stereonet

BenQ
W8000

BenQ

W8000
THX Certified Projector

Distributor: BenQ Australia

$4,499 RRP

Since spinning off from parent company, Acer, in 2001, Taiwanese based multi-national BenQ has grown significantly.

While still manufacturing PC monitors and peripherals, its product range has expanded to include projectors for business, education and home use. At the time of writing, BenQ's current range includes 11 different projectors for the home theatre market, starting with the entry level TW526 RRP $499, up to the subject of this review, the W8000 RRP $4,499. The W11000 4K projector has also just been announced, which will sell for RRP $7999.

As a professional ISF calibrator, having previously calibrated the W6000, W7000 and W7000+ this was not my first encounter with BenQ's home theatre projectors. I have been impressed by their ability to provide a bright film like image at a competitive price point. With a higher RRP than the W7000+, the W8000 is more in the 'mid-range' projector camp, so I was very interested to see how it performed.

"ability to provide a bright film like   image at a competitive price point"

What's in the box?

The W8000 is a HD (1080p) single chip DLP with a claimed contrast ratio of 50,000:1 (FOFO). With an impressive range of features for its price point, the W8000 includes THX Certification, ISFccc Certification, Rec. 709 (HDTV) colour performance, dynamic iris (in bright mode only) and the choice of five different optional lenses.
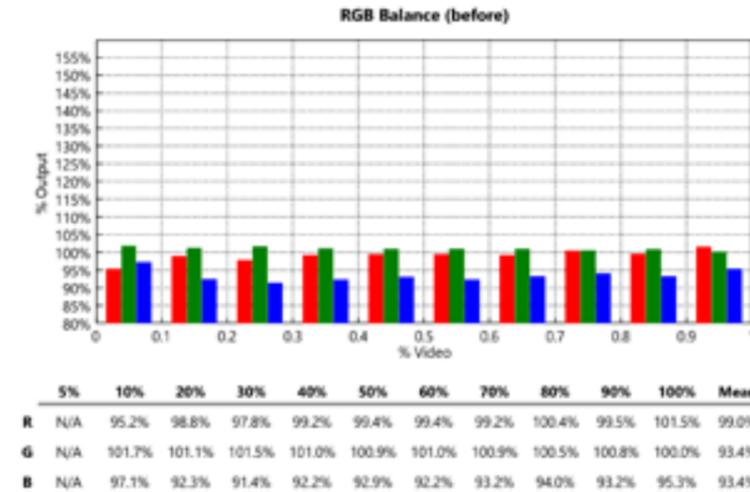
The W8000 is housed in a matt black chassis with silver edging. Its centre mounted lens has a throw ratio of 1.51 (standard lens) and horizontal and vertical lens shift, providing enough flexibility for most installations. The back of the unit hosts 2 HDMI inputs (HDMI 2 MHL), 1 USB input, RS232 input, 12 Volt trigger and 2 IR receivers (front and back).

Lens adjustment is a manual affair, with zoom and focus located on the lens ring and lens shift and keystone correction accessed via a pull down flap on the top of projector. There are adjustable feet for table or shelf mounting and ventilation is located to the sides and rear of the projector.

Also included in the box were two pairs of active 3D glasses, a quick-start guide, CD-ROM (with user manual) and of course a remote. The remote has large easy to read buttons and can be backlit with a quick press of the 'light' button.
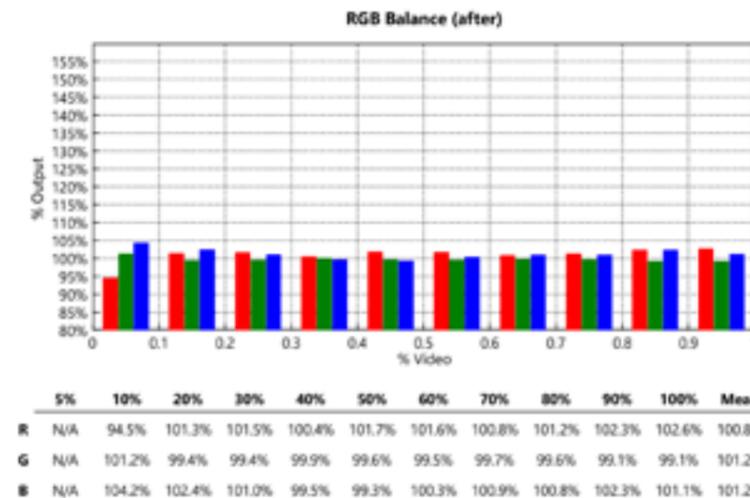
RGB Balance (before)

	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Mean
R	N/A	95.2%	98.8%	97.8%	99.2%	99.4%	99.4%	99.2%	100.4%	99.5%	101.5%	99.0%
G	N/A	101.7%	101.1%	101.5%	101.0%	100.9%	101.0%	100.9%	100.5%	100.8%	100.0%	93.4%
B	N/A	97.1%	92.3%	91.4%	92.2%	92.9%	92.2%	93.2%	94.0%	93.2%	95.3%	93.4%

After calibration (Diagram 2.) the W8000 achieved excellent greyscale tracking in THX mode, with all greyscale errors able to be reduced below the visible error threshold (Diagram 3.), with the exception of 10% (10% above black). Even at 10%, the amount of error was very low and much better than many other displays I have measured.

RGB Balance (after)

	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Mean
R	N/A	94.5%	101.3%	101.5%	100.4%	101.7%	101.6%	100.8%	101.2%	102.3%	102.6%	100.8%
G	N/A	101.2%	99.4%	99.4%	99.9%	99.6%	99.5%	99.7%	99.6%	99.1%	99.1%	101.2%
B	N/A	104.2%	102.4%	101.0%	99.5%	99.3%	100.3%	100.9%	100.8%	102.3%	101.1%	101.2%

Calibration

The W8000 has eight picture modes (Bright, Vivid, THX, Game, 3D, User 1 and User 2). An ISF Calibrator can unlock two additional picture modes (ISF Day and ISF Night picture). As well as the standard picture controls (brightness, contrast, colour etc.), the W8000 features more advanced calibration controls, including a CMS (colour management system) for those who choose to have their projector professionally calibrated. As most will put their projector in THX picture mode and not give it a second thought, I chose to conduct the initial measurements and calibration from the THX mode.
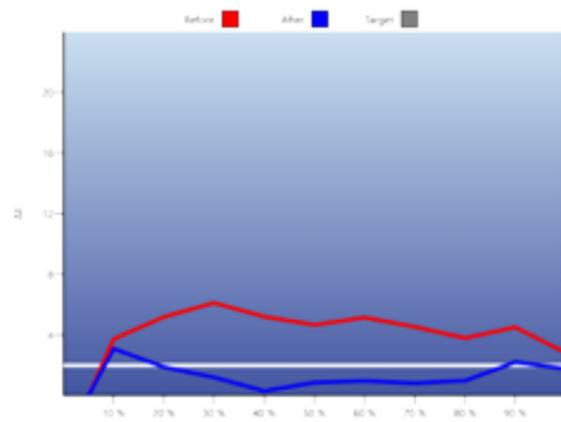
BenQ's projectors have a reputation for offering good light output and the W8000 remains true to form, measuring 32 ft-L* (foot-lamberts) with the lamp in normal mode and 27 ft-L in Eco mode. This high amount of light output means that the W8000 is a candidate for rooms that are not completely light controlled and for those who favour a brighter picture. If you plan on viewing the W8000 in a light-controlled room and prefer something closer to the recommended 12-16 ft-L (depending on which standard your referring to), it's simple enough to reduce the W8000's light output by lowering the contrast control and putting the lamp in Eco mode. This also carries the additional benefit of lowering fan noise and prolonging lamp life.

To have good greyscale performance, a display (projector or TV) needs to achieve an even RGB (red, green & blue) percentage output of 100% (or more precisely x.313 x.319) from just above black, right through to white. Diagram 1 shows the pre-calibration performance of the W8000 in THX mode. Measurements were taken in 10% steps beginning with 10% (just above black), through to 100% (white). While green was extremely accurate and the amount of red error was low, blue hovered around 90%. I have yet to encounter a projector (or TV for that matter) with accurate 'out of the box' greyscale tracking and in this regard the W8000 was no better or worse than other projectors I have tested.

Gamma (EOTF) determines how quickly or slowly, a display rises out of black. If it comes out of black too slowly the picture will look dim and shadow detail will be lost. Conversely, if a display comes out of black too fast the picture will look noisy, washed out and one-dimensional. Correct gamma tracking in a display will preserve shadow detail and give a display a sense of depth, or dimensionality.

Prior to calibration, the W8000's gamma averaged 2.15 (refer to Diagram 4: gamma tracking in THX mode. After calibration, average gamma was 2.30 with very little error. It is rare to see gamma tracking this accurate, even after calibration and I was hopeful that it was a sign of good things to come.

Diagram 5: Rec. 709

One of the key features of the W8000 is its Rec. 709 HDTV colour standard. If you've never heard of Rec. 709 before, you may be wondering why this is so important.

Diagram 5. Colour is the CIE 1931 colour space. The 'horseshoe' shaped area of colour represents how we see colour and the smaller triangle contained within it represents the Rec. 709 HDTV colour standard. As all the high definition material we watch is mastered in the Rec. 709 standard, if our projector or TV outputs colour in this same standard we get a faithful reproduction of the source material. In other words, we're seeing every colour exactly as the movie makers intended it.

Referring to Diagram 5: Rec 709 there are six small white squares located at the tips and middle point of the Rec. 709 'triangle'. The white squares are the target points primary colours (red, green and blue) and secondary colours (yellow, cyan and magenta) need to hit in order to accurately achieve the Rec. 709 colour standard. The coloured circles show the measured values of the primary and secondary colours both prior to greyscale calibration and after greyscale calibration. The small coloured triangles show the measured values of the primary and secondary colours after calibration.

You may notice that although the greyscale calibration greatly improved the white colour balance (represented by the small white circle and triangle within the larger Rec. 709 triangle), it only improved colour performance marginally, with the exception of Magenta, which was slightly worse after greyscale calibration.

It's for this reason that the W8000, has a fully functional colour management system (CMS) contained within its advanced calibration menu. The CMS located within the THX mode allows control over the the saturation, hue and brightness of every colour.... and it worked very well.

Diagram 6: Rec 709 Post CMS Calibration shows the colour performance of the W8000 after CMS calibration (represented by the colour red), which conforms very accurately to the Rec.709 colour standard with any error below the visible threshold. With excellent greyscale, gamma tracking and accurate Rec. 709 performance, I was keen to see how the W8000 performed with actual viewing material.

Keen observers may note that there aren't before and after values in Diagram 6. This is not a fault in any part of the W8000, but rather an oversight on my part.
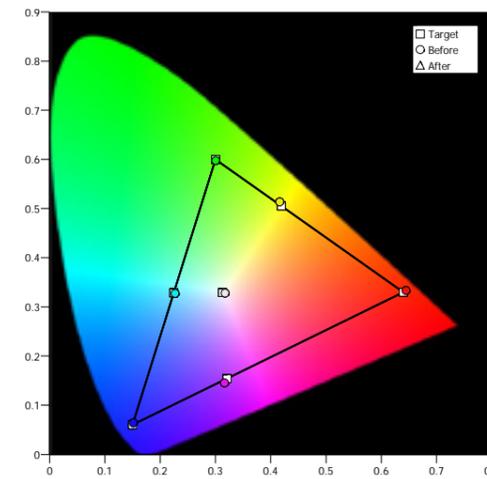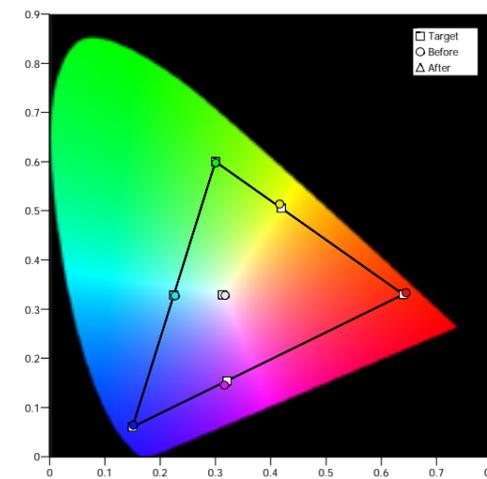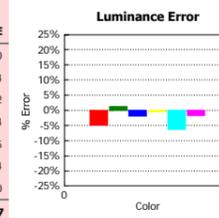
Diagram 3: Grayscale Error Chart

Grayscale ΔE Chart

This chart displays the color of white across the entire grayscale in raw xy date and Delta-E. White is defined as x0.3127, y0.3290. Delta E (dE or ΔE) measures deviation from color standard. The smaller the number, the less the deviation from the standard and the more accurate the color. Ideally, ΔE for white should not rise above 2.

	Before			After		
% Video	x, y	ΔE	CCT	x, y	ΔE	CCT
5%						
10%	0.311, 0.354	3.7	6,549	0.306, 0.326	3.1	6,902
20%	0.317, 0.339	5.2	6,229	0.312, 0.326	1.9	6,560
30%	0.317, 0.340	6.1	6,227	0.313, 0.327	1.2	6,489
40%	0.317, 0.339	5.2	6,211	0.313, 0.329	0.3	6,468
50%	0.317, 0.338	4.9	6,232	0.314, 0.329	0.9	6,410
60%	0.317, 0.339	5.1	6,203	0.314, 0.328	1.0	6,458
70%	0.317, 0.337	4.5	6,252	0.313, 0.328	0.8	6,513
80%	0.317, 0.336	3.8	6,213	0.313, 0.328	1.0	6,496
90%	0.317, 0.337	4.5	6,217	0.313, 0.328	2.2	6,521
100%	0.317, 0.334	2.8	6,253	0.314, 0.327	1.8	6,456
Mean:		4.6	6,243		1.4	6,527

Diagram 4: Gamma Tracking
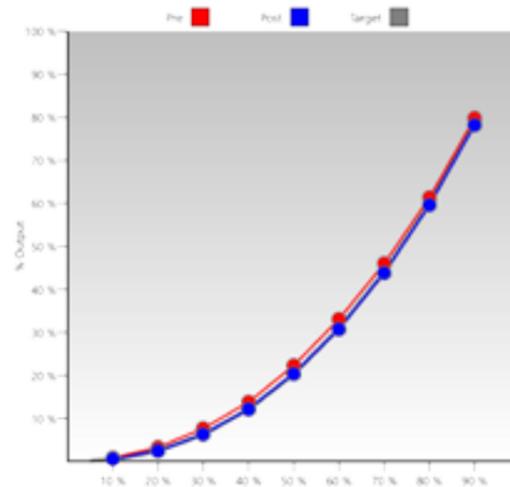
	Before			After		
% Input	Output	Gamma	Video	Output	Gamma	Video
			0			0
	0.27 (0.8%)	2.08		0.09 (0.6%)	2.26	
	1.05 (3.3%)	2.12		0.43 (2.5%)	2.29	
	2.45 (7.7%)	2.13		1.08 (6.3%)	2.29	
	4.42 (13.8%)	2.16		2.07 (12.2%)	2.30	
	7.13 (22.3%)	2.17		3.46 (20.3%)	2.30	
	10.57 (33.1%)	2.17		5.23 (30.7%)	2.31	
	14.72 (46.0%)	2.18		7.45 (43.8%)	2.32	
	19.61 (61.3%)	2.19		10.13 (59.6%)	2.32	
	25.50 (79.7%)	2.15		13.28 (78.1%)	2.35	
	31.98 (100.0%)	0	0	17.01 (100.0%)	0	0
Mean:	2.15			2.30		
Contrast:			0.0			0.0

Diagram 6: Rec 709 Post CMS Calibration

	Reference	Measured			Luminance Error
	xyY	xyY	ΔE		
Red	0.6400, 0.3300, 0.2127	0.6447, 0.3334, 0.202	2.0		
Green	0.3000, 0.6000, 0.7152	0.3003, 0.5978, 0.724	0.4		
Blue	0.1500, 0.0600, 0.0722	0.1515, 0.0640, 0.071	1.2		
Yellow	0.4193, 0.5053, 0.9278	0.4162, 0.5137, 0.924	1.4		
Cyan	0.2247, 0.3288, 0.7873	0.2270, 0.3276, 0.738	2.5		
Magenta	0.3209, 0.1542, 0.2848	0.3164, 0.1454, 0.280	1.4		
White	0.3127, 0.3290, 1.0000	0.3172, 0.3279, 54.600	3.0		
		Mean: 1.7			

Performance

One of my favourite 'demonstration BluRays' is The Wolverine. Released in 2013, it has both reference grade audio and video. True to its DLP technology, the W8000 turned in a very film like performance, with a beautiful sense of depth thanks in large part I'm sure to excellent gamma tracking.

While the colour of the temple and its surrounding gardens during Yoshidas funeral looked very natural, skin tones weren't as convincing. While Wolverine and Yukio's flesh tones are reddish, they both looked too red. Revisiting both the "Flesh Tone" and main colour control fixed this, with skin tones becoming both very natural and convincing.

Moving to the scene when Shingen follows Viper into Tokyo's alley-ways and streets at night the W8000 once again displayed a great sense of depth, with background detail never being lost. While black levels were decent, they weren't up to same levels I have seen from some of the W8000's competitors.

Switching to some older material, Lawrence of Arabia was shot in 1962 with a mixture of Super Panavision 70 and 35mm film. In 2012 it was given a 4K restoration for its 50th anniversary BluRay release. The W8000 provides a very film-like presentation of the movie, remaining true to the source material.

Once again colour reproduction was excellent with the warm hues of the desert very naturally rendered and skin tones accurately captured.

"the W8000 turned in a very film like performance"

Conclusion

While the W8000 doesn't offer the last word in black level performance, for those who prefer a brighter picture they may just have found the perfect match. It also means that it may be better than some of its competitors in a room that isn't able to be completely blacked out. With its very film-like presentation, the W8000 has an image that many are going to immediately warm to.

The only thing that may give you pause is the impending release of BenQ's W11000 Ultra HD projector…

For full specifications visit
http://www.benq.com.au/product/projector/w8000/