AR/VS applications, every aspect of the lens must be suitable. Consider the impact of ALL relevant lens characteristics to determine overall suitability.

Lens Category

Each Fujinon ENG/EFP lens belongs to a lens category (see Figure 2). Only certain lens categories are suitable for AR/VS applications. Check the lens category code:

Lens Category Code	Fujinon Code Description	Suitable for AR/VS Applications?
H	High Definition Premier Series	Excellent for AR/VS applications.
U	UHD Premier Series	Excellent for AR/VS applications.
X	High Definition eXeed Series	Not recommended for AR/VS applications.
Z	High Definition Select Series	Acceptable for AR/VS applications.

Sensor Format

Check the sensor format code (see Figure 2):

Sensor Format Code	Code Description	Suitable for AR/VS Applications?
A	Sensor size is 2/3"	Excellent for AR/VS applications.
S	Sensor size is 1/2"	Not recommended.
T	Sensor size is 1/3"	Not supported.
other	1" and 4/3"	Supportability depends on the combination of camera and lens. Contact Ross Video for more information about specific lenses.

Extender

If the lens has an extender, the lens model number contains the extender code (see Figure 2):

Extender Code	Code Description	Suitable for AR/VS Applications?
E	The lens has an extender.	Extender must be turned off for AR/VS applications.

Drive Unit Type

The **drive unit type** in the lens model code (see Figure 2) is a reliable indicator of whether the lens has 16-bit encoders, which are required for AR/VS applications. Lenses with 16-bit encoders have 20-pin Hirose connectors marked **Virtual**.

Check the drive unit type:

Drive Unit Type	20-pin Virtual Connector with 16-bit encoder	Encoder Bit Depth Suitable for AR/VS Applications?
M1	No	No
M6	Yes	Yes
M48	No	No
M58	No	No
S1	No	No
S6	Yes	Yes
S7	Yes	Yes
S48	No	No
S58	No	No
S4D	Yes	Yes
S5D	Yes	Yes
T48	No	No
T58	No	No
T4D	Yes	Yes
T4DD	Yes	Yes
T5D	Yes	Yes
T5DB	Yes	Yes
T5DD	Yes	Yes

Fujinon Studio/Field Lenses



Figure 3 - Fujinon DigiPower Studio Lens (XA55x9.5 BESM-S35K)

This section helps you determine whether a given Fujinon Studio/Field lens is controllable by the Ross Robotics system, and whether it is suitable for AR/VS applications.

Note: Studio/Field lenses tend to be heavier than ENG/EFP lenses. Check that the weight of the lens plus all other payload components (teleprompter, monitor, etc) does not exceed the payload capacity of your robot.

If your Ross Robotics system includes AR/VS, the lenses must be controllable AND suitable for AR/VS.

Lens model numbers contain codes indicating various characteristics of the lens. These codes can help determine lens controllability, and suitability for AR/VS applications. Figure 4 shows an example of a Fujinon Studio/Field lens model number. The lens characteristics with arrows below them are relevant when determining controllability and AR/VS suitability of the lens.

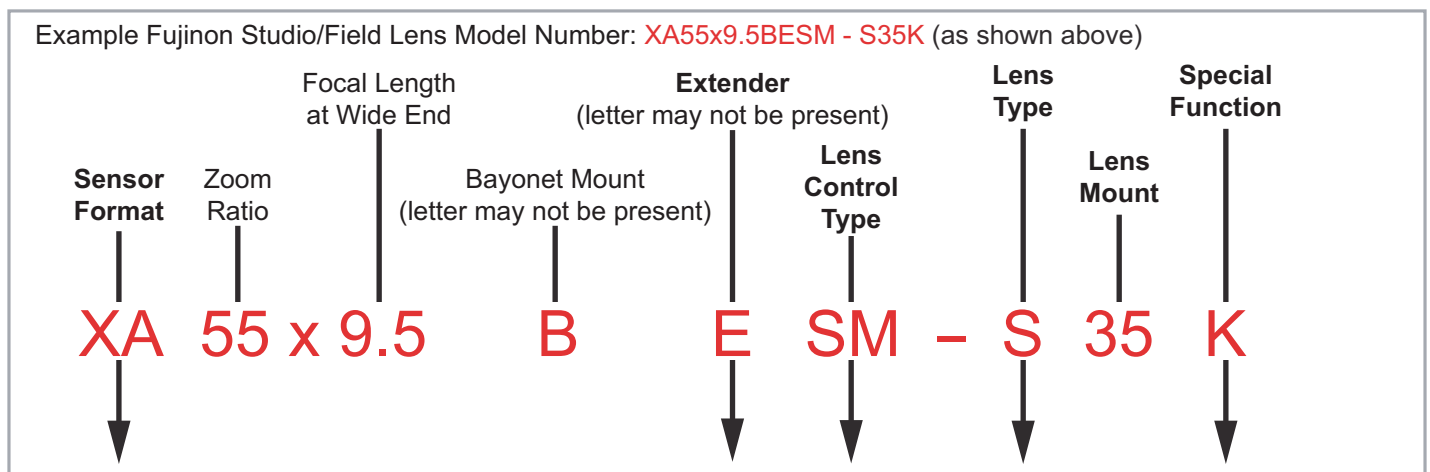


Figure 4 - Understanding Fujinon Studio/Field Lens Model Numbers

Fujinon Studio/Field Lens Controllability

As a general rule, if the lens has a 20-pin Hirose connector, it is controllable. If the lens is a large box lens like the one shown at the beginning of this section (Figure 3), as opposed to a small box lens like the one shown in Figure 5 below, contact Ross Video Technical Support to determine controllability.



Figure 5 - Fujinon DIGI 22 Small Box Lens

To be controlled by the Ross Robotics system, a given lens must have servo zoom and servo focus. To determine controllability, check the lens control type code (see Figure 4):

Lens Control Type Code	Fujinon Code Description	Controllable by Ross Robotics?
SM	Servo / Manual Module Interchangeable	Yes, but servo control modules are required. Manual control modules are not supported. Some older large box lenses have DB9 connectors; these lenses may be controllable. Ross Video needs to know which connector type your lens uses, so we can send you the correct lens control cable.
S	Servo Only	Yes

Fujinon Studio/Field Lens AR/VS Suitability

The following lens characteristics determine whether a given lens is suitable for AR/VS applications:

- Encoder Bit Depth
- Sensor Format
- Extender
- Lens Type
- Special Function

For a given lens to be considered suitable for AR/VS applications, every aspect of the lens must be suitable. Consider the impact of ALL relevant lens characteristics to determine overall suitability.

Encoder Bit Depth

AR/VS applications require 16-bit lens encoders. All new Fujinon Studio/Field lenses have the required bit depth.

If you plan to use a previously-purchased lens, confirm that the lens has a port for encoder data. Some older lenses do not, and therefore cannot be used for AR/VS applications. The port connector is on the underside of the lens, and is typically labeled **Virtual**, **EXT**, or **EXP**. The encoder data port is either a 20-pin Hirose connector, or a DB9 connector. Ross Video needs to know which connector type your lens uses, so we can send you the correct lens control cable(s).

Sensor Format

Check the sensor format code (see Figure 4):

Sensor Format Code	Code Description	Suitable for AR/VS Applications?
UA	Sensor size is 2/3"	Excellent for AR/VS applications.
XA	Sensor size is 2/3"	Excellent for AR/VS applications.
HA	Sensor size is 2/3"	Excellent for AR/VS applications.

Extender

If the lens has an extender, the lens model number contains the extender code (see Figure 4):

Extender Code	Code Description	Suitable for AR/VS Applications?
E	The lens has an extender.	Extender must be turned off for AR/VS applications.

Lens Type

Check the lens type code (see Figure 4):

Lens Type Code	Fujinon Code Description	Suitable for AR/VS Applications?
S	Field Lens with OS-Tech	Suitable for AR/VS applications. OS-Tech may need to be turned off.
T	Field Lens with OS-Tech	Suitable for AR/VS applications. OS-Tech may need to be turned off.
F	Studio Lens	Suitable for AR/VS applications.
D	Minibox Lens	May be suitable for AR/VS applications. Contact Ross Video Technical Support.

Special Function

Check the special function code (see Figure 4):

Special Function Code	Code Description	Suitable for AR/VS Applications?
K	Precision Focus (if have)	Suitable for AR/VS applications. Precision Focus may need to be turned off.

Canon ENG/EFP Lenses



Figure 6 - Canon ENG/EFP Lens (HJ14ex4.3B-IASE-A)

This section helps you determine whether a given Canon ENG/EFP lens is controllable by the Ross Robotics system, and whether it is suitable for AR/VS applications.

If your Ross Robotics system includes AR/VS, the lenses must be controllable AND suitable for AR/VS.

Lens model numbers contain codes indicating various characteristics of the lens. These codes can help determine lens controllability, and suitability for AR/VS applications. Figure 7 shows an example of a Canon ENG/EFP lens model number. The lens characteristics with arrows below them are relevant when determining controllability and AR/VS suitability of the lens.

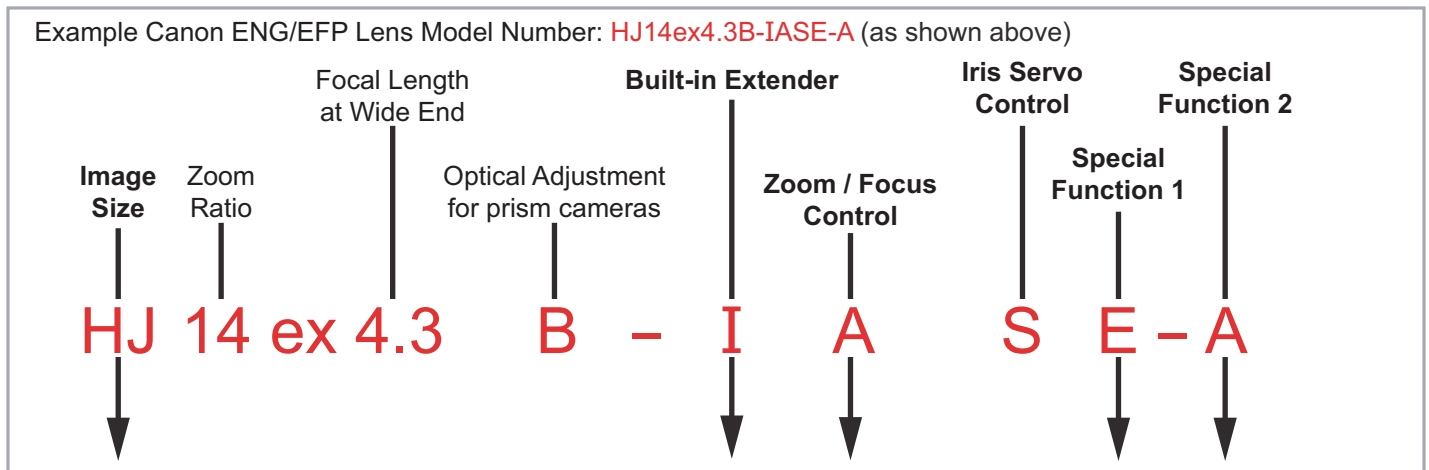


Figure 7 - Understanding Canon ENG/ EFP Lens Model Numbers

Canon ENG/EFP Lens Controllability

To be controlled by the Ross Robotics system, a given lens must have servo zoom and servo focus. To determine controllability, check the Zoom/Focus Control code (see Figure 7):

Zoom/Focus Control	Code Description	Controllable by Ross Robotics?
A	Servo Zoom, Servo Focus	Yes
L	Manual Zoom, Manual Focus	No
R	Servo Zoom, Manual Focus	No
T	Servo Zoom, Servo Focus	Yes, but by CamBot 520PT, 600PT only. This is an analog-control lens.

Canon ENG/EFP Lens AR/VS Suitability

As a general rule, if the middle connector on the lens is a 20-pin Hirose connector labeled **Virtual** AND the lens is the **IASE** type, it is suitable for AR/VS.

The following lens characteristics determine whether a given lens is suitable for AR/VS applications:

- Image Size
- Built-in Extender
- Special Function (1) — Analog / Digital
- Special Function (2)

For a given lens to be considered suitable for AR/VS applications, every aspect of the lens must be suitable. Consider the impact of ALL relevant lens characteristics to determine overall suitability.

Image Size

The image size is the size of the image sensor. Larger sensors are generally preferable. Check the Image Size code (see Figure 7):

Image Size Code	Code Description	Sensor Size	Suitable for AR/VS Applications?
HJ	High Definition Portable Lens for 2/3"	2/3"	Excellent for AR/VS applications.
KJ	High Definition HDgc Series Lens for 2/3"	2/3"	Excellent for AR/VS applications.
DJ	High Definition Day/Night Lens for 2/3"	2/3"	Not supported for AR/VS applications.
J	ENG/EFP Lens for 2/3"	2/3"	Not recommended.
KH	High Definition HDgc Series Lens for 1/2"	1/2"	Not recommended.
H	ENG/EFP Lens for 1/2"	1/2"	Not recommended.
KT	High Definition HDgc Series Lens for 1/3"	1/3"	Not supported (1/3" sensor size is not suitable for AR/VS applications).
YH	Pro Video Lens for 1/2"	1/2"	Not supported Canon Pro Video lenses cannot be controlled.
YJ	Pro Video Lens for 2/3"	2/3"	Not supported. Canon Pro Video lenses cannot be controlled.

Built-in Extender

If the lens has an extender, the lens model number contains an extender code (see Figure 7):

Extender Code	Code Description	Suitable for AR/VS Applications?
IE	Built-in extender	Suitable for AR/VS applications. Extender must be turned off.
I	Built-in extender	Suitable for AR/VS applications. Extender must be turned off.
K	No extender	Suitable for AR/VS applications.

Special Function (1) — Analog / Digital

The Special Function (1) code indicates the lens control type. Check the Special Function (1) code (see Figure 7):

Special Function (1) Code	Code Description	Suitable for AR/VS Applications?
E	Digital drive with rotary encoder	Excellent for AR/VS applications
D	Digital drive for portable lens	No
(none)	Analog drive for portable lens	No

Special Function (2)

Check the Special Function (2) codes. Any combination of the following codes may be present. (see Figure 7):

Special Function (2) Code	Code Description	Suitable for AR/VS Applications?
V	Built-in Vari Angle Prism	Yes May need to turn feature off.
AF	Auto Focus Function	Yes May need to turn feature off.
SC	Cine Style Lens	Yes
ME	Extender Manual	Yes. May need to turn extender off.
RE	Extender Servo	Yes. May need to turn extender off.
A	Upgrade Version	Yes. Depending on the upgrade version code, controllability of the lens may be affected.

Canon Studio/Field Lenses



Figure 8 - Canon DIGI SUPER 23 Studio Box Lens (XJ23x7.B IE-D)

This section helps you determine whether a given Canon Studio/Field lens is controllable by the Ross Robotics system, and whether it is suitable for AR/VS applications.

Note: Studio/Field lenses tend to be heavier than ENG/EFP lenses. Check that the weight of the lens plus all other payload components (teleprompter, monitor, etc) does not exceed the payload capacity of your robot.

If your Ross Robotics system includes AR/VS, the lenses must be controllable AND suitable for AR/VS.

Lens model numbers contain codes indicating various characteristics of the lens. These codes can help determine lens controllability, and suitability for AR/VS applications. Figure 9 shows an example of a Canon Studio/Field lens model number. The lens characteristics with arrows below them are relevant when determining controllability and AR/VS suitability of the lens.

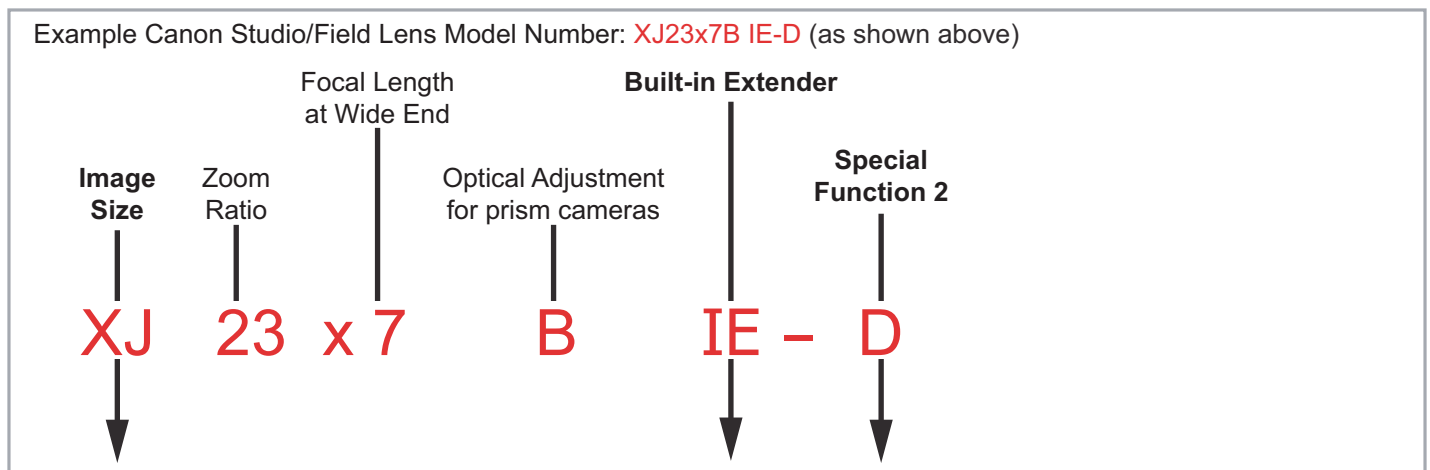


Figure 9 - Understanding Canon Studio/Field Lens Model Numbers

Canon Studio/Field Lens Controllability

Whether a Canon Studio/Field lens can be controlled by Ross Robotics depends on which firmware version is installed on the lens. For more information, contact Ross Video Technical Support.

To be controlled by the Ross Robotics system, a given lens must have servo zoom and servo focus.

Check the Special Function (2) codes (see Figure 9). Any combination of codes may be present, but the codes **MUST** include **D - Digi Servo for Studio/Field Lens**:

Special Function (2) Code	Code Description	Suitable for AR/VS Applications?
D	Digi Servo for Studio / Field Lens	Yes. This code MUST be present!

Canon Studio/Field Lens AR/VS Suitability

The following lens characteristics determine whether a given lens is suitable for AR/VS applications:

- Image Size
- Built-in Extender
- Special Function (2)

For a given lens to be considered suitable for AR/VS applications, every aspect of the lens must be suitable. Consider the impact of ALL relevant lens characteristics to determine overall suitability.

Image Size

The image size is the size of the image sensor. Larger sensors are generally preferable. Check the Image Size code (see Figure 9):

Image Size Code	Code Description	Suitable for AR/VS Applications?
PH	Studio/Field Lens for 1/2"	No
UJ	High Definition Studio/Field Lens for 2/3"	Excellent for AR/VS applications.
XJ	High Definition Studio/Field Lens for 2/3"	Excellent for AR/VS applications.

Built-in Extender

If the lens has an extender, the lens model number contains an extender code (see Figure 9):

Extender Code	Code Description	Suitable for AR/VS Applications?
IE	Built-in extender. Extender must be set to 1x (off).	Yes
I	Built-in extender. Extender must be set to 1x (off).	Yes
V	Built-in 0.8x crossover unit	Yes May need to turn feature off.
W	Built-in 0.8x crossover unit and 2x extender	Yes May need to turn feature off.

Special Function (2)

Check the Special Function (2) codes (see Figure 9) Any combinations of the following codes may be present:

Special Function (2) Code	Code Description	Suitable for AR/VS Applications?
D	Digi Servo for Studio / Field Lens	Yes. This code MUST be present!
V	Built-in Vari Angle Prism	Yes May need to turn feature off.
C	Clutchless Zoom System	Yes May need to turn feature off.
AF	Auto Focus Function	Yes May need to turn feature off.
SC	Cine Style Lens	Yes
ME	Extender Manual	Yes. May need to turn extender off.
RE	Extender Servo	Yes. May need to turn extender off.
A	Upgrade Version	Yes. Depending on the upgrade version code, controllability of the lens may be affected.