



User Guide

PLEASE READ & SAVE THESE ORIGINAL INSTRUCTIONS

Silk[®]

pure, soft white light



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INTRODUCTION

Congratulations on your purchase of a Rosco Silk LED fixture. Engineered to meet the requirements of the most discerning filmmaker, the Silk series LED lighting system has been specifically developed for film and video applications that demand extremely color-accurate, high-quality light.

Your new Silk fixture will create a high volume of enticingly soft, broad spectrum white light utilizing state-of-the-art tungsten and daylight balanced LEDs. Silk LED fixtures feature a non-glare diffuser that provides uniform, single-source light that gently embraces its subjects, making it the perfect fixture for illuminating feature films and television productions, on stage or on location.

IMPORTANT SAFEGUARDS

The symbols below are used throughout this manual to identify important safety information. Heed all warnings and safety information.

SYMBOL	MEANING
	WARNING, DANGER OR CAUTION Risk of injury to yourself or the product
	RISK OF ELECTRICAL SHOCK Risk of severe electrical shock

PREVENTING ELECTRIC SHOCK

- This fixture uses mains electrical power at 100 - 240 VAC. When directly contacted, such voltages are hazardous to human life. Follow all local electrical codes and take precautions when using this product.
- This product is designed to operate from three-wire power systems, where one of the wires is a safety ground. DO NOT disconnect the safety ground, or use extension cords or adapter plugs to connect this machine to a two-wire system. Operation without a safety ground may result in hazardous electrical shock.
- Use only extension cords that are of appropriate length and are rated for Silk® specified voltage and current. If an extension cord shows signs of wear or gets warm to the touch, discontinue its use and obtain a cord with a higher current rating. Improper extension cords are hazardous and may result in poor performance due to excessive voltage drop.
- Disconnect fixture from power source before servicing and when not in use.

IMPORTANT HEALTH & SAFETY INFORMATION

Silk lighting fixtures use high strength magnets on the front face

Do not place within 12" (300mm) of credit cards

Magnets can adversely affect heart pacemakers



MAINTAINING SAFE OPERATION

- Use only Rosco spare parts and accessories so as to not void the warranty.
- Allow the fixture to cool before attempting to service. Silk LED fixtures must only be serviced by a qualified technician.
- Silk LED fixtures are not intended for residential use. Use only in a professional studio or mobile broadcast environment by trained personnel under proper training and supervision. Keep out of reach from children. Children shall be supervised to ensure that they do not play with the fixture.
- Silk LED fixtures are capable of reaching a maximum surface temperature of 185°F (85°C). Keep minimum 4" (10cm) distance away from flammable materials / objects. The top of the unit may become hot to the touch during operation. Contact during or immediately following operation may result in burns.
- Silk LED fixtures are IP20 rated – for indoor use and/or a dry environment. Do not operate outdoors in a wet environment.



MAINTAINING SAFE OPERATION

- Silk LED fixtures are not certified for use in hazardous locations.
- Silk LED fixtures are designed for operation within the range of 32° to 95°F (0° to + 35°C).
- Ensure Silk LED fixtures are stored within the range of - 4° to 140°F (- 20° to + 60°C).
- Do not look directly into a Silk LED fixture for long periods of time, as prolonged exposure may be harmful to the eyes.
- High voltage and stored energy may be present inside the fixture. Only trained service personnel should engage in repairs.
- The use of a safety cable is strongly recommended when hung overhead. There are safety wire mounting ports in the extruded sides in all four corners.
- When suspended on the yoke, the yoke cannot be used as mounting point for secondary safety cable.
- All ventilation holes in the back plate must remain clear and are not to be obstructed during the operation of the fixture.
- This fixture is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

UNPACKING

Carefully remove the fixture from the box.

If there are any signs of physical damage to the fixture, contact your local Rosco dealer.

Your Rosco Silk LED fixture will arrive with a power supply detached from the fixture in the box.

Safety cables must be securely be attached using the designated slots on the Silk fixture (detailed on page 51) and be as short as possible to reduce travel distance if primary hanging accessory fails. The combined weight of fixture and accessories should be considered when choosing a suitable safety cable.

Ensure that the yoke locking handle is correctly tightened after positioning Silk. If the locking handle is not tightened correctly, the fixture may swing.

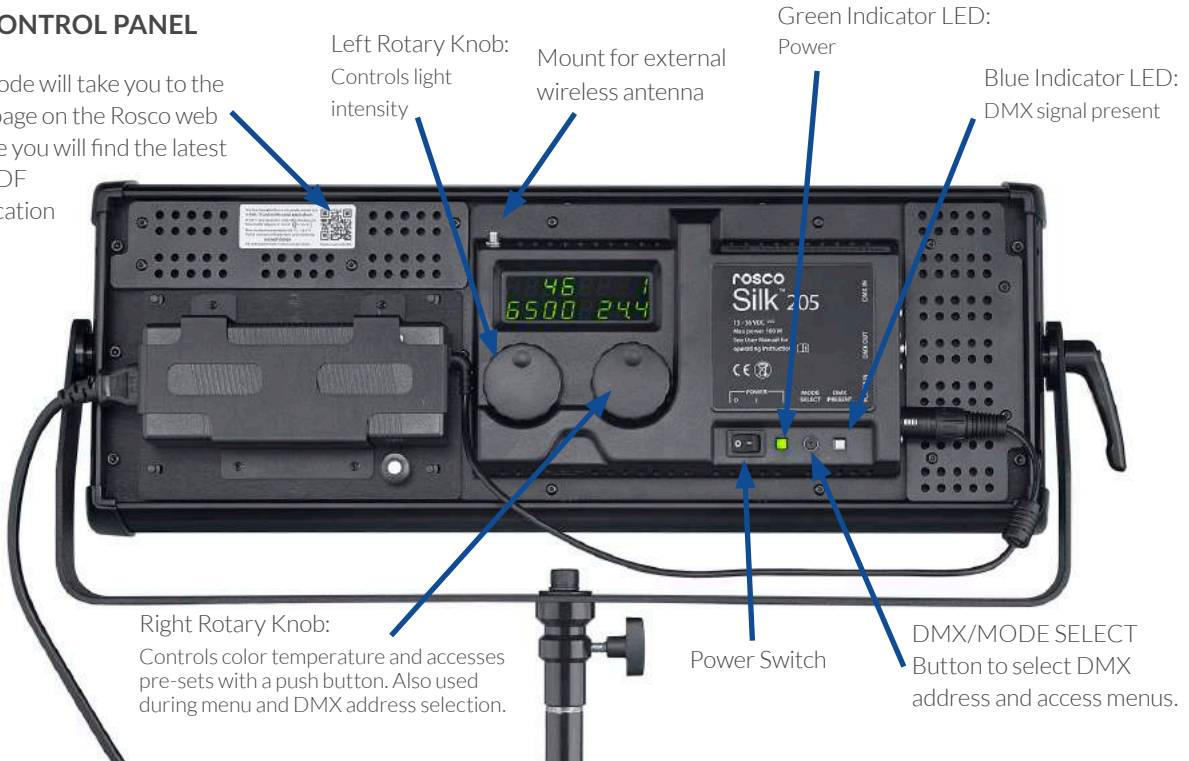
Silk 205 and Silk 305 are supplied with a right-angle mini-USB cable for future firmware updates.

CONTROLS

Silk LED fixtures can be controlled via the on-board, Control Panel located on the back of the fixture, or via user-supplied DMX512 data input.

REAR CONTROL PANEL

The QR code will take you to the Silk web page on the Rosco web site where you will find the latest manual PDF and application notes.



DISPLAY

<i>Top Left</i>	Dimming percentage
<i>Top Right</i>	DMX address
<i>Bottom Left</i>	Color temperature
<i>Bottom Right</i>	Input DC voltage



NOTE: If the input voltage drops below 13.5V, the input voltage will flash. (Only applies to 110, 210 and 205)

OPERATION

POWERING ON

1. Silk LED fixtures are supplied with a standard 100-240 VAC switching power supply, which is mounted in a cradle on the rear of the unit. A lead with a 4-pin XLR connector brings DC power from the power supply to the Silk.
 - a. Silk LED fixtures can be powered by V-Mount batteries. Remove the power supply and cradle, and then replace it with an optional Silk V-Mount Cheeseplate Battery Holder.
 - b. Silk LED fixtures can be powered by Anton/Bauer batteries. Remove the power supply and cradle, and then replace it with an optional Silk Anton/Bauer Cheeseplate Battery Holder.
2. Make sure the 4-pin XLR connector from the power supply is plugged into the Silk, and then plug the power supply into mains power: 100 – 240 VAC. Then switch on the unit with the rocker switch on the User Interface.
 - a. The rear display will illuminate.
 - b. Settings will default to those in use when the unit was last powered down.
3. If desired connect the Silk LED fixture to a DMX console using the 5-pin XLR ports on the rear control panel.
 - a. The presence of a DMX input signal is automatically detected.
 - b. The Blue Indicator LED will illuminate.

POWER ON

Attach the power supply to the back of the unit and plug the XLR 4 connector into the fixture. Plug the IEC connector into the power supply. Turn fixture on using the toggle switch on the Control Panel.

Safety cables must be securely attached to the designated slots on the Silk fixture (detailed on page 51) and be as short as possible to reduce travel distance if primary hanging accessory fails. The combined weight of fixture and accessories should be considered when choosing a suitable safety cable.

Ensure that the yoke locking handle is correctly tightened after positioning Silk. If the locking handle is not tightened correctly, the fixture may swing.

INFORMATION

Silk LED fixtures have a digital serial number and firmware version, which is viewable on the initial LED display load screen.

This information is also accessible by pressing and holding down the DMX/MODE/SELECT button.

The display will revert to default once the button is released or with momentary push.

MANUAL CONTROL

1. Select the output level of the fixture by rotating the left-hand knob until the desired set point has been achieved. The current set point will be shown in the upper left-hand portion of the display.
2. Select the color temperature of the fixture by rotating the right-hand knob until the desired set point has been achieved.
 - a. Silk LED fixtures can be set to color temperatures ranging from 2800K to 6500K.
 - b. The current set point will be shown in the lower left portion of the LED display.
 - c. Seven pre-set color temperatures are stored in the fixture's control logic.
Push the right-hand knob to choose the desired pre-set color temperature:

Preset Chart:

2900K	3200K	3600K	4300K	5000K	5600K	6500K
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NOTE: The rear LED display will automatically dim after several seconds if no inputs have been entered. The display will resume full illumination when the controls are operated.

SILK® LED V2 MENUS

Silk LED v2 has a range of additional menu choices to reach additional functionality.

- 8 or 16 bit dimming
- Dimming curves
- DMX modes
- Color profile
- Output profile
- Wireless antenna select
- Link/unlink wireless

To return all settings to default, turn the unit on with the DMX/MODE button pressed

Navigation in the menus uses parameter and choice using **1.1, 1.2, 2.1, 2.2** etc and an ALPHA abbreviation.

DMX Address	—	1-511/510	
8 bit/16 bit dimming	—	8 bit 16 bit	<i>8bit</i> <i>16bit</i>
DMX mode	—	Standard DMX Wireless DMX Silk is DMX master	<i>StA</i> <i>rAd</i> <i>Con</i>
Dimming curve	—	Linear Square Law S curve Tungsten	<i>Lin</i> <i>Squ</i> <i>S</i> <i>CCt</i>
Color profile	—	Standard Linear	<i>StA</i> <i>Lin</i>
Output profile	—	Standard Flat	<i>StA</i> <i>FLA</i>
Antenna selection	—	Internal External	<i>Int</i> <i>EtE</i>
Wireless link	—	Locked Unlink	<i>Loc</i> <i>UnL</i>

To return all setting to standard defaults – hold down the MODE SELECT button while switching the unit on. All defaults will be selected.

8 OR 16 BIT DIMMING CONTROL OPTION

DMX dimming is now possible in 8 bit or 16 bit mode. 8 bit dimming uses one channel of DMX and therefore the only possible resolution is 256 discrete steps. With 16 bits a fixture can have 65536 steps. Whilst it would be impossible for the human eye or a camera set up to discern all the steps it does provide potential for smoother dimming. When in 16 bit mode, Silk uses 3 channels of DMX; dimming coarse, dimming fine, CCT.

1.1 8 bit dimming



1.2 16 bit dimming



CHOICE OF THREE DMX MODES

- **Standard DMX (StA)**

In standard DMX mode, Silk uses 2 channels of DMX to control intensity and colour temperature and also conforms to Last Takes Precedence Protocol so 'on set' or 'desk control' can modify settings on the fixture. Silks can be daisy chained with 5 pin XLR connectors.

- **Wireless DMX (rAd)**

This mode allows the fixture to be controlled via wireless DMX with the Lumen Radio wireless module. When in wireless DMX mode, Silk can still be daisy chained to other fixtures not in wireless mode.

Note: The Lumen Radio chip offers over-the-air firmware upgrades, as well as a U.F.L connector for external antenna. TiMo is fully compliant with the ETSI EN 300328 (v1.8.1) '2015' revision, as well as fully FCC certified with a modular approval to 300mW. The chip is fully compatible with all existing CRMX transmitters, as well as transmitters from Wireless Solution running in G2, G3, G4 or G4S 2.4GHz mode, enabling a single wireless component to maximize compatibility within fixtures.

- **Silk is DMX master (Con)**

In this mode, a Silk can control other Silk's on set with common base address. That way in a small wired set up, one with limited crew, the overall light level or CCT can be adjusted from one master unit.

NOTE: When the Silk is in wireless mode, also behaves as a wired master; other fixtures wired downstream will receive DMX. So a wireless Silk can act as a hub.

2.1 Standard DMX



2.2 Wireless DMX



2.3 Silk is DMX Master (Controlling)



CHOICE OF FOUR DIMMING CURVES

- **Linear (Lin)** In Linear mode an address of 127 = 50% Dim. Because single channel DMX is only 8 bit (0-255), the lower end of the Dim curve has the same increment as the higher end.
- **Square law (Squ)** A square law curve applies a multiple derived from the square root of the control level (with full output equal to 1.00) to increase voltage response at low control levels to compensate for the infrared loss in a tungsten fixture.
- **S curve** Greater resolution at low end and high end, compressed in the middle
- **Tungsten (Cct)** Tungsten emulates the CCT shift seen as traditional tungsten fixtures are dimmed. Tungsten mode works at all colour temperatures and starts warming up when dimming below 50%. A “t” will appear on the LED display after the colour temperature as the CCT displayed will no longer be an accurate reflection of output.

NOTE: Some desks designed for LED fixtures have curves built in. It is important to ensure that your Silk fixture is in linear mode when imposing an additional curve from a desk to avoid compound and confusing output performance.

3.1 Linear



3.2 Square law



3.3 'S' curve



3.4 Tungsten



CHOICE OF TWO COLOR PROFILES

Standard has the CCT relate to a percentage on the DMX board in 1% steps, i.e. 100K

0 - 28% = 2800K
32% = 3200K
50% = 5000K
65% - 100% = 6500K

Linear mode has the CCT divided equally on channel 2 from

0 = 2800K
100 = 6500K

4.1 Standard



4.2 Linear



SELECT BOOST OR FLAT OUTPUT MODE

Flat mode ensures light output is constant at all colour temperatures. In this mode as you move towards 6500K, the output will stay the same. (in other modes it will increase).

5.1 Standard

Standard mode maximises output at the middle and cold end of the CCT range



5.2 Flat

Flat mode maintains level output at all color temperatures. This comprises output at the cold end of the spectrum.



SELECT INTERNAL/EXTERNAL ANTENNA

Sets the wireless antenna to internal or external optional antenna. The unit does not come supplied with the external antenna but does have a SMA connector to attach it to.

6.1 Internal



6.2 External



ABILITY TO UNLINK THE WIRELESS OR LEAVE LOCK LINKED

7.1 Wireless transmitter lock linked



7.2 Unlink wireless



RETURN TO DEFAULT SETTINGS

To return all settings to standard defaults – hold down the MODE SELECT button while switching the unit on. All defaults will be selected.

CHOICE OF TWO COLOR PROFILES

Standard In standard mode CCT is segmented to match percentage set on the DMX desk, thus 50% or 127 = 5000K, 32% = 3200K. This enables users with simple desks to have a clear idea of what CCT to expect from the luminaire.

Linear In Linear mode an address of 127 = 4645K. Because single channel DMX is only 8 bit (0-255), the lower end of the Dim curve has the same increment as the higher end.

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
0	0	2800	2800
1	0	2800	2800
2	0	2800	2800
3	1	2800	2800
4	1	2800	2800
5	2	2800	2815
6	2	2800	2830
7	2	2800	2845
8	3	2800	2860
9	3	2800	2875
10	4	2800	2890
11	4	2800	2905
12	4	2800	2920
13	5	2800	2935
14	5	2800	2950
15	6	2800	2965
16	6	2800	2980

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
17	6	2800	2995
18	7	2800	3010
19	7	2800	3025
20	8	2800	3040
21	8	2800	3055
22	8	2800	3070
23	9	2800	3085
24	9	2800	3100
25	10	2800	3115
26	10	2800	3130
27	10	2800	3145
28	11	2800	3160
29	11	2800	3175
30	12	2800	3190
31	12	2800	3205
32	12	2800	3220
33	13	2800	3235

DMX MAPPING**DISPLAY**

DMX	%	Color Standard	Color Linear
34	13	2800	3250
35	14	2800	3265
36	14	2800	3280
37	14	2800	3295
38	15	2800	3310
39	15	2800	3325
40	16	2800	3340
41	16	2800	3355
42	16	2800	3370
43	17	2800	3385
44	17	2800	3400
45	18	2800	3415
46	18	2800	3430
47	18	2800	3445
48	19	2800	3460
49	19	2800	3475
50	20	2800	3490

DMX MAPPING**DISPLAY**

DMX	%	Color Standard	Color Linear
51	20	2800	3505
52	20	2800	3520
53	21	2800	3535
54	21	2800	3550
55	21	2800	3565
56	22	2800	3580
57	22	2800	3595
58	23	2800	3610
59	23	2800	3625
60	24	2800	3640
61	24	2800	3655
62	24	2800	3670
63	25	2800	3685
64	25	2800	3700
65	26	2800	3715
66	26	2800	3730
67	27	2800	3745

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
68	27	2800	3760
69	27	2800	3775
70	28	2800	3790
71	28	2800	3805
72	28	2850	3820
73	29	2900	3835
74	29	2950	3850
75	30	2950	3865
76	30	3000	3880
77	30	3050	3895
78	31	3100	3910
79	31	3100	3925
80	32	3150	3940
81	32	3200	3955
82	33	3250	3970
83	34	3300	3985
84	33	3300	4000

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
85	34	3350	4015
86	34	3400	4030
87	34	3450	4045
88	35	3500	4060
89	35	3500	4075
90	35	3550	4090
91	36	3600	4105
92	37	3650	4120
93	37	3650	4135
94	37	3700	4150
95	38	3750	4165
96	38	3800	4180
97	38	3850	4195
98	39	3850	4210
99	39	3900	4225
100	40	3950	4240
101	40	4000	4255

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
102	40	4000	4270
103	41	4050	4285
104	41	4100	4300
105	42	4150	4315
106	42	4200	4330
107	42	4200	4345
108	43	4250	4360
109	43	4300	4375
110	44	4350	4390
111	44	4400	4405
112	44	4400	4420
113	45	4450	4435
114	45	4500	4450
115	46	4550	4465
116	46	4550	4480
117	46	4600	4495
118	47	4650	4510

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
119	48	4700	4525
120	48	4750	4540
121	48	4750	4555
122	49	4800	4570
123	49	4850	4585
124	49	4900	4600
125	50	4950	4615
126	50	4950	4630
127	50	5000	4645
128	51	5050	4660
129	51	5100	4675
130	52	5100	4690
131	52	5150	4705
132	53	5200	4720
133	53	5250	4735
134	53	5300	4750
135	54	5300	4765

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
136	54	5350	4780
137	55	5400	4795
138	55	5450	4810
139	55	5500	4825
140	56	5500	4840
141	56	5550	4855
142	57	5600	4870
143	57	5650	4885
144	57	5650	4900
145	58	5700	4915
146	58	5750	4930
147	59	5800	4945
148	59	5850	4960
149	59	5850	4975
150	60	5900	4990
151	60	5950	5005
152	61	6000	5020

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
153	61	6000	5035
154	61	6050	5050
155	62	6100	5065
156	62	6150	5080
157	63	6200	5095
158	63	6200	5110
159	63	6250	5125
160	64	6300	5140
161	64	6350	5155
162	65	6400	5170
163	65	6400	5185
164	65	6450	5200
165	66	6500	5215
166	66	6500	5230
167	67	6500	5245
168	67	6500	5260
169	67	6500	5275

DMX MAPPING**DISPLAY**

DMX	%	Color Standard	Color Linear
170	68	6500	5290
171	68	6500	5305
172	69	6500	5320
173	69	6500	5335
174	69	6500	5350
175	70	6500	5365
176	70	6500	5380
177	71	6500	5395
178	71	6500	5410
179	71	6500	5425
180	72	6500	5440
181	72	6500	5455
182	73	6500	5470
183	73	6500	5485
184	73	6500	5500
185	74	6500	5515
186	74	6500	5530

DMX MAPPING**DISPLAY**

DMX	%	Color Standard	Color Linear
187	75	6500	5545
188	75	6500	5560
189	75	6500	5575
190	76	6500	5590
191	76	6500	5605
192	77	6500	5620
193	77	6500	5635
194	77	6500	5650
195	78	6500	5665
196	78	6500	5680
197	78	6500	5695
198	79	6500	5710
199	79	6500	5725
200	80	6500	5740
201	80	6500	5755
202	81	6500	5770
203	81	6500	5785

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
204	81	6500	5800
205	82	6500	5815
206	82	6500	5830
207	83	6500	5845
208	83	6500	5860
209	83	6500	5875
210	84	6500	5890
211	84	6500	5905
212	85	6500	5920
213	85	6500	5935
214	85	6500	5950
215	85	6500	5965
216	86	6500	5980
217	87	6500	5995
218	87	6500	6010
219	87	6500	6025
220	88	6500	6040

DMX MAPPING DISPLAY

DMX	%	Color Standard	Color Linear
221	88	6500	6055
222	89	6500	6070
223	89	6500	6085
224	89	6500	6100
225	90	6500	6115
226	90	6500	6130
227	91	6500	6145
228	91	6500	6160
229	91	6500	6175
230	92	6500	6190
231	92	6500	6205
232	92	6500	6220
233	93	6500	6235
234	93	6500	6250
235	94	6500	6265
236	94	6500	6280
237	95	6500	6295

DMX MAPPING**DISPLAY**

DMX	%	Color Standard	Color Linear
238	95	6500	6310
239	95	6500	6325
240	96	6500	6340
241	96	6500	6355
242	97	6500	6370
243	97	6500	6385
244	97	6500	6400
245	98	6500	6415
246	98	6500	6430
247	99	6500	6445
248	99	6500	6460
249	99	6500	6475
250	100	6500	6490
251	100	6500	6500
252	100	6500	6500
253	100	6500	6500
254	100	6500	6500

DMX OPERATION

Silk LED fixtures can be operated via DMX512 protocol using the standard 5-pin DMX In and DMX Out connectors on the Rear Control Panel or by wireless using a Lumen Radio wireless transmitter. Once DMX is connected to the Silk fixture via the 'DMX In' port, it can be controlled by a DMX console. When a valid DMX signal is detected, the Blue Indicator LED will illuminate. The 'DMX Out' connector allows other DMX enabled fixtures to be daisy-chained together.

When Silk is in Master mode, the Blue Indicator will flash and a "c" for control will be displayed on the display.

When Silk is in wireless DMX mode, it will feed DMX on the OUT connector but cannot have a wired input. Silk can therefore be used as a wireless hub, distributing DMX to wired fixtures that do not have wireless capability.

NOTE: Silk LED fixtures are self-terminating and do not require external DMX termination.

DMX Control uses two channels in 8 bit dimming mode and 3 channels in 16 bit mode:

- DMX Channel 1 = Output (Dimming) Intensity
(DMX value 0 - 255 = level 0 - 100%)
- DMX Channel 2 = CCT Color Temperature
(DMX value 0 = 2800K, 255 = 6500K)

NOTE: Silk uses LTP (Last Takes Precedence) protocol. LTP is a handy way of controlling intelligent lighting parameters that relate to intensity or color mixing. If you need a color wheel to change from tungsten to daylight, or dimmer position change, you want it to happen as you expect. This allows manual override 'on set' even if the fixture is being run back to the board on set or in the gallery. LTP control channels send the latest instruction to an intelligent fixture parameter and nothing changes until it sends another one on that channel.

Silk LED fixtures use industry standard 5-Pin XLR male and female connectors to receive DMX signals and output DMX signals.

The DMX Pin wiring is as follows:

- Pin 1: Ground
- Pin 2: Data -
- Pin 3: Data +
- Pin 4: Spare
- Pin 5: Spare

RUNNING MULTIPLE WIRELESS UNITS

In a controlled radio environment, running 8-10 universes in parallel should not be a problem. If you have many other systems running the limit might be a bit lower, but 4-6 universes should always work.

When running multiple universes, it is recommended to use Lumen Radio TX2 units instead of doubling up on single universe TX units. The two radio modules inside the TX2 are synchronized so that they consume less frequency space than two single universe TX units.

Should single TX units be used, keep them physically separated by at least 6" (15 cm) so as to avoid crosstalk.

For further details on wireless transmitters go to: <https://www.lumenradio.com/>

SETTING THE DMX ADDRESS

Push the MODE/SELECT Button and the DMX base address in the upper right corner of the display will flash. Rotate the right-hand knob to the desired DMX base address (001 to 511). Once the desired address has been selected, push the DMX set button and the display will move onto the next menu option. The display will time out after a few seconds and revert to home screen. Alternately six pushes on the mode button will scroll through other options and return to the home screen. Silk LED fixtures utilize 2 channels per fixture in 8 bit dimming and 3 channels in 16 bit dimming. Other, subsequent DMX addresses should be offset by 2 or 3.

Silk DMX color mapping in standard/default mode has been designed to enable easy access of color temperatures from simple or older DMX control boards. The color temperature relates directly to the percentage on the desk, such that if Channel 2, (base channel + 1), on the desk is at 30%, the color temperature will be at 3000K. In the optional linear color profile, 0% = 2800K and 100% = 6500K interim equal steps are 15K.

KELVIN/CCT	DEC	%
2800	72	28
2900	74	29
3200	82	32
3600	92	36
4300	110	43
5000	127	50
5600	142	56
6500	165	65

DEC	%	Color Linear
0	0	2800
11	4	2905
31	12	3205
58	23	3610
104	41	4300
151	59	5005
191	75	5605
251	98	6500

NOTE: Silk LED fixtures will maintain their current Color Temperature and Output/Dimming settings in the event of an interruption to the DMX signal.

Full DMX mapping tables are available on the Rosco website at: www.rosco.com/silk

SILK® 210 RUNNING ON DC SOURCES

Silk 210 is designed to run on any voltage between 13V – 36VDC.

For optimal performance run Silk 210 on an AC transformer.

A second option is to run it on 24 V DC source, either with a block battery or with the Silk Double V-lock adaptor (BB-VLO-2X) or Double AB adaptor (BB-AB-2X).

The third option is to run on one 12V battery using the V-lock or Anton/Bauer adaptor plate (BB-SIL-VLOCP or BB-SIL-ABCP). In this situation, it is advised to use the highest capacity battery available. High capacity and heavy duty V-locks and Anton/Bauer batteries are available and High Draw versions are available from some manufacturers such as Hawk-Woods.

At full output, Silk 210 can pull up to 9A as the battery voltage reduces, therefore it is advised to select a battery that is suitably rated.

Hawk-Woods and other manufacturers now offer a range of batteries that are designed for high current draw, up to 15A, ideal for use with Silk fixtures. A battery used on Silk 210 must have a current rating of >9A to cope with current draw at lower voltages to ensure it doesn't cut out early and reduce running time.

There are a range of variables that effect battery life such as: capacity, age, number of duty cycles, quality, and ambient temperature.

Silk firmware has been designed to maintain light output and protect the driver electronics as supply voltage drops.

At 13.5V input the entire display will flash to warn the user that there is limited remaining capacity. Between 13V and 12.5V the lamp will switch off and display “Lo OFF”. Please switch off the unit and change the battery or switch to an alternative power source. The time between the warning display and cut out will vary but a typical duration would be 5 – 15 minutes, but typical duration on a 100W battery would be 10 minutes.

Additionally there are other steps you can take to prolong battery life on Silk 210 **if** running time is the priority. Roll off the output to < 90% and walk the lamp in slightly closer to the subject if possible. This can increase the running time by up to 75%. Adjusting color temperature below 5300K, if possible, will also increase running time. (For instance, setting the fixture to 4300K, if appropriate to your situation, will increase running time by as much as 25%.)

Rosco has tested many Lithium Ion batteries currently available and a list of test results and expected run times are shown on the next page.

Many other batteries offered from a range of manufacturers may work but their performance and reliability cannot be confirmed by Rosco.

Use only Lithium Ion batteries $\geq 100W$ with this Silk fixture.

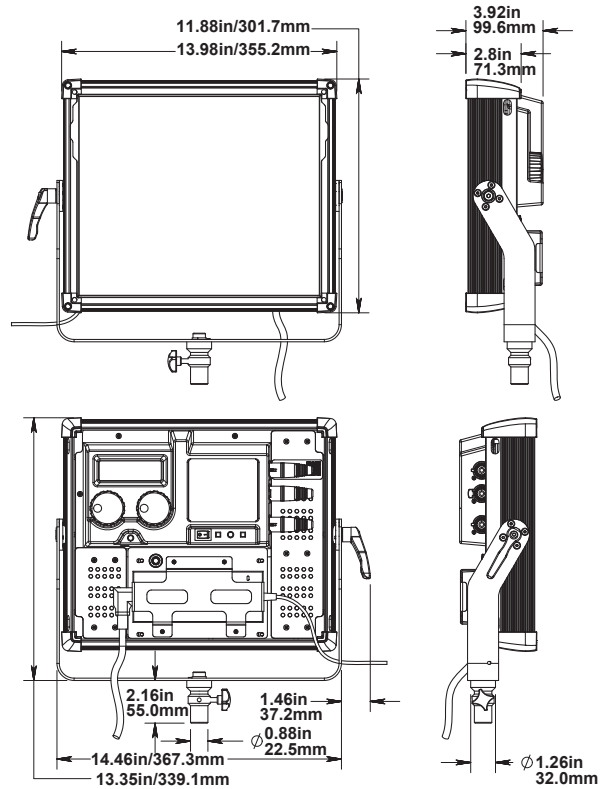
IMPORTANT NOTE: When changing batteries on the unit, first switch off with the power switch, change the battery and then switch back on. Permanent damage to the driver board is possible when swapping batteries with the unit switched on.

BATTERY RUN TIMES - SILK® 210 IN STANDARD OUTPUT

Bat 1	Bat 2	Manufacturer	CCT	running time
91		IDX	2800	0:36:00
91		IDX	4700	0:37:00
91		IDX	5600	0:24:00
94		AB PAGlink	2800	0:38:00
94		AB PAGLink	4700	0:40:00
94		AB PAGLink	5600	0:26:00
98		BCB	2800	0:47:00
98		BCB	4700	0:47:00
98		BCB	5600	0:36:00
98		BCB	6500	0:46:00
130		Dynacore	4300	0:58:00
130		Dynacore	5600	0:23:00
90H		Hawk-Woods	4300	0:50:36
90H		Hawk-Woods	5000	0:36:00
90H		Hawk-Woods	5600	0:50:00
140		Hawk-Woods	3200	0:24:00
140		Hawk-Woods	4300	1:12:00
140		Hawk-Woods	4700	1:01:00
140		Hawk-Woods	5000	0:26:00
140		Hawk-Woods	5600	0:25:00
140		Hawk-Woods	6500	0:53:00
150		AB HC Dionic	2800	0:31:00
150		AB HC Dionic	4700	0:30:00

Bat 1	Bat 2	Manufacturer	CCT	running time
150		AB HC Dionic	5600	0:27:00
150		AB HC Dionic	6500	0:37:00
190		Hawk-Woods	2800	1:16:00
190		Hawk-Woods	3200	0:48:00
190		Hawk-Woods	4300	1:40:00
190		Hawk-Woods	4700	1:23:00
190		Hawk-Woods	5600	1:30:00
90H		Hawk-Woods	4300	0:45:00
90H		Hawk-Woods	5600	0:26:00
150		Lanparte	4300	1:10:00
146		IDX	4300	1:21:00
87		IDX	5600	0:29:00
150		Lanparte	5600	0:44:00
146		IDX	5600	1:00:00
130		DYNACORE	5600	0:42:00
140	140	Hawk-Woods	3200	2:29:00
140	140	Hawk-Woods	4300	2:48:00
140	140	Hawk-Woods	5600	2:15:00
190	190	Hawk-Woods	3200	3:21:00
190	190	Hawk-Woods	4300	3:50:00
190	190	Hawk-Woods	5600	2:10:00

SILK® 110 DIMENSIONS



SILK® 110 SPECIFICATIONS

Power: Input Voltage 13-36 VDC

AC Power Transformer

- Power Supply Universal 100-240VAC input/24VDC output
- Power Consumption 100W Max (DC)

DC Operation via standard Anton/Bauer, V-Mount or 4-Pin batteries (owner supplied)

Physical Characteristics:

Dimensions (excluding Yoke)	13.9" × 11.9" × 3.9" (355.2 mm × 302 mm × 100 mm)
Dimensions (including Yoke & Receiver)	15.9" × 13.3" × 3.9" (405 mm × 394 mm × 100 mm)
Weight (including Power Supply, Yoke & Receiver)	9.25 lbs. (4.2 kg)

Optical Characteristics:

The Silk LED Fixture is a broad spectrum, diffuse, white light source. Like all discontinuous spectrum lamps, this source can only emulate a black body radiator or daylight source. However Silk LED fixtures have been developed to mix well with traditional sources, such as Tungsten Halogen, MSR and HMI fixtures, as they work within the color gamut of current broadcast and motion picture cameras and film stock.

Measuring Correlated Color Temperature (CCT)

Silk fixtures utilize an LED source that is optimized for the film, TV and image capture industries. Many existing color meters cannot be used to accurately read the correlated color temperature (CCT) of Silk and other discontinuous spectrum light sources.

Old style color meters in use today were designed for a full spectrum source such as incandescent lights. These meters possess only 3 sensors to measure the light output: red, green, and blue. As such, a narrow band light source, such as Silk may not read correctly.

A few color meters now on the market will provide a more accurate CCT reading and these include: Asense Lighting Passport, Sekonic C700 and UPRTECH MK350N and MF250N.

To ensure that the CCT of the light emanating from the Silk LED fixtures matches traditional light sources, the output from Rosco Silk LED fixtures has been validated using TLCI test algorithms and validated as a source of the highest quality. Metrics suggest the source will need negligible correction in post-production, save for subjective adjustments.

SILK® 110 ACCESSORIES

Mounting

BA-SIL-110-SY	Silk 110 Yoke
BA-SIL-110-POY	Silk 110 PoleOp Yoke

Battery Holders

BB-SIL-AB-CP	Silk Anton/Bauer battery plate
BB-SIL-VLO-CP	Silk V-Lock battery plate Silk Double V-Lock battery adaptor

BD-SIL-110 Silk 110 Barn Doors (set)

CAS-SIL-110S Silk 110 Soft Carrying Case
Silk 110 Hard Case

CAS-SIL-110RC Silk 110 Rain Cover

Diffusion and Light Modifiers

DM-SIL-110LV45 Silk 110 Egg Crate Louver 45 degrees

DM-SIL-110LV60 Silk 110 Egg Crate Louver 60 degrees

DM-SIL-110SB Silk 110 DOPChoice SoftBox, inc 1/4
grid cloth

DM-SIL-110SG Silk 110 DOPChoice SnapGrid, fabric
louver

Transformers (AC Mains PSU)

TR-COM-120WOC	AC PSU to XLR4 24V, no power cord
TR-SIL-120WC	Silk AC 120W PSU with cradle

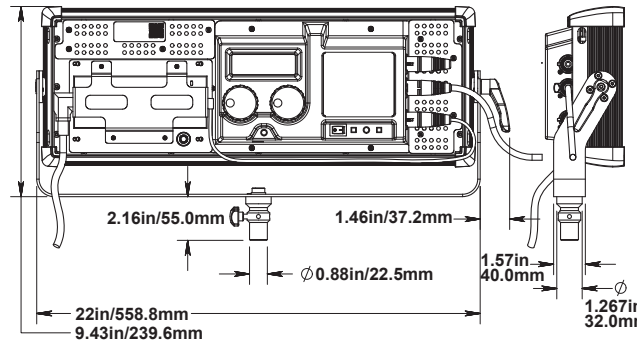
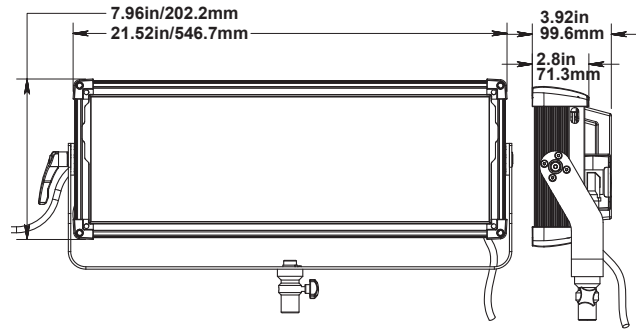
Mains Power Cables

SCHI-C13-EU	EU IEC AC supply cable, 3 pin, 3m
SCHI-C13-UK	UK IEC AC supply cable, 3 pin, 3m
SCHI-C13-US	US IEC AC supply cable, 3 pin, 3m

Replacement Parts

XS-SIL-110DIF	Silk Diffusion Panel – Silk 110
XS-SIL-CC	Silk corner piece module with accessory retention mechanism

SILK® 205 DIMENSIONS



SILK® 205 SPECIFICATIONS

Power: Input Voltage 13-36 VDC

AC Power Transformer

- Power Supply Universal 100-240VAC input/24VDC output
- Power Consumption 100W Max (DC)

DC Operation via standard Anton/Bauer, V-Mount or 4-Pin batteries (owner supplied)

Physical Characteristics:

Dimensions (excluding Yoke)	21.5" × 7.9" × 3.9" (546 mm × 302 mm × 100 mm)
Dimensions (including Yoke & Receiver)	22" × 9.43" × 3.9" (559 mm × 239 mm × 100 mm)
Weight (including Power Supply, Yoke & Receiver)	9.92 lbs. (4.5 kg)

Optical Characteristics:

The Silk LED Fixture is a broad spectrum, diffuse, white light source. Like all discontinuous spectrum lamps, this source can only emulate a black body radiator or daylight source. However Silk LED fixtures have been designed to mix well with traditional sources, such as Tungsten Halogen, MSR and HMI fixtures, as they work within the color gamut of current broadcast and motion picture cameras and film stock.

Measuring Correlated Color Temperature (CCT)

Silk fixtures utilize an LED source that is optimized for the film, TV and image capture industries. Many existing color meters cannot be used to accurately read the correlated color temperature (CCT) of Silk and other discontinuous-spectrum light sources.

Old style color meters in use today were designed for a full spectrum source such as incandescent lights. These meters possess only 3 sensors to measure the light output: red, green, and blue. As such, a narrow band light source, such as Silk may not read correctly.

A few color meters now on the market will provide a more accurate CCT reading and these include: Asense Lighting Passport, Sekonic C700 and UPRTECH MK350N and MF250N.

To ensure that the CCT of the light emanating from the Silk LED fixtures matches traditional light sources, the output from Rosco Silk LED fixtures has been validated using TLCI test algorithms and validated as a source of the highest quality. Metrics suggest the source will need negligible correction in post-production, save for subjective adjustments.

SILK® 205 ACCESSORIES

Mounting

BA-SIL-205-SY	Silk 205 Yoke
BA-SIL-205-POY	Silk 205 PoleOp Yoke

Battery Holders

BB-SIL-AB-CP	Silk Anton/Bauer battery plate
BB-SIL-VLO-CP	Silk V-Lock battery plate Silk Double V-Lock battery adaptor

BD-SIL-205	Silk 205 Barn Doors (set)
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CAS-SIL-205S	Silk 205 Soft Carrying Case Silk 205 Hard Case
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CAS-SIL-205RC	Silk 205 Rain Cover
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Diffusion and Light Modifiers

DM-SIL-205LV45	Silk 205 Egg Crate Louver 45 degrees
DM-SIL-205LV60	Silk 205 Egg Crate Louver 60 degrees

DM-SIL-205SB	Silk 205 DOPChoice SoftBox, inc 1/4 grid cloth
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DM-SIL-205SG	Silk 205 DOPChoice SnapGrid, fabric louver
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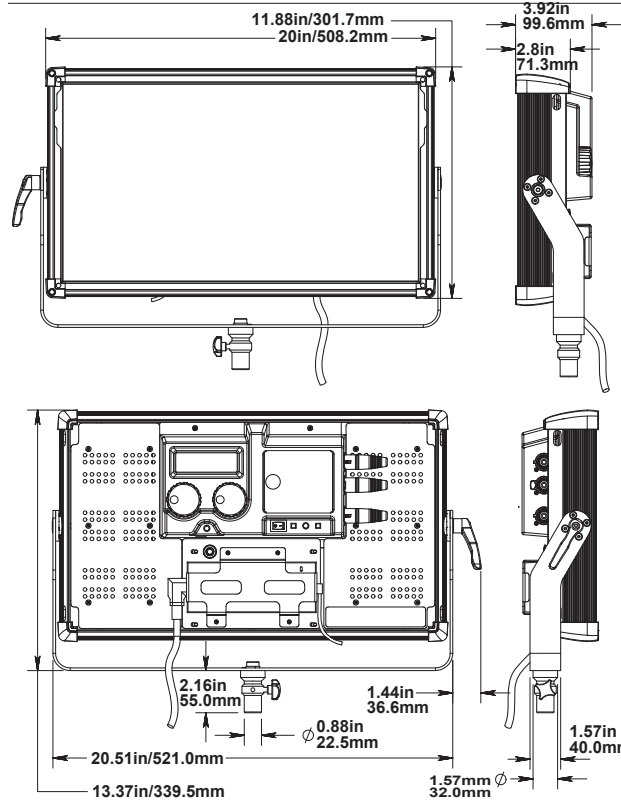
Mains Power Cables

SCHI-C13-EU	EU IEC AC supply cable, 3 pin, 3m
SCHI-C13-UK	UK IEC AC supply cable, 3 pin, 3m
SCHI-C13-US	US IEC AC supply cable, 3 pin, 3m

Replacement Parts

XS-SIL-205DIF	Silk Diffusion Panel – Silk 205
XS-SIL-CC	Silk corner piece module with accessory retention mechanism

SILK® 210 DIMENSIONS



SILK® 210 SPECIFICATIONS

Power

Input Voltage 13-36 VDC

AC Power Transformer

- Power Supply Universal 100-240VAC input/24VDC output
- Power Consumption 110W Max (DC)

DC Operation via standard Anton/Bauer, V-Mount or 4-Pin batteries (owner supplied)

Physical Characteristics

Dimensions (excluding Yoke) 20" × 11.9" × 3.92" (508 mm × 302 mm × 100 mm)

Dimensions (including Yoke & Receiver) 20.5" × 13.4" × 3.92" (521 mm × 339 mm × 100 mm)

Weight (including Power Supply, Yoke & Receiver) 13 lbs. (5.9 kg)

Optical Characteristics

The Silk LED Fixture is a broad spectrum, diffuse, white light source. Like all discontinuous spectrum lamps, this source can only emulate a black body radiator or daylight source. However Silk LED fixtures have been designed to mix well with traditional sources, such as Tungsten Halogen, MSR and HMI fixtures, as they work within the color gamut of current broadcast and motion picture cameras and film stock.

Measuring Correlated Color Temperature (CCT)

Silk fixtures utilize an LED source that is optimized for the film, TV and image capture industries. Many existing color meters cannot be used to accurately read the correlated color temperature (CCT) of Silk and other discontinuous spectrum light sources.

Old style color meters in use today were designed for a full spectrum source such as incandescent lights. These meters possess only 3 sensors to measure the light output: red, green, and blue. As such, a narrow band light source, such as Silk may not read correctly.

A few color meters now on the market will provide a more accurate CCT reading and these include: Asense Lighting Passport, Sekonic C700 and UPRTECH MK350N and MF250N.

To ensure that the CCT of the light emanating from the Silk LED fixtures matches traditional light sources, the output from Rosco Silk LED fixtures has been validated using TLCI test algorithms and validated as a source of the highest quality. Metrics suggest the source will need negligible correction in post-production, save for subjective adjustments.

SILK® 210 ACCESSORIES

Mounting

BA-SIL-210-SY	Silk 210 Yoke
BA-SIL-210-POY	Silk 210 PoleOp Yoke

Battery Holders

BB-SIL-AB-CP	Silk Anton/Bauer battery plate
BB-SIL-VLO-CP	Silk V-Lock battery plate Silk Double V-Lock battery adaptor

BD-SIL-210 Silk 210 Barn Doors (set)

CAS-SIL-210S Silk 210 Soft Carrying Case
Silk 210 Hard Case

CAS-SIL-210RC Silk 210 Rain Cover

Diffusion and Light Modifiers

DM-SIL-210LV45 Silk 210 Egg Crate Louver 45 degrees

DM-SIL-210LV60 Silk 210 Egg Crate Louver 60 degrees

DM-SIL-210SB Silk 210 DOPChoice SoftBox, inc 1/4 grid cloth

DM-SIL-210SG Silk 210 DOPChoice SnapGrid, fabric louver

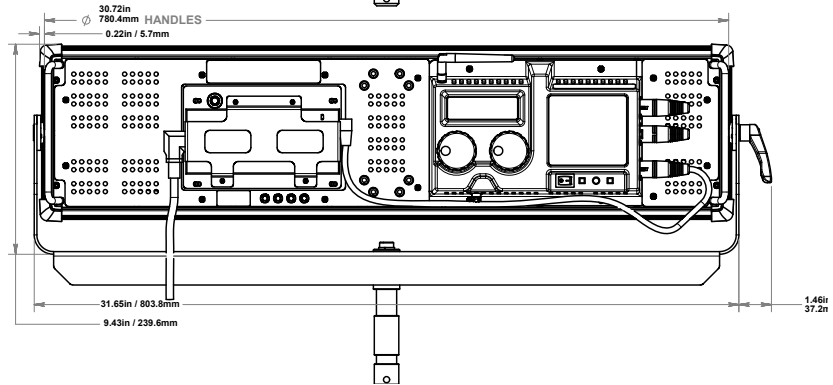
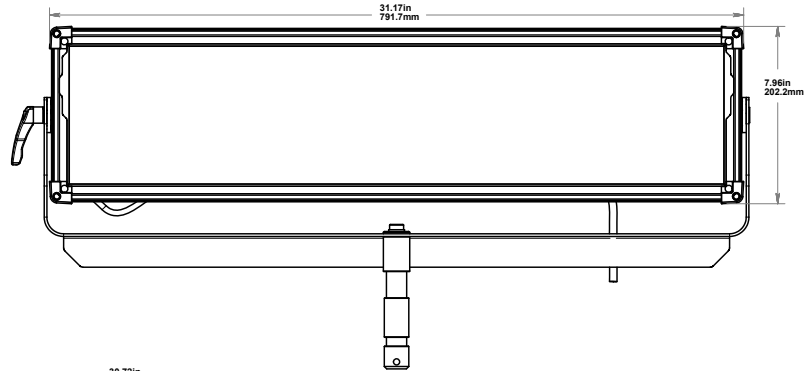
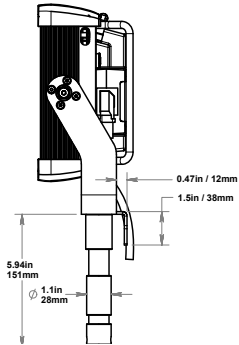
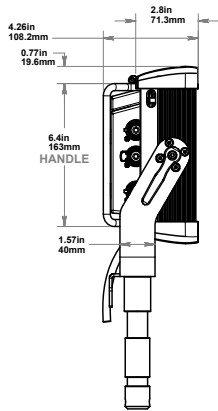
Mains Power Cables

SCHI-C13-EU	EU IEC AC supply cable, 3 pin, 3m
SCHI-C13-UK	UK IEC AC supply cable, 3 pin, 3m
SCHI-C13-US	US IEC AC supply cable, 3 pin, 3m

Replacement Parts

XS-SIL-210DIF	Silk Diffusion Panel – Silk 210
XS-SIL-CC	Silk corner piece module with accessory retention mechanism

SILK® 305 DIMENSIONS



SILK® 305 SPECIFICATIONS

Power: Input Voltage 23-36 VDC

AC Power Transformer

- Power Supply Universal 100-240VAC input/24VDC output
- Power Consumption 140W Max

DC Operation via double Anton/Bauer, double V-Mount or 4-Pin batteries (owner supplied)

Physical Characteristics:

Dimensions (excluding Yoke)	31.2" × 7.96" × 4.26" (792 mm × 202 mm × 108.2 mm)
Dimensions (including Yoke & Receiver)	31.65" × 9.43" × 4.26" (804 mm × 239.6 mm × 108.2 mm)
Weight (including Power Supply, Yoke & Receiver)	16.5 lbs. (7.5 kg)

Optical Characteristics:

The Silk LED Fixture is a broad spectrum, diffuse, white light source. Like all discontinuous spectrum lamps, this source can only emulate a black body radiator or daylight source. However Silk LED fixtures have been designed to mix well with traditional sources, such as Tungsten Halogen, MSR and HMI fixtures, as they work within the color gamut of current broadcast and motion picture cameras and film stock.

Measuring Correlated Color Temperature (CCT)

Silk fixtures utilize an LED source that is optimized for the film, TV and image capture industries. Many existing color meters cannot be used to accurately read the correlated color temperature (CCT) of Silk and other discontinuous spectrum light sources.

Old style color meters in use today were designed for a full spectrum source such as incandescent lights. These meters possess only 3 sensors to measure the light output: red, green, and blue. As such, a narrow band light source, such as Silk may not read correctly.

A few color meters now on the market will provide a more accurate CCT reading and these include: Asense Lighting Passport, Sekonic C700 and UPRTECH MK350N and MF250N.

To ensure that the CCT of the light emanating from the Silk LED fixtures matches traditional light sources, the output from Rosco Silk LED fixtures has been validated using TLCI test algorithms and validated as a source of the highest quality. Metrics suggest the source will need negligible correction in post-production, save for subjective adjustments.

SILK® 305 ACCESSORIES

Mounting

BA-SIL-305-SY	Silk 305 Yoke
BA-SIL-305-POY	Silk 305 PoleOp Yoke

Battery Holders

BB-SIL-AB-CP	Silk Anton/Bauer battery plate
BB-SIL-VLO-CP	Silk V-Lock battery plate Silk Double V-Lock battery adaptor

BD-SIL-305 Silk 305 Barn Doors (set)

CAS-SIL-305S Silk 305 Soft Carrying Case
Silk 305 Hard Case

CAS-SIL-305RC Silk 305 Rain Cover

Diffusion and Light Modifiers

DM-SIL-305LV45 Silk 305 Egg Crate Louver 45 degrees

DM-SIL-305LV60 Silk 305 Egg Crate Louver 60 degrees

DM-SIL-305SB Silk 305 DOPChoice SoftBox, inc 1/4 grid cloth

DM-SIL-305SG Silk 305 DOPChoice SnapGrid, fabric louver

Mains Power Cables

SCHI-C13-EU	EU IEC AC supply cable, 3 pin, 3m
SCHI-C13-UK	UK IEC AC supply cable, 3 pin, 3m
SCHI-C13-US	US IEC AC supply cable, 3 pin, 3m

Replacement Parts

XS-SIL-305DIF	Silk Diffusion Panel – Silk 305
XS-SIL-CC	Silk corner piece module with accessory retention mechanism

ACCESSORY MOUNTING



CENTER MOUNT OPTIONS

Silk 220 and 305 are provided with eight mounting holes to support either a Kino Flo center mount assembly or Avenger Baby Plate with 5/8" swivel spigot.

220 and 305 are shipped with four spare mounting screws should the ones shipping with the accessories get lost.

WARNING - The threads are not to be used for mounting accessories or hanging the fixture.



UPDATING FIRMWARE

ONLY APPLICABLE TO V2.0 AND ABOVE

From time to time we may upgrade the firmware on Silk LED to optimise its performance or introduce new features.

No special programming hardware is required for this upgrade and the latest firmware will be available as a download from the Rosco website at www.rosco.com/silk/firmware

- 1) Plug a USB lead into the driver board and the PC with the Silk powered off. The USB port can be found on the underside of the electronics pod centred below the two control knobs.
- 2) Hold the encoder button down and still holding the button down switch on the power.
- 3) Release the encoder button after a few seconds and wait until Windows™ detects the SILK as a drive, this can take a few seconds.
- 4) Open the drive.
- 5) Delete the current firmware.bin file.
- 6) Copy the new file to the now empty drive.
- 7) Wait a couple of seconds for the device to be programmed.
- 8) Safely remove the device from Windows™/eject like you do with a USB stick.
- 9) Cycle the power on the SILK unit and it will now boot the new code.

TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit does not respond to DMX control, but DMX indicator LED 'lit'	Unit set to incorrect DMX address	Check DMX address
Unit does not respond to DMX, but DMX indicator LED 'off'	No DMX signal is being received Bad Cable No DMX plugged in Power off at the console	Check cable and DMX run from the console
Two fixtures on the same DMX channel output different CCT when operated from a desk	They are set to different color profiles	Set all fixtures to the same color profile
Lights start flashing when DMX cable is plugged in	Light is in DMX wireless mode and receiving two DMX signals	Unplug cable or set lamp to standard DMX mode
Two lamps on the same DMX channel appear to have different output	They are set to different dimming curves	Set all lamps to the same dimming curve
DMX light flashing consistently	Fixture is in master or control mode	Set fixture to wireless or standard DMX mode
Two lamps appear to have different output >4000K	It is likely fixtures are set to different output profiles	Set both to 5.2 Standard or Flat mode

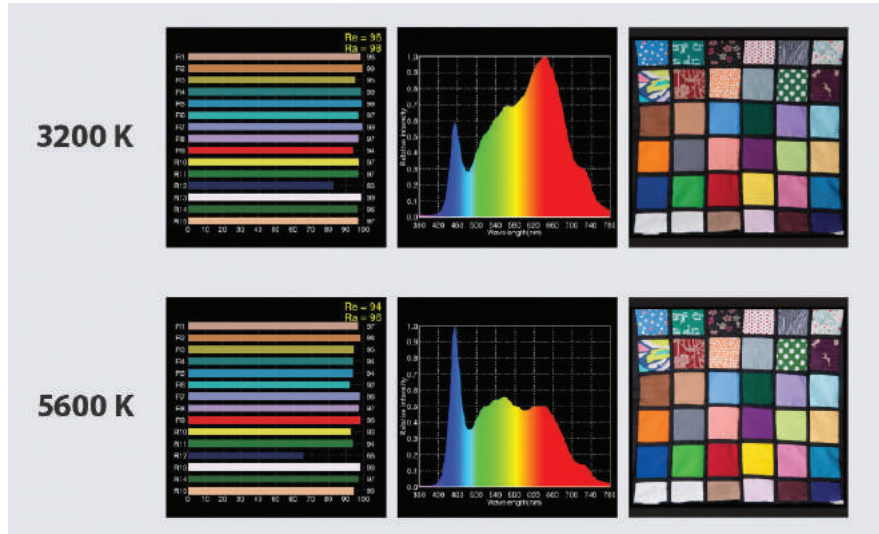
MEASURING CCT

To ensure that the CCT of the light emanating from the Silk LED fixtures matches traditional light sources, the output from Rosco Silk LED fixtures has been validated using TLCI test algorithms and validated as a source of the highest quality. Metrics suggest the source will need negligible correction in post-production, save for subjective adjustments.

COLOR METRICS

The diagrams below show, histogram, spectral power distribution and chip chart images gathered with a standard Silk LED at the 3200K and 5600K set points.

These metrics are typical of a Silk LED fixture, but individual units may vary within manufacturing tolerance. It is the user's responsibility, as is customary and standard practice, to shoot image capture tests when combining sources using different core technology such as HMI, fluorescent, tungsten or RGB LED fixtures to ensure compatibility.



CRI is not a good measure of the appropriateness of the color output for image capture and should not be relied on when comparing fixtures.

PARAMETER	3200K	5600K
CRI Ra	96	98
R9	96	98
CQS	91	96
TLCI	98	96

Data: DMX 512 - 5P XLR In/Out

Approvals: ETL/UL1573 and 8750

CE

RoHS

IP20 Rated

IEC 62471:2006, EN 62471:2008

FLICKER FREE

Silk LED has been tested at 1,000fps, 1,500fps, 2,000fps and 3,000fps at a range of color temperatures.

Silk LED has also been verified at 1,000 fps at 100%, 50% and 25% output and exhibits no evidence of wavering or flicker.

A Vision Research Miro LG320S was used for the test and a high speed specialist validated the process and results.

ENVIRONMENTAL: Disposal of Old Electrical & Electronic Equipment

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste.



2 YEAR LIMITED WARRANTY

Rosco Laboratories warrants to the first retail purchaser that this Product will be free from defects in workmanship and material for a period of twenty four (24) months from the date of original purchase. For warranty service you must be able to provide proof of purchase. Should this Product prove defective during the warranty period, please contact your local Rosco office for Return Authorization. No warranty service will be performed without Return Authorization. At Rosco's sole discretion, covered Products will be repaired or replaced with new or refurbished equipment or a model of like kind and quality. Exchanged or replaced parts and Products assume the remaining warranty period of the original product covered by this limited warranty. You are responsible for securely packaging the defective Product and returning it to Rosco as per the instructions of the Return Authorization. Within North America, Rosco will ship the repaired or replaced Product to you freight prepaid. Shipments to other locations will be made freight collect. This warranty is non-transferable and does not extend beyond the first retail purchase of the Product.

This warranty does not cover damage to the Rosco Product caused by parts not manufactured, distributed or certified by Rosco. Rosco is not obligated to provide warranty service should the Product fail to be properly maintained or fail to function properly as a result of misuse, abuse, improper installation, neglect, improper shipping, damage caused by disasters such as flood, fire and lightning, improper electrical current or unauthorized service repairs other than those by a Rosco Authorized Servicer.

If a claimed defect cannot be identified or reproduced, you will be held responsible for the costs incurred. Unless otherwise stipulated by state law, all warranties expressed or implied are limited to the twenty four (24) month period of this warranty.

THE WARRANTY AND REMEDY PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. EXCEPT AS PROVIDED IN THIS WRITTEN WARRANTY AND UNLESS EXCLUSIONS ARE SPECIFICALLY FORBIDDEN BY STATE LAW, NEITHER ROSCO NOR ITS AFFILIATES WILL BE LIABLE FOR ANY LOSS, INCONVENIENCE, OR DAMAGE, INCLUDING DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING INJURY TO PERSONS OR PROPERTY, RESULTING FROM THE USE OR INABILITY TO USE THE ROSCO PRODUCT, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.



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www.rosco.com/silk

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