INTRODUCTION

Rows should have sufficient spacing to prevent shading and maximize solar yield. The required row spacing depends on the following (for north facing rows):

- Geographic location (in particular, the latitude)

- Vertical distance between the top of one row and the base of the next

- How many hours of the day the rows must remain unshaded

DETERMINING THE CORRECT SPACING

Measure vertical difference

Measure the vertical difference in height between the lowest part of one row and the highest part of the next row. This takes into account the slope of the roof or ground.

Multiply this height by a factor

To determine the gap between the panels, multiply the height by a factor. This factor accounts for the location of the sun (altitude and azimuth) on the winter solstice. At minimum (and in accordance with CEC guidelines) the panels should not be shaded between the hours of 10 am to 2 pm.

To further minimize shading and maximize yield, it is recommended to avoid shading from 9 am to 3 pm. If a lot of space is available then an even better solution is to avoid shading from sunrise (+ one hour) to sunset (- one hour), as shown in the following table:

| City	Latitude	CEC (10 am - 2 pm)	SunLock (9 am - 3 pm)	Sunrise +1 to sunset -1
Darwin	12°	0.9	1.3	2.2
Brisbane	27°	1.4	1.8	3.2
Perth	32°	1.8	2.3	3.3
Sydney	34°	1.8	2.3	3.8
Canberra	35°	1.9	2.6	3.9
Adelaide	35°	2.0	2.6	3.9
Melbourne	37°	2.3	3.3	4.1
Hobart	42°	2.8	4.1	5.6

Add this to the row width

To get the row spacing add the row width (width of the panels) to the row gap (just calculated).

**SUNLOCK**

WORKED EXAMPLE

Measure height

Solar modules are installed on 15° commercial roof brackets on a north facing roof with a pitch of 3°. The difference in vertical height is ~ 230 mm.
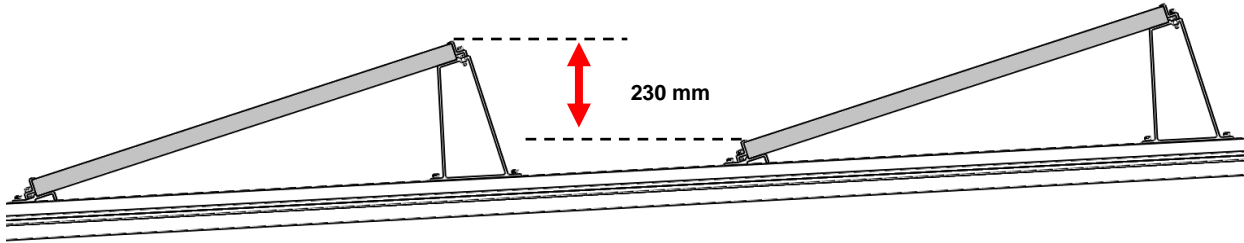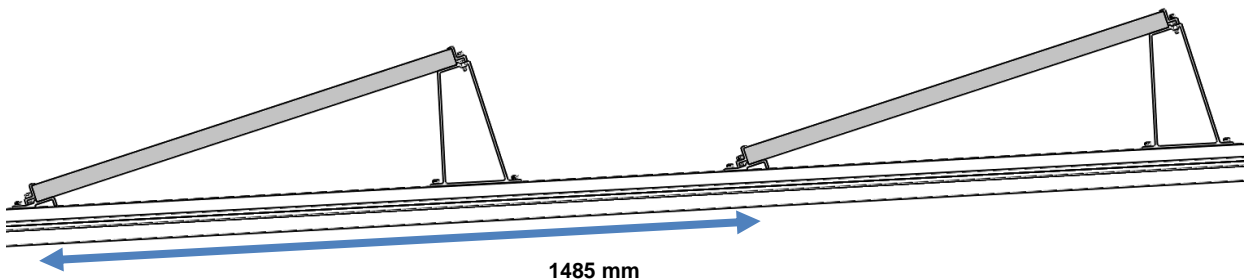
230 mm

Multiply this height by a factor

The solar modules are installed in Perth and should be unshaded from 9 am to 3 pm on the winter solstice. Use the SunLock factor of 2.3. Therefore, the row gap is 230 mm x 2.3 = 529 mm.
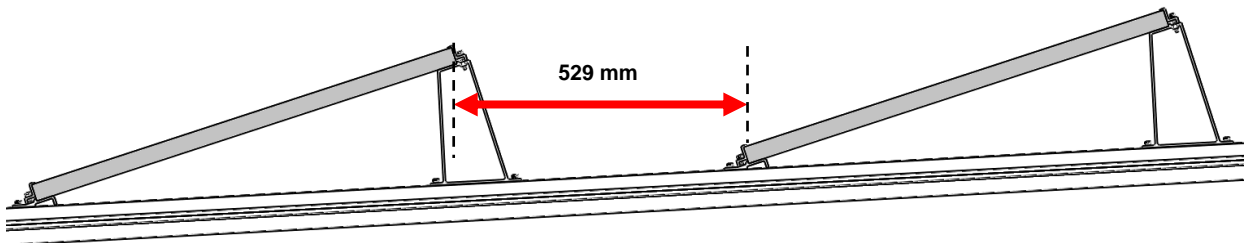
529 mm

Add this to the row width

The solar module has a width of ~ 956 mm. Therefore, the total row spacing is 956 mm + 529 mm = 1485 mm.

1485 mm

LOOK UP TABLES

Commercial roof brackets on a north facing roof with a 3° pitch:

North facing roof (3 degrees)					
City	Tilt Bracket (degrees)	Latitude (degrees)	CEC (10am to 2pm)	SunLock (9am to 3pm)	Sunrise to Sunset (+1 hour to -1 hour)
Darwin	5	12	1200 *	1200 *	1200 *
Darwin	10	12	1200 *	1200 *	1320
Darwin	15	12	1200 *	1270	1465
Brisbane	5	27	1200 *	1200 *	1230
Brisbane	10	27	1205	1265	1455
Brisbane	15	27	1290	1380	1665
Perth	5	32	1200 *	1200 *	1240
Perth	10	32	1265	1335	1465
Perth	15	32	1380	1485	1685
Sydney	5	34	1200 *	1200 *	1270
Sydney	10	34	1265	1335	1530
Sydney	15	34	1380	1485	1775
Canberra	5	35	1200 *	1200 *	1280
Canberra	10	35	1280	1375	1540
Canberra	15	35	1400	1550	1800
Adelaide	5	35	1200 *	1200 *	1280
Adelaide	10	35	1290	1375	1540
Adelaide	15	35	1430	1550	1800
Melbourne	5	37	1200 *	1240	1290
Melbourne	10	37	1340	1470	1570
Melbourne	15	37	1490	1690	1830
Hobart	5	42	1210	1290	1370
Hobart	10	42	1400	1570	1730
Hobart	15	42	1590	1830	2080

Note: minimum row spacing is 1200 mm.

Commercial roof brackets on a south facing roof with a 3° pitch:

City	Tilt Bracket (degrees)	Latitude (degrees)	CEC (10am to 2pm)	SunLock (9am to 3pm)	Sunrise to Sunset (+1 hour to -1 hour)
South facing roof (3 degrees)
Darwin	5	12	1200 *	1200 *	1220
Darwin	10	12	1200 *	1240	1430
Darwin	15	12	1225	1350	1630
Brisbane	5	27	1200 *	1200 *	1340
Brisbane	10	27	1260	1340	1670
Brisbane	15	27	1380	1500	1980
Perth	5	32	1200 *	1230	1350
Perth	10	32	1340	1450	1690
Perth	15	32	1500	1660	2020
Sydney	5	34	1200 *	1230	1420
Sydney	10	34	1340	1450	1820
Sydney	15	34	1500	1660	2210
Canberra	5	35	1200 *	1270	1430
Canberra	10	35	1370	1520	1850
Canberra	15	35	1530	1760	2260
Adelaide	5	35	1200 *	1270	1430
Adelaide	10	35	1390	1520	1850
Adelaide	15	35	1560	1760	2260
Melbourne	5	37	1230	1350	1460
Melbourne	10	37	1450	1690	1910
Melbourne	15	37	1660	2020	2340
Hobart	5	42	1290	1460	1700
Hobart	10	42	1570	1910	2380
Hobart	15	42	1840	2340	3040

Note: minimum row spacing is 1200 mm.

FURTHER INFORMATION

For further information contact Apollo Energy on 1300 855 484 or sunlock@apolloenergy.com.au.