

## General overview

Mode	Description	Number of channels
DS16	Standard DS modes.	10
DS8	DS MODE=ON uses DS16 by default.	5
ITSH16	Similar to DS8/16, with positive saturation.	10
ITSH8		5
XFADE16	Crossfade modes	16
XFADE8		9
RGB8 (no fan control)	Basic RGB + Temperature modes	4
iRGB8		6
ARRI6	ARRI RGBW crossfade modes	17 + 3 unused = 20
ARRI1		9 + 3 unused = 12

Note: DMX channels 511 and 512 are used for the purposes of Port-Address (Universe) identification, and are ignored if used for the purposes of channel control. The last available DMX channel is 510.

## DS16 / ITSH16

DMX channel shift	Name/Function	Range	Explanation
+0, +1 (16-bit)	• <b>Intensity</b>	0-65535	
+2, +3 (16-bit)	• Color temperature	0-65535	1,500 - 10,000 K
+4, +5 (16-bit)	• Saturation	0-65535	<b>DS16:</b> 0: maps to 0% 1...32768: maps to -120%...0% 32768: exactly 0% 32768...65535: maps to 0%...120% <b>ITSH16:</b> 0...65535: dims from 0%...120%
+6, +7 (16-bit)	• Hue	0-65535	Hue from 0 to 360 degrees
+8 (8-bit)	• Fan Control	0-255	Modifies fan mode for this channel according to value: 0 - Manual 1...50: FLEX 51...101: FAST 102...152: SLOW 153...203: OFF 204...255: FLX2
+9 (8-bit)	• Reserved	0-255	Reserved

Modes DS16 and ITSH16 differ only in the implementation of saturation dimming. Use DS16 for negative/positive mid-starting saturation, and ITSH16 for positive saturation only.

## DS8 / ITSH8

DMX channel shift	Name/Function	Range	Explanation
+0 (8-bit)	• <b>Intensity</b>	0-255	
+1 (8-bit)	• Color temperature	0-255	1,500 - 10,000 K
+2 (8-bit)	• Saturation	0-255	<b>Mode DS8:</b> 0: maps to 0% 1...127: maps to -120%...0% 127: maps to 0% 127...255: maps to 0%...120% <b>Mode ITSH8:</b> 0...255 maps to 0%...120%
+3 (8-bit)	• Hue	0-255	Hue from 0 to 360 degrees
+4 (8-bit)	• Fan Control	0-255	Modifies fan mode for this channel according to value: • 0 - Manual • 1...50: FLEX • 51...101: FAST • 102...152: SLOW • 153...203: OFF • 204...255: FLX2

Modes DS8 and ITSH8 differ only in the implementation of saturation dimming. Use DS8 for negative/positive mid-starting saturation, and ITSH8 for positive saturation only.

## XFADE16

DMX channel shift	Name/Function	Range	Explanation
+0, +1 (16-bit)	• <b>Master Dimmer (Coarse)</b> • <b>Master Dimmer (Fine)</b>	0-65535	Master Dimmer for this lamp/range
+2, +3 (16-bit)	• Color Temperature (Coarse) • Color Temperature (Fine)	0-65535	Modifies temperature in the range from <b>1,500 K</b> ("0") to 10,000 K.
+4 (8-bit)	• Tint (Coarse)	0-255	Modifies Green/Magenta Tint for White Balance from -30...+30
+5 (8-bit)	• Fan Mode	0-255	Modifies fan mode for this channel according to value: • 0 - Manual • 1...50: FLEX • 51...101: FAST • 102...152: SLOW • 153...203: OFF • 204...255: FLX2
+6, +7 (16-bit)	• XFade (Coarse) • XFade (Fine)	0-65535	Crossfade between White Balance (channels +0...+4) and RGBW (channels +8...+15)
+8, +9 (16-bit)	• Red (Coarse) • Red (Fine)	0-65535	Pure Red (R=G=B goes to WB)
+10, +11 (16-bit)	• Green (Coarse) • Green (Fine)	0-65535	Pure Green (R=G=B goes to WB)
+12, +13 (16-bit)	• Blue (Coarse) • Blue (Fine)	0-65535	Pure Blue (R=G=B goes to WB)
+14, +15 (16-bit)	• White (Coarse) • White (Fine)	0-65535	Additional control for WB on top of the RGB balance (0 - no effect, 255 - pure WB)

\* Fan settings act as follows:

- FLEX: Minimum of approx 1,300 rpm below 45 °C; increases linearly to approx 2,900 rpm at 58 °C
- FAST: Always at max (approx 2,900 rpm)
- SLOW: Always at min (approx 1,300 rpm)
- OFF: Fan off until 77 °C, then turns on at minimum

speed of approx 1,300 rpm, and turns back off when temperature goes down below 60 °C

- FLX2: Fan off until 45 °C, turns on and linearly increases to a maximum of approx 2,900 rpm at 58 °C

\*\* Note: Critical temperature for a lamp module is 80 °C, upon which it is shut off. Covering the lamp unit even partly is not recommended, as it will increase the chances of it reaching this critical temperature. Consult with Digital Sputnik technical support if you have questions about a custom application in extreme conditions.

## XFADE8

DMX channel shift	Name/Function	Range	Explanation
+0 (8-bit)	• <b>Master Dimmer</b>	0-255	Master Dimmer for this lamp/range
+1 (8-bit)	• Color Temperature	0-255	Modifies temperature in the range from 1,500 K ("0") to 10,000 K.
+2 (8-bit)	• Tint	0-255	Modifies Green/Magenta Tint for White Balance from -30...+30 (zero is at 0, 127, and 128) (equivalent green/magenta hues: 120° and 300°)
+3 (8-bit)	• XFade	0-255	Crossfade between White Balance (channels +0...+2) and RGBW (channels +4...+7)
+4 (8-bit)	• Red	0-255	Pure Red (R=G=B goes to WB)
+5 (8-bit)	• Green	0-255	Pure Green (R=G=B goes to WB)
+6 (8-bit)	• Blue	0-255	Pure Blue (R=G=B goes to WB)
+7 (8-bit)	• White	0-255	Additional control for WB on top of the RGB balance (0 - no effect, 255 - pure WB)
+8 (8-bit)	• Fan Mode	0-255	Modifies fan mode for this channel according to value*/**: <ul style="list-style-type: none"> <li>• 0 - Manual</li> <li>• 1...50: FLEX</li> <li>• 51...101: FAST</li> <li>• 102...152: SLOW</li> <li>• 153...203: OFF 2</li> <li>• 204...255: FLX2</li> </ul>

## iRGB8

DMX channel shift	Name/Function	Range	Explanation
+0 (8-bit)	• <b>Master Dimmer</b>	0-255	Intensity
+1 (8-bit)	• Red	0-255	Pure R (R=G=B goes to WB)
+2 (8-bit)	• Green	0-255	Pure G (R=G=B goes to WB)
+3 (8-bit)	• Blue	0-255	Pure B (R=G=B goes to WB)
+4 (8-bit)	• Temperature	0-255	Modifies White Balance (WB) temperature in the range from 1,500 K ("0") to 10,000 K ("255").
+5 (8-bit)	• Fan Control	0-255	Modifies fan mode for this channel according to value: 0 - Manual 1...50: FLEX 51...101: FAST 102...152: SLOW 153...203: OFF 204...255: FLX2

## RGB8

DMX channel shift	Name/Function	Range	Explanation
+0 (8-bit)	• <b>Red</b>	0-255	Pure R (R=G=B goes to WB)
+1 (8-bit)	• <b>Green</b>	0-255	Pure G (R=G=B goes to WB)
+2 (8-bit)	• <b>Blue</b>	0-255	Pure B (R=G=B goes to WB)
+3 (8-bit)	• Color Temperature	0-255	Modifies temperature in the range from 1,500 K ("0") to 10,000 K.

\* Fan settings act as follows:

- FLEX: Minimum of approx 1,300 rpm below 45 °C; increases linearly to approx 2,900 rpm at 58 °C
- FAST: Always at max (approx 2,900 rpm)
- SLOW: Always at min (approx 1,300 rpm)
- OFF: Fan off until 77 °C, then turns on at minimum

speed of approx 1,300 rpm, and turns back off when temperature goes down below 60 °C

- FLX2: Fan off until 45 °C, turns on and linearly increases to a maximum of approx 2,900 rpm at 58 °C

## ARRI6

DMX channel shift	Name/Function	Range	Explanation
+0, +1 (16-bit)	• <b>Master Dimmer (Coarse)</b> • <b>Master Dimmer (Fine)</b>	0-65535	Master Dimmer for this lamp/range
+2, +3 (16-bit)	• Color Temperature (Coarse) • Color Temperature (Fine)	0-65535	Modifies temperature in the range from 2,800 K("0") to 10,000 K ("65535").
+4, +5 (16-bit)	• Tint (Coarse) • Tint (Fine)	0-65535	Modifies Green/Magenta Tint for White Balance from -30...+30
+6, +7 (16-bit)	• XFade (Coarse) • XFade (Fine)	0-65535	Crossfade between White Balance (channels +0...+5) and RGBW (channels +8...+15)
+8, +9 (16-bit)	• Red (Coarse) • Red (Fine)	0-65535	Pure Red (R=G=B goes to WB)
+10, +11 (16-bit)	• Green (Coarse) • Green (Fine)	0-65535	Pure Green (R=G=B goes to WB)
+12, +13 (16-bit)	• Blue (Coarse) • Blue (Fine)	0-65535	Pure Blue (R=G=B goes to WB)
+14, +15 (16-bit)	• White (Coarse) • White (Fine)	0-65535	Additional control for WB on top of the RGB balance (0 - no effect, 255 - pure WB)
+16 (8-bit)	• Fan Mode (adapted ARRI)	0-255	0...9: Manual 10...60: SLOW 61...120: FLEX 121...250: FAST 251...255: OFF
+17 (8-bit)			Reserved/unused channels as per ARRI spec
+18 (8-bit)			
+19 (8-bit)			

## ARRI1

DMX channel shift	Name/Function	Range	Explanation
+0 (8-bit)	• <b>Master Dimmer</b>	0-255	Master Dimmer for this lamp/range
+1 (8-bit)	• Color Temperature	0-255	Modifies temperature in the range from 2,800 K("0") to 10,000 K ("65535").
+2 (8-bit)	• Tint	0-255	Modifies Green/Magenta Tint for White Balance from -30...+30 (zero is at 0, 127, and 128)
+3 (8-bit)	• XFade	0-255	Crossfade between White Balance (channels +0...+2) and RGBW (channels +4...+7)
+4 (8-bit)	• Red	0-255	Pure Red (R=G=B goes to WB)
+5 (8-bit)	• Green	0-255	Pure Green (R=G=B goes to WB)
+6 (8-bit)	• Blue	0-255	Pure Blue (R=G=B goes to WB)
+7 (8-bit)	• White	0-255	Additional control for WB on top of the RGB balance (0 - no effect, 255 - pure WB)
+8 (8-bit)	• Fan Mode (adapted ARRI)	0-255	0...9: Manual 10...60: SLOW 61...120: FLEX 121...250: FAST 251...255: OFF
+9 (8-bit)			Reserved/unused channels as per ARRI spec
+10 (8-bit)			
+11 (8-bit)			

\*\* Note: Critical temperature for a lamp module is 80 °C, upon which it is shut off. Covering the lamp unit even partly is not recommended, as it will increase the chances of it reaching this critical temperature. Consult with Digital Sputnik technical support if you have questions about a custom application in extreme conditions.

## MODE XFADE8, XFADE16, DS8, DS16, ITSH8, ITSH16, RGB8, iRGB8 parameter ranges

Described herein are nonstandard ranges used.

**Color temperature** (0...65535) is translated as follows:

- Coarse component  
0...255 in byte0 → 1,500...10,000 K (approx 33.2 K increments)  
Used alone in 8-bit modes
- Fine component  
0...255 in byte1 → adds +0...+approx 33.2 K (with 1 K resolution)

### Quick reference table DMX values

Coarse (0-255)	Fine (0-255)	16-bit, 0-65535 range	%	Color Temperature, Kelvins
36	39	9255	14.12%	2700
51	54	13110	20.00%	3200
90	93	23133	35.29%	4500
123	131	31619	48.24%	5600

### Hex values

Coarse (00-FF)	Fine (00-FF)	16-bit, 0000-FFFF range	%	Color Temperature, Kelvins
24	27	2427	14.12%	2700
33	36	3336	20.00%	3200
5A	5D	5A5D	35.29%	4500
7B	83	7B83	48.24%	5600
123	131	31619	48.24%	5600

## Complete reference table

The following table describes the resulting temperature when the "Fine" (the least significant, byte1) is set to 0.

**Coarse** - DMX Coarse (byte0) Use only this value in 8-bit mode

**Fine** - DMX Fine (byte1). In 8-bit modes, equals 127

**CCT** - Color Temperature, Kelvins

Coarse	Fine	CCT	Coarse	Fine	CCT	Coarse	Fine	CCT
0	0	1500	85	0	4322	170	0	7144
1	0	1533.2	86	0	4355.2	171	0	7177.2
2	0	1566.4	87	0	4388.4	172	0	7210.4
3	0	1599.6	88	0	4421.6	173	0	7243.6
4	0	1632.8	89	0	4454.8	174	0	7276.8
5	0	1666	90	0	4488	175	0	7310
6	0	1699.2	91	0	4521.2	176	0	7343.2
7	0	1732.4	92	0	4554.4	177	0	7376.4
8	0	1765.6	93	0	4587.6	178	0	7409.6
9	0	1798.8	94	0	4620.8	179	0	7442.8
10	0	1832	95	0	4654	180	0	7476
11	0	1865.2	96	0	4687.2	181	0	7509.2
12	0	1898.4	97	0	4720.4	182	0	7542.4
13	0	1931.6	98	0	4753.6	183	0	7575.6
14	0	1964.8	99	0	4786.8	184	0	7608.8
15	0	1998	100	0	4820	185	0	7642
16	0	2031.2	101	0	4853.2	186	0	7675.2
17	0	2064.4	102	0	4886.4	187	0	7708.4
18	0	2097.6	103	0	4919.6	188	0	7741.6
19	0	2130.8	104	0	4952.8	189	0	7774.8
20	0	2164	105	0	4986	190	0	7808
21	0	2197.2	106	0	5019.2	191	0	7841.2
22	0	2230.4	107	0	5052.4	192	0	7874.4
23	0	2263.6	108	0	5085.6	193	0	7907.6
24	0	2296.8	109	0	5118.8	194	0	7940.8
25	0	2330	110	0	5152	195	0	7974
26	0	2363.2	111	0	5185.2	196	0	8007.2
27	0	2396.4	112	0	5218.4	197	0	8040.4
28	0	2429.6	113	0	5251.6	198	0	8073.6
29	0	2462.8	114	0	5284.8	199	0	8106.8
30	0	2496	115	0	5318	200	0	8140
31	0	2529.2	116	0	5351.2	201	0	8173.2
32	0	2562.4	117	0	5384.4	202	0	8206.4
33	0	2595.6	118	0	5417.6	203	0	8239.6
34	0	2628.8	119	0	5450.8	204	0	8272.8
35	0	2662	120	0	5484	205	0	8306
36	0	2695.2	121	0	5517.2	206	0	8339.2
37	0	2728.4	122	0	5550.4	207	0	8372.4
38	0	2761.6	123	0	5583.6	208	0	8405.6
39	0	2794.8	124	0	5616.8	209	0	8438.8
40	0	2828	125	0	5650	210	0	8472
41	0	2861.2	126	0	5683.2	211	0	8505.2
42	0	2894.4	127	0	5716.4	212	0	8538.4
43	0	2927.6	128	0	5749.6	213	0	8571.6
44	0	2960.8	129	0	5782.8	214	0	8604.8
45	0	2994	130	0	5816	215	0	8638
46	0	3027.2	131	0	5849.2	216	0	8671.2
47	0	3060.4	132	0	5882.4	217	0	8704.4
48	0	3093.6	133	0	5915.6	218	0	8737.6
49	0	3126.8	134	0	5948.8	219	0	8770.8
50	0	3160	135	0	5982	220	0	8804
51	0	3193.2	136	0	6015.2	221	0	8837.2
52	0	3226.4	137	0	6048.4	222	0	8870.4
53	0	3259.6	138	0	6081.6	223	0	8903.6
54	0	3292.8	139	0	6114.8	224	0	8936.8
55	0	3326	140	0	6148	225	0	8970
56	0	3359.2	141	0	6181.2	226	0	9003.2
57	0	3392.4	142	0	6214.4	227	0	9036.4
58	0	3425.6	143	0	6247.6	228	0	9069.6
59	0	3458.8	144	0	6280.8	229	0	9102.8
60	0	3492	145	0	6314	230	0	9136
61	0	3525.2	146	0	6347.2	231	0	9169.2
62	0	3558.4	147	0	6380.4	232	0	9202.4
63	0	3591.6	148	0	6413.6	233	0	9235.6
64	0	3624.8	149	0	6446.8	234	0	9268.8
65	0	3658	150	0	6480	235	0	9302
66	0	3691.2	151	0	6513.2	236	0	9335.2
67	0	3724.4	152	0	6546.4	237	0	9368.4
68	0	3757.6	153	0	6579.6	238	0	9401.6
69	0	3790.8	154	0	6612.8	239	0	9434.8
70	0	3824	155	0	6646	240	0	9468
71	0	3857.2	156	0	6679.2	241	0	9501.2
72	0	3890.4	157	0	6712.4	242	0	9534.4
73	0	3923.6	158	0	6745.6	243	0	9567.6
74	0	3956.8	159	0	6778.8	244	0	9600.8
75	0	3990	160	0	6812	245	0	9634
76	0	4023.2	161	0	6845.2	246	0	9667.2
77	0	4056.4	162	0	6878.4	247	0	9700.4
78	0	4089.6	163	0	6911.6	248	0	9733.6
79	0	4122.8	164	0	6944.8	249	0	9766.8
80	0	4156	165	0	6978	250	0	9800
81	0	4189.2	166	0	7011.2	251	0	9833.2
82	0	4222.4	167	0	7044.4	252	0	9866.4
83	0	4255.6	168	0	7077.6	253	0	9899.6
84	0	4288.8	169	0	7110.8	254	0	9932.8
						255	0	9966

Fine value (byte1) adds up to 33.2 K to the temperature, in 1 K increments, according to the following table.

DMX Fine (byte1) range	Color Temperature addition, Kelvins
0-7	0
8-15	1
16-23	2
24-30	3
31-38	4
39-46	5
47-53	6
54-61	7
62-69	8
70-76	9
77-84	10
85-92	11
93-99	12
100-107	13
108-115	14
116-122	15
123-130	16
131-138	17
139-145	18
146-153	19
154-161	20
162-168	21
169-176	22
177-184	23
185-192	24
193-199	25
200-207	26
208-215	27
216-222	28
223-230	29
231-238	30
239-245	31
246-253	32
254-255	33

## Tint range (Applies to XFADE8 / XFADE16)

### byte0

- 0, 127 and 128 => OFF (no tint)
- 1-126 => Green Tint 100 to 0%, linear
- 129-255 => Magenta Tint 0 to 100%, linear

### byte1

- *reserved / not used. In MODE 5D, fan control is used in its place.*

0 is chosen as a starting point for Tint because most of the DMX controllers use '0' as a starting position. Tint is also OFF in the middle (127, 128) so it is possible to use it as mid-starting slider controller.

## Saturation ranges (Applies to modes DS8 and DS16)

Saturation is non-linear with greatest change closer to -100% and +100%. Small change is between -50%, 0%, and +50%. However, using both Coarse and Fine (16-bit) Mode it is possible to set the desired color precisely.

Behavior	DMX Coarse (byte0) Used alone in 8-bit mode	DMX Fine (byte1) Value of "1" adds approx 0.003%. Resolution is 1/255
Neutral white (0%)	0	0...255
-120% to 0%	1-125	0...255
Neutral white (0%)	126-127	0...255
0% to +120%	128-255	0...255

## Hue ranges (Applies to modes DS8, DS16, ITSH8, ITSH16)

Hue	DMX Coarse (byte0) Value of "1" is approx. 1.17°. Used alone in 8-bit modes.	DMX Fine (byte1) Value of "1" adds approx +0.005°. Resolution is approx 2...3/255
0°=360°-60°	0-42	0-255
60°-120°	43-85	0-255
120°*-180°	86*-127	0-255
180°-240°	128-170	0-255
240°-300°	171-213	0-255
300°-360°=0°	214-255	0-255

\* - For green/magenta adjustment, use the setting of 120° with the DMX Coarse value of 86.

## DMX saving of the last state (Applies to all modes)

As of v1.14.6:

When the DMX mode is enabled, the fixture will save the last colors to memory, and resume them after a power cycle, under one of these circumstances:

1. DMX packets are sent unchanged for at least 5 minutes (i.e. it is impossible to save a changing light)
2. DMX is **disconnected** for at least 5 minutes,  
or
3. the user presses any button on the device (applies to this device only) and does not turn the device off for at least 10 seconds.