Zoom microscope (LWZ/ULWZ)

Operation manual

(3.2)

OptoSigma®

Contents

For your safety

Before using this product, read this manual and all warnings or cautions in the documentation provided. This manual describes the usage rules for the safety of you and others. To be able to refer to this manual anytime, please keep it carefully.

The symbols used in this manual

⚠ WARNING	⚠ CAUTION
This symbol marks warnings that should be read and used to prevent serious injury or death	This symbol indicates where caution should be used to avoid possible injury to yourself or others, or damage to property.

Symbols used in this manual

	This symbol is used to indicate cross-references to relevant information in this manual or other documentation.
	This symbol marks items that should be confirmed before an operation (or action) is performed.
	This symbol marks definitions of terms and other useful information.
(Note)	This symbol marks supplementary information

Disclaimer of Liability

1) SIGMA KOKI CO., LTD. does not accept liability for damages resulting from the use of this product or the inability to use this product.
2) SIGMA KOKI CO., LTD. does not accept liability for damages resulting from the use of this product under the deferent rules from that described in this manual.
3) SIGMA KOKI CO., LTD. does not accept liability for damages resulting from the use of this product in extraordinary conditions, Including fire, earthquakes, and other acts of God, action by any third party, other accidents, and deliberate or accidental misuse.

⚠ WARNING

- Do not use this product in the presence of flammable gas, explosives, or corrosive substances, in areas exposed to high levels of moisture or humidity, in poorly ventilated areas, or near flammable materials.
- Do not turn on the power in the event that it has received a strong physical shock as the result of a fall or other accident.

⚠ CAUTION

- Do not put something on this product.
- Do not touch the product when your hands are wet.
- This product can only be repaired, modified, or disassembled by a qualified technician.
- Do not touch the inside of this product
- The glass lens may be broken in the event that it has received a strong physical shock as the result of a fall or other accident.
- Do not leave this product in an enclosed area or in areas in which it would be exposed to direct sunlight or vibration.

Chapter 1: Overview and Specifications

1-1 Overview

This product "zoom microscope" consists of the zoom lens barrel and the objective lens. The zoom lens barrel is compact form and its zoom ratio is 12. The objective lens is special designed for this zoom microscope, and have a long working distance (ZOL) and ultra-long working distance (UZOL). 2 types zoom lens barrel, manual and motorized models, are prepared. Front conversion lens for changing the working distance are prepared for ultra-long working distance objective lens (UZOL-7).
Product name and constituent components are listed bellow.

Table 1. Product list

Product name	Zoom lens barrel	Objective lens	Front conversion lens
LWZ-15	SZL	ZOL-15	
LWZ-30		ZOL-30	
LWZ-50		ZOL-50	
ULWZ-100		UZOL-15	
ULWZ-200		UZOL-7	—
ULWZ-300			UFCL-300
ULWZ-400			UFCL-400
ULWZ-500			UFCL-500
LWZ-15M	SZLM(-C)	ZOL-15	
LWZ-30M		ZOL-30	
LWZ-50M		ZOL-50	
ULWZ-100M		UZOL-15	
ULWZ-200M		UZOL-7	—
ULWZ-300M			UFCL-300
ULWZ-400M			UFCL-400
ULWZ-500M			UFCL-500

1-2 Specification

● Zoom lens barrel

Table 2. Spec sheet

Model	SZL	SZLM(-C)
Manual/Motorized	Manual	Motorized
Zoom ratio	12	
Focal length	58.3 mm ～ 700 mm	
Correction wavelength	400 nm ～ 700 nm	
Image size	ϕ 8.0 mm (1/2inch camera supported)	
Illumination	Coaxicial epi-illumination	
Camera mount	C-mount	
Weight	900 g	1250 g
Dimensions	Refer to figure 1	Refer to figure 2
Pin assignment	—	Refer to figure 3
Recommended speed	—	650 pps

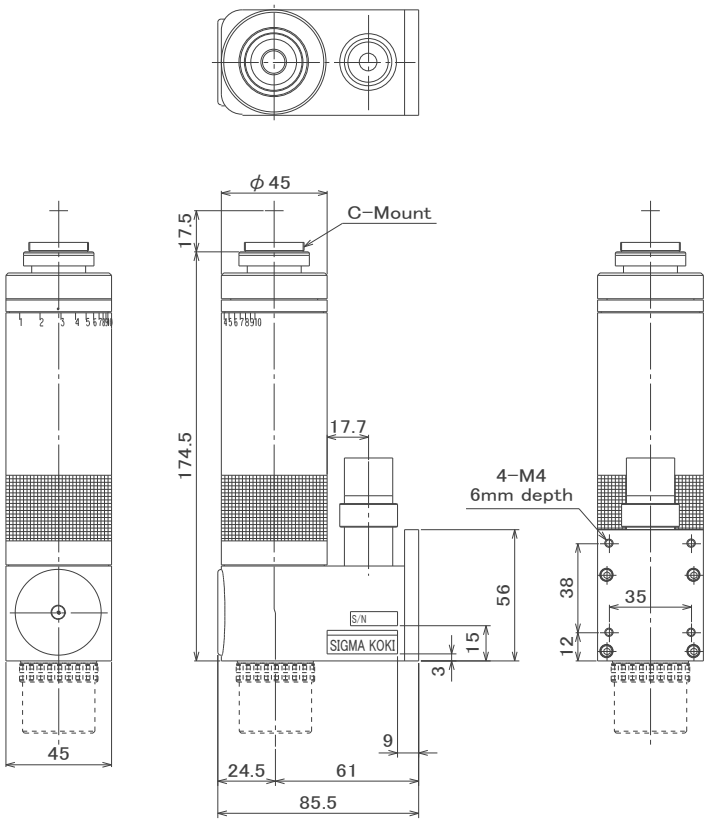

Figure 1. Dimensions of SZL

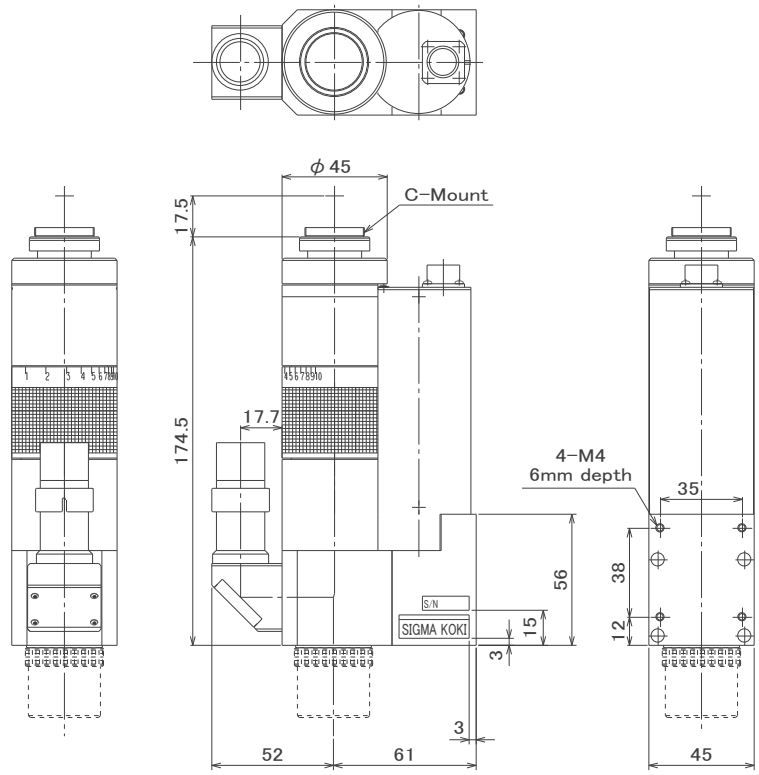

Figure 2. Dimensions of SZLM(-C)

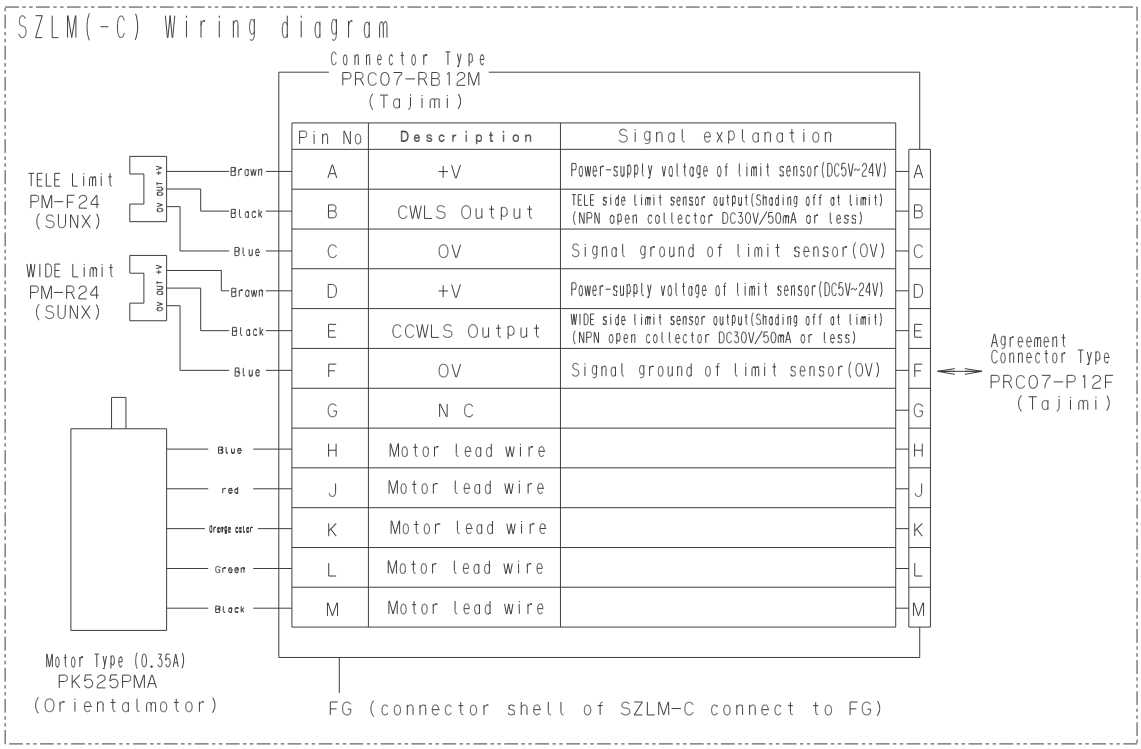

Figure 3. Pin assignment diagram of SZLM(-C)

● Long working distance objective lens (ZOL)

Table 3. Spec sheet

Model	ZOL-15	ZOL-30	ZOL-50
Focal length	46.7 mm	23.3 mm	14.0 mm
Optical magnification※1	1.25 x ～ 15 x	2.5 x ～ 30 x	4.16 x ～ 50 x
Working distance	46.2 mm	35.2 mm	14.0 mm
N.A. ※1	0.03 ～ 0.2	0.06 ～ 0.36	0.1 ～ 0.45
Resolution (λ=0.55μm)※1	11.18 μm ～ 1.68 μm	5.59 μm ～ 0.93 μm	3.36 μm ～ 0.75 μm
Focal depth (λ=0.55μm)※1	±305.6 μm ～ ±6.9 μm	±76.4 μm ～ ±2.1 μm	±27.5 μm ～ ±1.4 μm
Actual field of view※1	ϕ6.4 mm ～ ϕ0.53 mm	ϕ3.2 mm ～ ϕ0.27 mm	ϕ1.93 mm ～ ϕ0.16 mm
Image size	ϕ8.0 mm (1/2inch camera supported)		
Correction wavelength	400 nm ～ 700 nm		
Weight	150 g	396 g	250 g
Dimensions	Refer to figure 4		

※1 In the case of combination with zoom lens barrel (SZL, SZLM(-C))

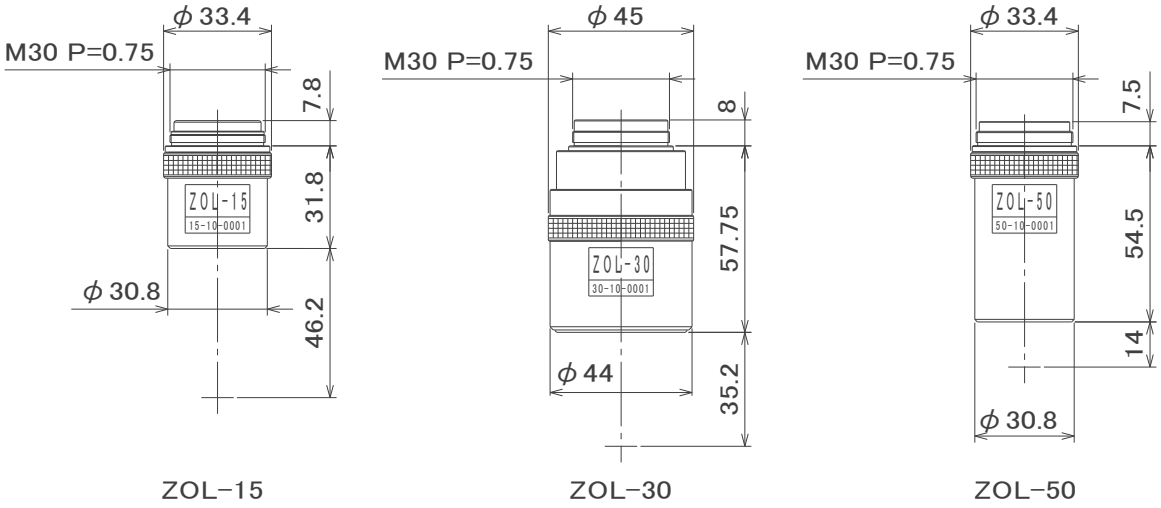

Figure 4. Dimensions of ZOL

● Ultra-long working distance objective lens (UZOL)

Table 4 Spec sheet

Model	UZOL-15	UZOL-7	UFCL-300	UFCL-400	UFCL-500
Focal length	46.7 mm	100.0 mm	156.3 mm	205.3 mm	255.5 mm
Optical magnification※1	1.25 x ～ 15 x	0.58 x ～ 7 x	0.37 x ～ 4.48 x	0.28 x ～ 3.41 x	0.23 x ～ 2.74 x
Working distance	101 mm	206 mm	305 mm	404 mm	502 mm
N.A.※1	0.03 ～ 0.2	0.014 ～ 0.08	0.009 ～ 0.052	0.007 ～ 0.039	0.006 ～ 0.032
Resolution (λ=0.55μm)※1	11.2 μm ～ 1.7 μm	24.0 μm ～ 4.2 μm	37.3 μm ～ 6.5 μm	47.9 μm ～ 8.6 μm	55.9 μm ～ 10.5 μm
Focal depth (λ=0.55μm)※1	±305.6 μm ～ ±6.9 μm	±1403 μm ～ ±43 μm	±3395 μm ～ ±102 μm	±5612 μm ～ ±181 μm	±7639 μm ～ ±269 μm
Actual field of view※1	φ6.4 mm ～ φ0.53 mm	φ13.8 mm ～ φ1.14 mm	φ21.6 mm ～ φ1.79 mm	φ28.6 mm ～ φ2.35 mm	φ34.8 mm ～ φ2.92 mm
Image size	φ8.0 mm (1/2inch camera supported)				
Correction wavelength	400 nm ～ 700 nm				
Weight	1130 g	900 g	992 g	992 g	992 g
Dimensions	Refer to figure 5				

※1 In the case of combination with zoom tube (SZL, SZLM(-C))

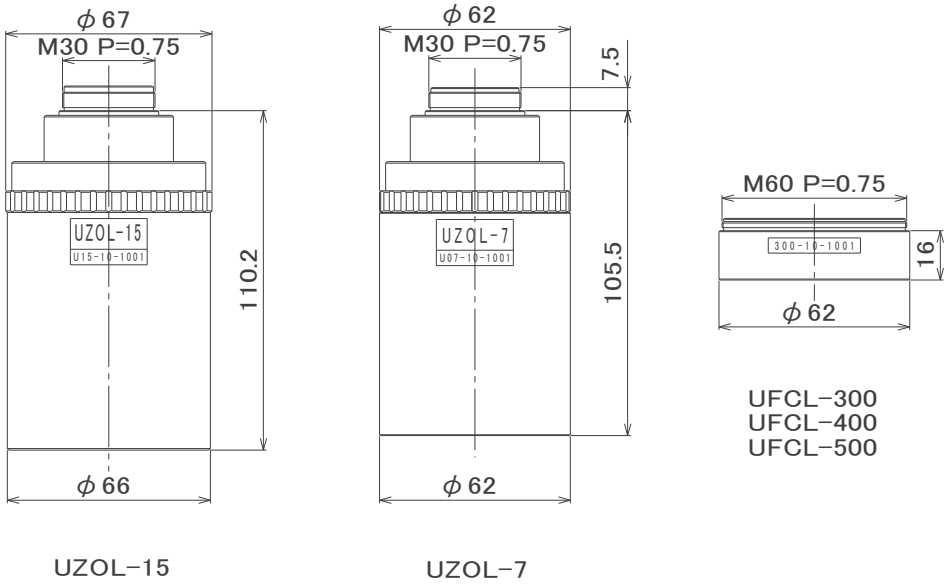

Figure 5. Dimensions of UZOL

● System diagram

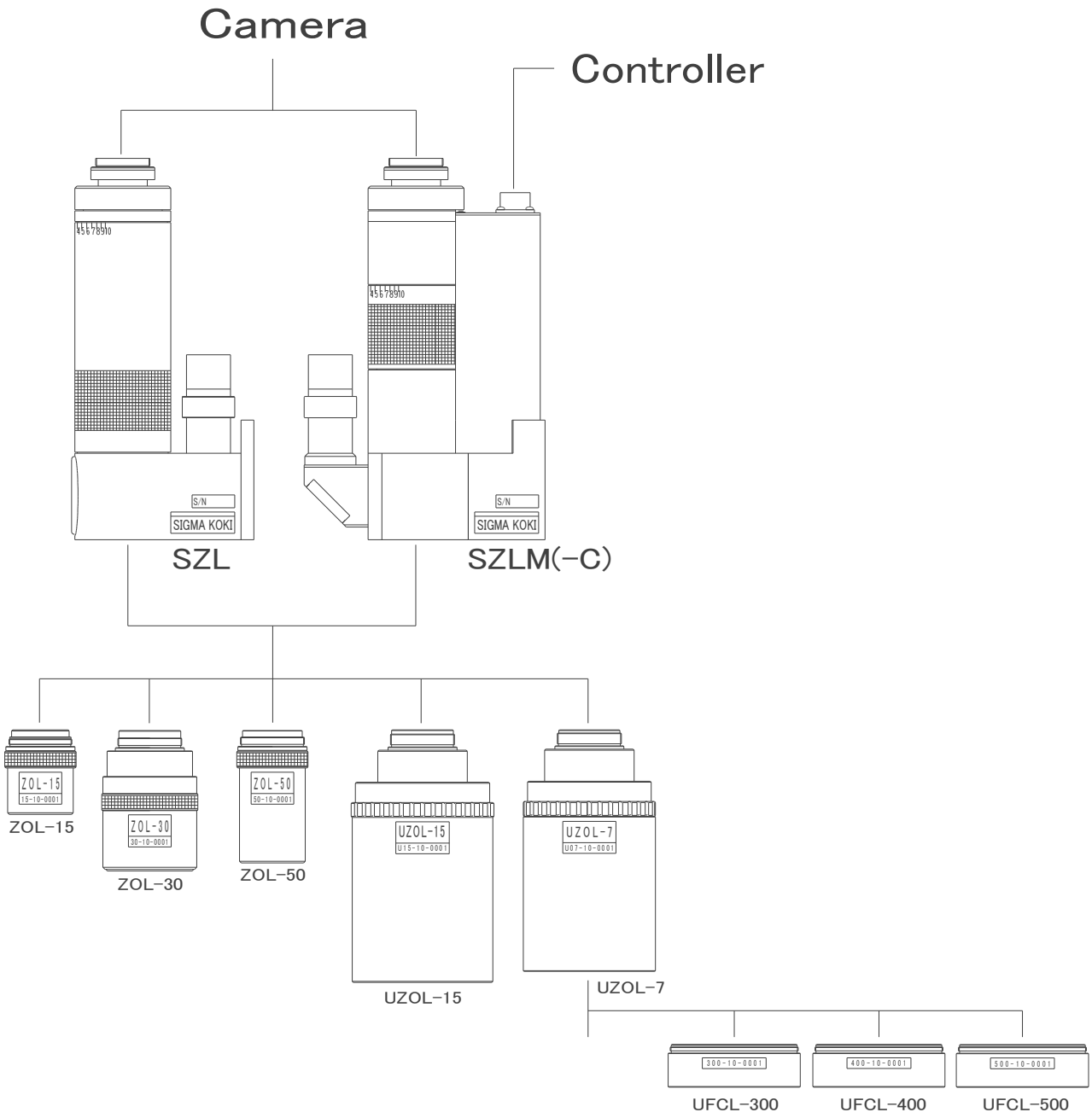

Figure 6. system diagram

● Optical performance at any zoom position

Table 5

LWZ-15

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	1.25	0.030	16.67	11.18	179	305.56	6.40	0.024	20.83	477
1	1.50	0.036	13.89	9.32	215	212.19	5.33	0.024	20.83	477
2	3.00	0.066	7.58	5.08	393	63.13	2.67	0.022	22.73	568
3	4.50	0.095	5.26	3.53	566	30.47	1.78	0.021	23.68	617
4	6.00	0.124	4.03	2.71	739	17.89	1.33	0.021	24.19	644
5	7.50	0.156	3.21	2.15	930	11.30	1.07	0.021	24.04	636
6	9.00	0.188	2.66	1.78	1121	7.78	0.89	0.021	23.94	630
7	10.50	0.200	2.50	1.68	1192	6.88	0.76	0.019	26.25	758
8	12.00	0.200	2.50	1.68	1192	6.88	0.67	0.017	30.00	990
9	13.50	0.200	2.50	1.68	1192	6.88	0.59	0.015	33.75	1253
10	15.00	0.200	2.50	1.68	1192	6.88	0.53	0.013	37.50	1547

LWZ-30

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	2.50	0.060	8.33	5.59	358	76.39	3.20	0.024	20.83	477
1	3.00	0.072	6.94	4.66	429	53.05	2.67	0.024	20.83	477
2	6.00	0.132	3.79	2.54	787	15.78	1.33	0.022	22.73	568
3	9.00	0.189	2.65	1.78	1127	7.70	0.89	0.021	23.81	624
4	12.00	0.248	2.02	1.35	1478	4.47	0.67	0.021	24.19	644
5	15.00	0.310	1.61	1.08	1848	2.86	0.53	0.021	24.19	644
6	18.00	0.362	1.38	0.93	2158	2.10	0.44	0.020	24.86	680
7	21.00	0.362	1.38	0.93	2158	2.10	0.38	0.017	29.01	925
8	24.00	0.362	1.38	0.93	2158	2.10	0.33	0.015	33.15	1209
9	27.00	0.362	1.38	0.93	2158	2.10	0.30	0.013	37.29	1530
10	30.00	0.362	1.38	0.93	2158	2.10	0.27	0.012	41.44	1889

LWZ-50

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	4.16	0.100	5.00	3.36	596	27.50	1.92	0.024	20.80	476
1	5.00	0.120	4.17	2.80	715	19.10	1.60	0.024	20.83	477
2	10.00	0.220	2.27	1.53	1311	5.68	0.80	0.022	22.73	568
3	15.00	0.315	1.59	1.07	1878	2.77	0.53	0.021	23.81	624
4	20.00	0.414	1.21	0.81	2468	1.60	0.40	0.021	24.15	642
5	25.00	0.451	1.11	0.74	2689	1.35	0.32	0.018	27.72	845
6	30.00	0.451	1.11	0.74	2689	1.35	0.27	0.015	33.26	1217
7	35.00	0.451	1.11	0.74	2689	1.35	0.23	0.013	38.80	1656
8	40.00	0.451	1.11	0.74	2689	1.35	0.20	0.011	44.35	2163
9	45.00	0.451	1.11	0.74	2689	1.35	0.18	0.010	49.89	2738
10	50.00	0.451	1.11	0.74	2689	1.35	0.16	0.009	55.43	3380

ULWZ-100

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	1.25	0.030	16.67	11.2	179	305.6	6.40	0.024	20.83	477
1	1.50	0.036	13.89	9.3	215	212.2	5.33	0.024	20.83	477
2	3.00	0.066	7.58	5.1	393	63.1	2.67	0.022	22.73	568
3	4.50	0.095	5.26	3.5	566	30.5	1.78	0.021	23.68	617
4	6.00	0.124	4.03	2.7	739	17.9	1.33	0.021	24.19	644
5	7.50	0.156	3.21	2.2	930	11.3	1.07	0.021	24.04	636
6	9.00	0.188	2.66	1.8	1121	7.8	0.89	0.021	23.94	630
7	10.50	0.200	2.50	1.7	1192	6.9	0.76	0.019	26.25	758
8	12.00	0.200	2.50	1.7	1192	6.9	0.67	0.017	30.00	990
9	13.50	0.200	2.50	1.7	1192	6.9	0.59	0.015	33.75	1253
10	15.00	0.200	2.50	1.7	1192	6.9	0.53	0.013	37.50	1547

ULWZ-200

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	0.58	0.014	35.71	24.0	83	1403	13.79	0.024	20.71	472
1	0.70	0.028	17.86	12.0	167	351	11.43	0.040	12.50	172
2	1.40	0.043	11.63	7.8	256	149	5.71	0.031	16.28	292
3	2.10	0.054	9.26	6.2	322	94	3.81	0.026	19.44	416
4	2.80	0.061	8.20	5.5	364	74	2.86	0.022	22.95	579
5	3.50	0.066	7.58	5.1	393	63	2.29	0.019	26.52	773
6	4.20	0.071	7.04	4.7	423	55	1.90	0.017	29.58	962
7	4.90	0.077	6.49	4.4	459	46	1.63	0.016	31.82	1114
8	5.60	0.080	6.25	4.2	477	43	1.43	0.014	35.00	1348
9	6.30	0.080	6.25	4.2	477	43	1.27	0.013	39.38	1705
10	7.00	0.080	6.25	4.2	477	43	1.14	0.011	43.75	2105

ULWZ-300

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	0.37	0.009	55.56	37.3	54	3395	21.62	0.024	20.56	465
1	0.45	0.019	26.32	17.7	113	762	17.78	0.042	11.84	154
2	0.90	0.026	19.23	12.9	155	407	8.89	0.029	17.31	330
3	1.35	0.032	15.63	10.5	191	269	5.93	0.024	21.09	489
4	1.80	0.038	13.16	8.8	227	190	4.44	0.021	23.68	617
5	2.25	0.042	11.90	8.0	250	156	3.56	0.019	26.79	789
6	2.70	0.046	10.87	7.3	274	130	2.96	0.017	29.35	947
7	3.15	0.049	10.20	6.8	292	115	2.54	0.016	32.14	1136
8	3.60	0.052	9.62	6.5	310	102	2.22	0.014	34.62	1318
9	4.05	0.052	9.62	6.5	310	102	1.98	0.013	38.94	1668
10	4.48	0.052	9.62	6.5	310	102	1.79	0.012	43.08	2041

ULWZ-400

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	0.28	0.007	71.43	47.9	42	5612	28.57	0.025	20.00	440
1	0.34	0.015	33.33	22.4	89	1222	23.53	0.044	11.33	141
2	0.68	0.019	26.32	17.7	113	762	11.76	0.028	17.89	352
3	1.02	0.024	20.83	14.0	143	477	7.84	0.024	21.25	497
4	1.36	0.028	17.86	12.0	167	351	5.88	0.021	24.29	649
5	1.70	0.031	16.13	10.8	185	286	4.71	0.018	27.42	827
6	2.04	0.034	14.71	9.9	203	238	3.92	0.017	30.00	990
7	2.38	0.036	13.89	9.3	215	212	3.36	0.015	33.06	1202
8	2.72	0.039	12.82	8.6	232	181	2.94	0.014	34.87	1338
9	3.06	0.039	12.82	8.6	232	181	2.61	0.013	39.23	1693
10	3.41	0.039	12.82	8.6	232	181	2.35	0.011	43.72	2102

ULWZ-500

Zoom scale	β	N. A.	Fno	R (μm)	R (TVLine)	D.F. (±μm)	F.O.V. (mm)	Image side		
								N. A.	Fno	D.F.(±μm)
0.83	0.23	0.006	83.33	55.9	36	7639	34.78	0.026	19.17	404
1	0.28	0.012	41.67	28.0	72	1910	28.57	0.043	11.67	150
2	0.56	0.016	31.25	21.0	95	1074	14.29	0.029	17.50	337
3	0.84	0.020	25.00	16.8	119	688	9.52	0.024	21.00	485
4	1.12	0.023	21.74	14.6	137	520	7.14	0.021	24.35	652
5	1.40	0.026	19.23	12.9	155	407	5.71	0.019	26.92	797
6	1.68	0.028	17.86	12.0	167	351	4.76	0.017	30.00	990
7	1.96	0.030	16.67	11.2	179	306	4.08	0.015	32.67	1174
8	2.24	0.032	15.63	10.5	191	269	3.57	0.014	35.00	1348
9	2.52	0.032	15.63	10.5	191	269	3.17	0.013	39.38	1705
10	2.74	0.032	15.63	10.5	191	269	2.92	0.012	42.81	2016

β : magnification
R: resolution, spatial resolution
D.F.: focal depth
F.O.V: field of view

(Note) The value listed above is theoretical and not guaranteed.

● Number of pulses at any optical magnification

Conditions: Gear ratio = 6.833:1

Base step angles of stepping motor 0.36 deg

Micro-step setting 1/20

Limit sensor of telephoto end is the origin

Table 6

ZOL15:15～1.25x (microsutep)

β	angle	pulse	β	angle	pulse	β	angle	pulse	β	angle	pulse	β	angle	pulse
15.3	−0.983	−373	12.3	10.221	3880	9.3	25.396	9641	6.3	47.177	17910	3.3	83.848	31831
15.15	−0.495	−188	12.15	10.871	4127	9.15	26.296	9983	6.15	48.533	18425	3.15	86.518	32845
15	0	0	12	11.531	4378	9	27.212	10331	6	49.923	18952	3	89.317	33907
14.85	0.503	191	11.85	12.201	4632	8.85	28.145	10685	5.85	51.349	19494	2.85	92.261	35025
14.7	1.012	384	11.7	12.882	4890	8.7	29.095	11045	5.7	52.813	20049	2.7	95.365	36203
14.55	1.529	580	11.55	13.573	5153	8.55	30.063	11413	5.55	54.316	20620	2.55	98.646	37449
14.4	2.052	779	11.4	14.275	5419	8.4	31.049	11787	5.4	55.860	21206	2.4	102.120	38768
14.25	2.583	981	11.25	14.988	5690	8.25	32.054	12169	5.25	57.452	21810	2.25	105.814	40170
14.1	3.122	1185	11.1	15.713	5965	8.1	33.078	12558	5.1	59.072	22426	2.1	109.755	41666
13.95	3.668	1392	10.95	16.448	6244	7.95	34.123	12954	4.95	60.771	23070	1.95	113.970	43266
13.8	4.221	1603	10.8	17.196	6528	7.8	35.189	13359	4.8	62.510	23731	1.8	118.497	44985
13.65	4.783	1816	10.65	17.956	6817	7.65	36.275	13771	4.65	64.306	24413	1.65	123.385	46841
13.5	5.353	2032	10.5	18.729	7110	7.5	37.384	14192	4.5	66.162	25117	1.5	128.686	48853
13.35	5.931	2251	10.35	19.514	7408	7.35	38.517	14622	4.35	68.083	25846	1.35	134.467	51048
13.2	6.517	2474	10.2	20.312	7711	7.2	39.673	15061	4.2	70.076	26603	1.25	138.616	52623
13.05	7.112	2700	10.05	21.124	8019	7.05	40.856	15510	4.05	72.142	27387			
12.9	7.715	2929	9.9	21.949	8333	6.9	42.063	15968	3.9	74.292	28203			
12.75	8.328	3161	9.75	22.789	8651	6.75	43.297	16437	3.75	76.531	29053			
12.6	8.949	3397	9.6	23.643	8976	6.6	44.561	16917	3.6	78.865	29940			
12.45	9.580	3637	9.45	24.512	9305	6.45	45.854	17407	3.45	81.302	30865			

ZOL15:15～1.25x (half step)

β	angle	pulse	β	angle	pulse	β	angle	pulse	β	angle	pulse	β	angle	pulse
15.3	−0.983	−19	12.3	10.221	194	9.3	25.396	482	6.3	47.177	895	3.3	83.848	1592
15.15	−0.495	−9	12.15	10.871	206	9.15	26.296	499	6.15	48.533	921	3.15	86.518	1642
15	0	0	12	11.531	219	9	27.212	517	6	49.923	948	3	89.317	1695
14.85	0.503	10	11.85	12.201	232	8.85	28.145	534	5.85	51.349	975	2.85	92.261	1751
14.7	1.012	19	11.7	12.882	245	8.7	29.095	552	5.7	52.813	1002	2.7	95.365	1810
14.55	1.529	29	11.55	13.573	258	8.55	30.063	571	5.55	54.316	1031	2.55	98.646	1872
14.4	2.052	39	11.4	14.275	271	8.4	31.049	589	5.4	55.860	1060	2.4	102.120	1938
14.25	2.583	49	11.25	14.988	284	8.25	32.054	608	5.25	57.452	1091	2.25	105.814	2009
14.1	3.122	59	11.1	15.713	298	8.1	33.078	628	5.1	59.072	1121	2.1	109.755	2083
13.95	3.668	70	10.95	16.448	312	7.95	34.123	648	4.95	60.771	1154	1.95	113.970	2163
13.8	4.221	80	10.8	17.196	326	7.8	35.189	668	4.8	62.510	1187	1.8	118.497	2249
13.65	4.783	91	10.65	17.956	341	7.65	36.275	689	4.65	64.306	1221	1.65	123.385	2342
13.5	5.353	102	10.5	18.729	356	7.5	37.384	710	4.5	66.162	1256	1.5	128.686	2443
13.35	5.931	113	10.35	19.514	370	7.35	38.517	731	4.35	68.083	1292	1.35	134.467	2552
13.2	6.517	124	10.2	20.312	386	7.2	39.673	753	4.2	70.076	1330	1.25	138.616	2631
13.05	7.112	135	10.05	21.124	401	7.05	40.856	776	4.05	72.142	1369			
12.9	7.715	146	9.9	21.949	417	6.9	42.063	798	3.9	74.292	1410			
12.75	8.328	158	9.75	22.789	433	6.75	43.297	822	3.75	76.531	1453			
12.6	8.949	170	9.6	23.643	449	6.6	44.561	846	3.6	78.865	1497			
12.45	9.580	182	9.45	24.512	465	6.45	45.854	870	3.45	81.302	1543			

β : Magnification

(Note) The value listed above is theoretical and not guaranteed.

Please calibrate by the actual measurement.

Chapter 2: Part Names and Functions

2-1 Part names

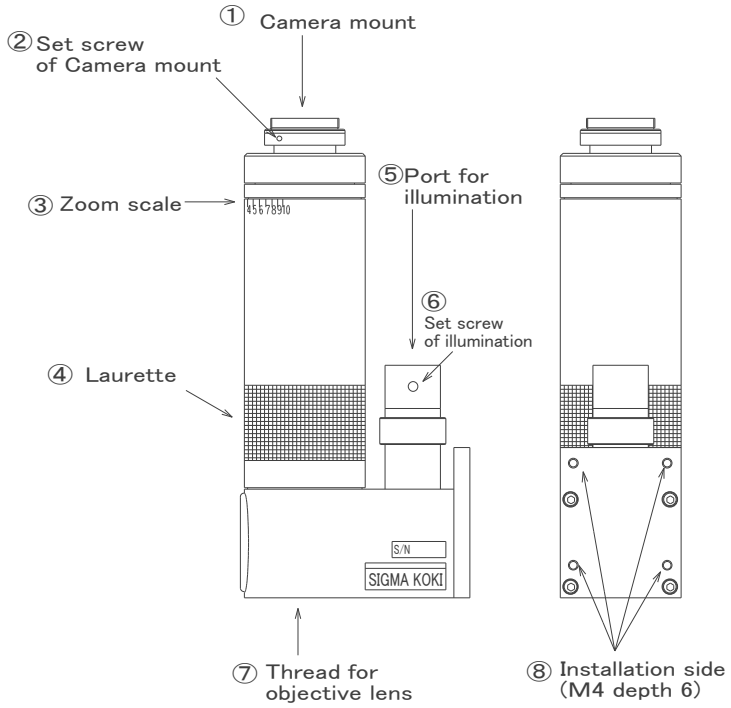

Figure 7. Part names of SZL

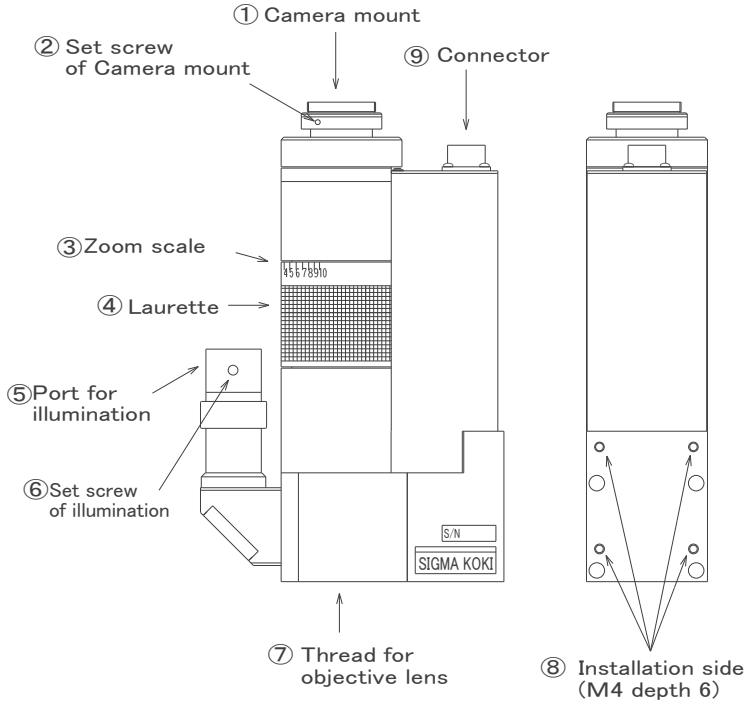

Figure 8. Part names of SZLM(-C)

2-2 Part functions

1) Camera mount: Only C-mount type camera is usable.
2) Set screw of camera mount: This screw fix a camera mount.
3) Zoom scale: This scale indicates optical magnification.
(☞ Please refer to table 5.)
4) Laurette: Use for manual operation
5) Port for illumination: Fiber light guide MSL-500L (sigma koki made) is available. (※1)

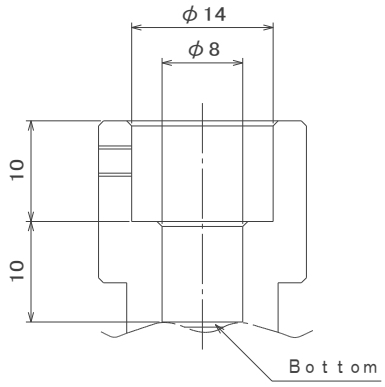

Figure 9. Detail drawing (※2)

6) Set screw of illumination: Use for fixing an illumination
7) Thread for objective lens: Only ZOL and UZOL series is available (M30 P=0.75). (※3)
8) Installation side: Use for fixing the zoom lens barrel with M4 screw
9) Connector: Connect to controller with a cable (ZCA-2 or ZCA-2C).

☞ (※1) For more information please refer to the comprehensive catalog or web site.
(※2) Do not touch the bottom of the port to avoid breakdown.
(Note) (※3) Only ZOL/UZOL is available. The use of other objective lens is not guaranteed.

Chapter 3: Basic Operation

3-1 Installation and Operation

1) Set the zoom lens barrel to the appropriate mounting space and fix with M4 screw.
2) Loose the set screw of camera mount and detach the camera mount from the barrel. Screw this camera mount into the C-mount camera. Next, attach again the camera mount with C-mount camera to the barrel and fix with set screw. (※1)
3) Attach the objective lens to the thread of the barrel. Be careful not to touch at the surface of the lens.
4) Insert the fiber light guide to the port for illumination. Before insert the fiber, be careful that set screw don't appear inside of the port. Check the fiber reach to the end of the port, finally fix with set screw.
5) Focus to the subject in wide position by checking the observed image on the monitor. Turn the laurette to change the zoom position from wide to telephoto little by little and each time focus again to the subject. Finally, zoom position reached the telephoto end and zoom microscope focus to the subject. Turn the laurette to change the zoom position from telephoto to wide, and check that zoom microscope focus to the subject any zoom position.
6) Focus to the subject in telephoto position, and move the target point of the subject to the center of the field of view (the center of the monitor). By doing so, you can observe the target on the center of the field at any zoom position.

(※1) Recommended tightening torque.[0.06N・m]

・**Accessories provided with this product**

Operating manual (this documentation)
Quick set up manual

・**General specifications**

Recommended Operating Temperature	23℃±3℃
Storage Temperature	0 to 40℃
Ambient Humidity	up to 80%RH (no condensation)
Indoor use only	

・**Guarantee**

Guarantee period of this product is a 1year from shipping. If this product breaks down in guarantee period, please return to the SIGMA KOKI CO., LTD. We will repair that products or replace the parts at the failure point at no charge. SIGMA KOKI CO., LTD. does not accept liability for damages resulting from the inability to use this product. If this product break down resulting from the reasons listed bellow, SIGMA KOKI CO., LTD. does not guarantee.

1) Any third party repair or modify this product
2) Deliberate or accidental misuse
3) The use or store of this product in extraordinary different conditions from the conditions described in this manual.
4) Fire, earthquakes, flood, lightning strike, and other natural disaster.
5) Consumables (Including optics)

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