

\* symmetry operation

Table 1: Symmetry operations for 3d polar vector.

No.	tag	matrix (polar)	det	TR
1	$\{1 0\}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	1	1
2	$\{3^+_{001} 0\}$	$\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	1	1
3	$\{3^-_{001} 0\}$	$\begin{bmatrix} -1 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	1	1
4	$\{m_{100} 00\frac{1}{2}\}$	$\begin{bmatrix} -1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	-1	1
5	$\{m_{110} 00\frac{1}{2}\}$	$\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	-1	1
6	$\{m_{010} 00\frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	-1	1
7	$\{1 \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{2}{3} \\ 0 & 1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	1	1
8	$\{3^+_{001} \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{2}{3} \\ 1 & -1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	1	1
9	$\{3^-_{001} \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{2}{3} \\ -1 & 0 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	1	1
10	$\{m_{100} \frac{2}{3}\frac{1}{3}\frac{5}{6}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{2}{3} \\ 0 & 1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	-1	1
11	$\{m_{110} \frac{2}{3}\frac{1}{3}\frac{5}{6}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{2}{3} \\ -1 & 0 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	-1	1
12	$\{m_{010} \frac{2}{3}\frac{1}{3}\frac{5}{6}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{2}{3} \\ 1 & -1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	-1	1
13	$\{1 \frac{1}{3}\frac{2}{3}\frac{2}{3}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{3} \\ 0 & 1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	1	1

continued ...

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No.	tag	matrix (polar)	det	TR
14	$\{3_{001}^+   \frac{1}{3} \frac{2}{3} \frac{2}{3}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{3} \\ 1 & -1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	1	1
15	$\{3_{001}^-   \frac{1}{3} \frac{2}{3} \frac{2}{3}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{1}{3} \\ -1 & 0 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	1	1
16	$\{m_{100}   \frac{1}{3} \frac{2}{3} \frac{1}{6}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{1}{3} \\ 0 & 1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	-1	1
17	$\{m_{110}   \frac{1}{3} \frac{2}{3} \frac{1}{6}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{3} \\ -1 & 0 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	-1	1
18	$\{m_{010}   \frac{1}{3} \frac{2}{3} \frac{1}{6}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{3} \\ 1 & -1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	-1	1
19	$\{1'   00 \frac{1}{2}\}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	1	-1
20	$\{3_{001}^+ '   00 \frac{1}{2}\}$	$\begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	1	-1
21	$\{3_{001}^- '   00 \frac{1}{2}\}$	$\begin{bmatrix} -1 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & \frac{1}{2} \end{bmatrix}$	1	-1
22	$\{m_{100}'   0\}$	$\begin{bmatrix} -1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	-1	-1
23	$\{m_{110}'   0\}$	$\begin{bmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	-1	-1
24	$\{m_{010}'   0\}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	-1	-1
25	$\{1'   \frac{2}{3} \frac{1}{3} \frac{5}{6}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{2}{3} \\ 0 & 1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	1	-1
26	$\{3_{001}^+ '   \frac{2}{3} \frac{1}{3} \frac{5}{6}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{2}{3} \\ 1 & -1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	1	-1
27	$\{3_{001}^- '   \frac{2}{3} \frac{1}{3} \frac{5}{6}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{2}{3} \\ -1 & 0 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{5}{6} \end{bmatrix}$	1	-1

continued ...

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No.	tag	matrix (polar)	det	TR
28	$\{m_{100}' \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{2}{3} \\ 0 & 1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	-1	-1
29	$\{m_{110}' \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{2}{3} \\ -1 & 0 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	-1	-1
30	$\{m_{010}' \frac{2}{3}\frac{1}{3}\frac{1}{3}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{2}{3} \\ 1 & -1 & 0 & \frac{1}{3} \\ 0 & 0 & 1 & \frac{1}{3} \end{bmatrix}$	-1	-1
31	$\{1' \frac{1}{3}\frac{2}{3}\frac{1}{6}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{3} \\ 0 & 1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	1	-1
32	$\{3_{001}^+ \frac{1}{3}\frac{2}{3}\frac{1}{6}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{3} \\ 1 & -1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	1	-1
33	$\{3_{001}^- \frac{1}{3}\frac{2}{3}\frac{1}{6}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{1}{3} \\ -1 & 0 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{1}{6} \end{bmatrix}$	1	-1
34	$\{m_{100}' \frac{1}{3}\frac{2}{3}\frac{2}{3}\}$	$\begin{bmatrix} -1 & 1 & 0 & \frac{1}{3} \\ 0 & 1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	-1	-1
35	$\{m_{110}' \frac{1}{3}\frac{2}{3}\frac{2}{3}\}$	$\begin{bmatrix} 0 & -1 & 0 & \frac{1}{3} \\ -1 & 0 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	-1	-1
36	$\{m_{010}' \frac{1}{3}\frac{2}{3}\frac{2}{3}\}$	$\begin{bmatrix} 1 & 0 & 0 & \frac{1}{3} \\ 1 & -1 & 0 & \frac{2}{3} \\ 0 & 0 & 1 & \frac{2}{3} \end{bmatrix}$	-1	-1