Sony E Mount Lens Protocol

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Contributors

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Physical & Electrical Specifications

Dimension	Value
Flange Focal Distance	18mm

Pin Definitions

Pin #	Function	Description

1	LENS_GND	Lens motor GND
2	LENS_POWER	Can be either 5.0V or unregulated Vbat (7.4V nominal) - This is somehow negotiated between body and lens.
3	LOGIC_GND	Ground for lens logic circuitry
4	BODY_VD_LENS	Body to lens signaling that kicks off each command/response loop. In nearly all cases, it is normally high but pulses low at a very low duty cycle, 60 Hz
5	LOGIC_VCC	Lens logic power 3.15V. All data lines are 3.15V logic high.
6	LENS_CS_BODY	Handshaking line from lens to body. Always high when RXD is transferring data, normally low.
7	RXD	Serial data from lens to body
8	TXD	Serial data from body to lens
9	BODY_CS_LENS	Handshaking line from body to lens. Always high when TXD is transferring data.
10	LENS_XDETECT	weakly pulled high by the body. Grounded to LOGIC_GND by the lens, or sometimes via 680 Ohm resistor (Viltrox EF-NEX II). Used to detect presence of a lens. Body will not output power unless this pin is grounded.

Signaling

UART 8N1, LSB-first.

Communication starts at 750 kbaud. The camera and lens usually negotiate a speed change to 1.5 Mbaud during init.

Serial Message Format

Framing

Byte#	Name	Value	Description
0	SOM	0xF0	Start of message. Presumably this value is used as this results in the bit pattern b11110000 which can be used to detect baud rate accurately.

1,2	MESSAGE_LENGTH		16-bit length of message
3	MESSAGE_CLASS		Normal 0x01 Initialization or shutdown 0x02 ?? 0x03
4	SEQ_NUMBER		0 during initialization, and then begins counting BODY_VD_LENS cycles during normal operation. The sequence count appears to reset after 0xEF. It appears that the body can command a change in sequence numbers by altering this value - the lens will always report the last seen sequence number plus 1. That is to say the sequence number does not go up with each message but with each message pair.
5	MESSAGE_TYPE		A value from Message Types below
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N - 2	CHECKSUM		16-bit checksum, the sum of all bytes in the message payload byte [1,N-3]
N - 1	' '		Continuation of CHECKSUM
N	EOM	0x55	End of message
>N	GARBAGE		Any bytes after EOM are ignored

Message Types

MESSAGE_ID	**Name**	**Body To Lens**	**Lens To Body**
0x03	Aperture	Yes	
0x04	Unknown	Yes	
0x05	Aperture Status		Yes
0x06	Focus Position Status		Yes

0x1C	Stop AF	Yes	ACK?
0x1D	Absolute or relative motor movement	Yes	ACK
0x1F	AF Hunt	Yes	ACK
0x22	Absolute motor movement	Yes	
0x2F	Echo request	Yes	
0x3C	Move at speed		ACK?

Initialization Messages

MESSAGE_ID	**Name**	**Body To Lens**	**Lens To Body**
0x01	Capabilities?	0x29	0x29
0x07		0x0A	0x2B
0x08			0x11
0x09		0x0D	0x14
0x10	Seen on EF-E adapter	0x0A	0x0A
0x16	Part of a reset sequence?	0x0A	0X0A
0x0A		0x19	
0x0B		0x0B	0x0B
0x0C	SEL70200|SEL2875, appears to signal speed change	0x0A	0x0A
0x0D	Seen on EF-E adapter	0x0A	0x0A
0x19	SEL2875	0x0A	0x0A

0x28	SEL2875	0x0A	0x2C
0x2B	Seen on EF-E adapter on lens AF switch change	0x0A	0x0A

Message Definitions

0x03

length: 0x20

Byte#	Name	Value	Description
12	Liveness?	0x00 0x01	Always seems to oscillate between 0 and 1
21	Target 1?	0x15 0x17	Camera outputs a pattern here oscillate +/-1 constantly after first len packet camera sends 0x01
22	Target 2?	0x15 0x17	after first len packet camera sends 0x55

0x05

length: 0x90

Byte#	Name	Value	Description
20-21	Focus ?		272 -1792 bigger further big steps
23	Focus Pos		147-255 (not 0 at lens minimum)
30-31	Aperture	0x00 0x4AB	00 = brightest 0x4AB = darkest
33-39	Aperture ??		vary with aperture movement unknown how
60	Focus moving flag		coupled to 0x06 byte 2 0x00 not in motion 0x255 focusing further 0x01 focusing closer???
77	Target 1		Follows 0x03 byte 21

78	Target 2		Follows 0x03 byte 22
81	??		163 - 154 Inversely proportional to focus distance
84			

0x06

length: 0x30

Byte#	Name	Value	Description
0	Limit Flags	0x08 0x10	Is the lens at a focus limit? Maybe other flags included.
1	?	0x00	static?
2	Focus Position	0x00 0x3F	Focus position 0x00 is max focus distance. Value increases as focus position moves closer.
3	?	0x10	static?
4	?	0x00	static?
5	?	0x00	static?
6	?	0x00	static?
7	?	0x00	static?
8		0x10	
		0x3F	
		0x10	
		0x00	
>		0x00	unknown to message length

Limit flags

128	64	32	16	8	4	2	1

?	?	?	Focus Max	Focus Min	?	?	?

0x0C

length: 0x0A

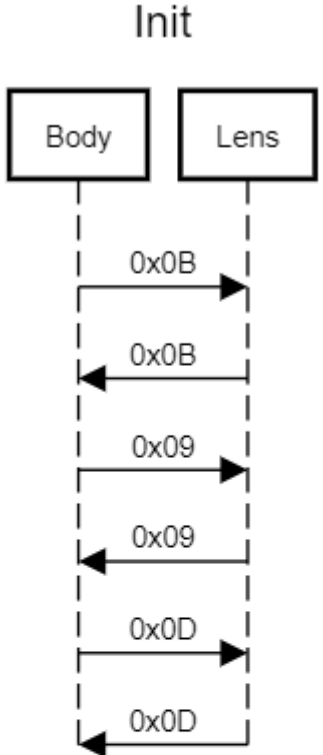
Byte#	Name	Value	Description
0	Speed	0x02 0x01	In order to jump to 1.5MBaud the camera sends 0x02, the lens responds with 0x01 (to signal it's complying??)

Initialization Sequences

Partial and complete initialization. It appears that the camera has some way of determining if a complete initialization is needed. If so it start with an init 0x01 message otherwise it may start with 0x0B.

Voigtlander 15mm Manual Focus

This lens does not negotiate a higher baud rate, all communication is at 750kBaud. This could be considered a minimal valid sequence. Test camera is a NEX7

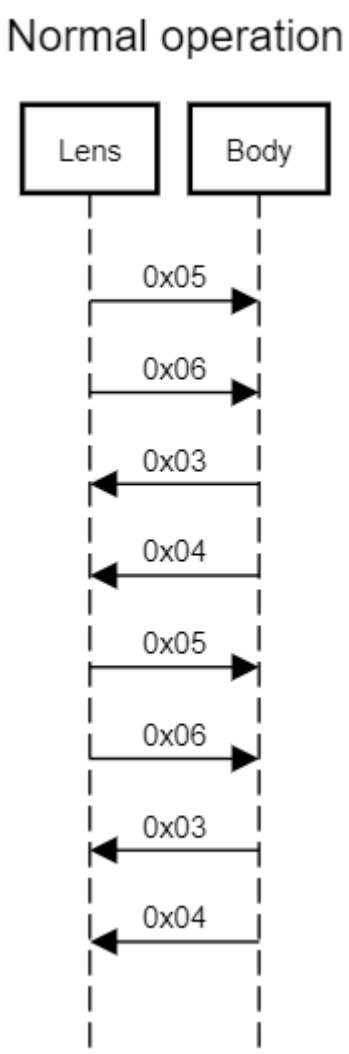


Body->Lens: 0x0B
Lens->Body: 0x0B
Body->Lens: 0x09
Lens->Body: 0x09
Body->Lens: 0x0D
Lens->Body: 0x0D
Body->Lens: 0x10
Lens->Body: 0x10
Body->Lens: 0x0A
Lens->Body: 0x0A

Main Message Loop

Two message slots in each direction run at 60Hz

Voigtlander 15mm Manual Focus

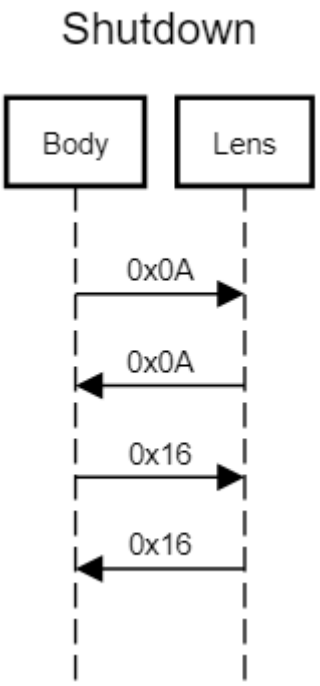


Lens->Body: 0x05
Lens->Body: 0x06
Body->Lens: 0x03
Body->Lens: 0x04
Lens->Body: 0x05
Lens->Body: 0x06
Body->Lens: 0x03
Body->Lens: 0x04

Shutdown

These sequences happen when the camera is powering off.

Voigtlander 15mm Manual Focus



Body->Lens: 0x0A
Lens->Body: 0x0A
Body->Lens: 0x16
Lens->Body: 0x16