Table 15.2.2.1. *Affine normalizers of the triclinic and monoclinic space groups*

Space group $\mathcal{G}$		Matrix–vector pairs in Table 15.2.2.2
No.	Hermann–Mauguin symbol	
1	$P1$	$\boldsymbol{M}_1, \boldsymbol{v}_1$
2	$P\bar{1}$	$\boldsymbol{M}_1, \boldsymbol{v}_2$
3	$P121$	$\boldsymbol{M}_2, \boldsymbol{v}_3$
3	$P112$	$\boldsymbol{M}_3, \boldsymbol{v}_4$
4	$P12_11$	$\boldsymbol{M}_2, \boldsymbol{v}_3$
4	$P112_1$	$\boldsymbol{M}_3, \boldsymbol{v}_4$
5	$C121$	$\boldsymbol{M}_4, \boldsymbol{v}_3$
5	$A121$	$\boldsymbol{M}_5, \boldsymbol{v}_3$
5	$I121$	$\boldsymbol{M}_6, \boldsymbol{v}_3$; $\boldsymbol{M}_7, \boldsymbol{v}_3$
5	$A112$	$\boldsymbol{M}_8, \boldsymbol{v}_4$
5	$B112$	$\boldsymbol{M}_9, \boldsymbol{v}_4$
5	$I112$	$\boldsymbol{M}_{10}, \boldsymbol{v}_4$; $\boldsymbol{M}_{11}, \boldsymbol{v}_4$
6	$P1m1$	$\boldsymbol{M}_2, \boldsymbol{v}_5$
6	$P11m$	$\boldsymbol{M}_3, \boldsymbol{v}_6$
7	$P1c1$	$\boldsymbol{M}_5, \boldsymbol{v}_5$
7	$P1n1$	$\boldsymbol{M}_6, \boldsymbol{v}_5$; $\boldsymbol{M}_7, \boldsymbol{v}_5$
7	$P1a1$	$\boldsymbol{M}_4, \boldsymbol{v}_5$
7	$P11a$	$\boldsymbol{M}_9, \boldsymbol{v}_6$
7	$P11n$	$\boldsymbol{M}_{10}, \boldsymbol{v}_6$; $\boldsymbol{M}_{11}, \boldsymbol{v}_6$
7	$P11b$	$\boldsymbol{M}_8, \boldsymbol{v}_6$
8	$C1m1$	$\boldsymbol{M}_4, \boldsymbol{v}_5$
8	$A1m1$	$\boldsymbol{M}_5, \boldsymbol{v}_5$
8	$I1m1$	$\boldsymbol{M}_6, \boldsymbol{v}_5$; $\boldsymbol{M}_7, \boldsymbol{v}_5$
8	$A11m$	$\boldsymbol{M}_8, \boldsymbol{v}_6$
8	$B11m$	$\boldsymbol{M}_9, \boldsymbol{v}_6$
8	$I11m$	$\boldsymbol{M}_{10}, \boldsymbol{v}_6$; $\boldsymbol{M}_{11}, \boldsymbol{v}_6$
9	$C1c1$	$\boldsymbol{M}_6, \boldsymbol{v}_5$; $\boldsymbol{M}_{12}, \boldsymbol{v}_7$
9	$A1n1$	$\boldsymbol{M}_6, \boldsymbol{v}_5$; $\boldsymbol{M}_{13}, \boldsymbol{v}_7$
9	$I1a1$	$\boldsymbol{M}_6, \boldsymbol{v}_5$; $\boldsymbol{M}_7, \boldsymbol{v}_7$
9	$A11a$	$\boldsymbol{M}_{10}, \boldsymbol{v}_6$; $\boldsymbol{M}_{14}, \boldsymbol{v}_8$
9	$B11n$	$\boldsymbol{M}_{10}, \boldsymbol{v}_6$; $\boldsymbol{M}_{15}, \boldsymbol{v}_8$
9	$I11b$	$\boldsymbol{M}_{10}, \boldsymbol{v}_6$; $\boldsymbol{M}_{11}, \boldsymbol{v}_8$
10	$P12/m1$	$\boldsymbol{M}_2, \boldsymbol{v}_2$
10	$P112/m$	$\boldsymbol{M}_3, \boldsymbol{v}_2$
11	$P12_1/m1$	$\boldsymbol{M}_2, \boldsymbol{v}_2$
11	$P112_1/m$	$\boldsymbol{M}_3, \boldsymbol{v}_2$
12	$C12/m1$	$\boldsymbol{M}_4, \boldsymbol{v}_2$
12	$A12/m1$	$\boldsymbol{M}_5, \boldsymbol{v}_2$
12	$I12/m1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_7, \boldsymbol{v}_2$
12	$A112/m$	$\boldsymbol{M}_8, \boldsymbol{v}_2$
12	$B112/m$	$\boldsymbol{M}_9, \boldsymbol{v}_2$
12	$I112/m$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{11}, \boldsymbol{v}_2$
13	$P12/c1$	$\boldsymbol{M}_5, \boldsymbol{v}_2$
13	$P12/n1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_7, \boldsymbol{v}_2$
13	$P12/a1$	$\boldsymbol{M}_4, \boldsymbol{v}_2$
13	$P112/a$	$\boldsymbol{M}_9, \boldsymbol{v}_2$
13	$P112/n$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{11}, \boldsymbol{v}_2$
13	$P112/b$	$\boldsymbol{M}_8, \boldsymbol{v}_2$
14	$P12_1/c1$	$\boldsymbol{M}_5, \boldsymbol{v}_2$
14	$P12_1/n1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_7, \boldsymbol{v}_2$
14	$P12_1/a1$	$\boldsymbol{M}_4, \boldsymbol{v}_2$
14	$P112_1/a$	$\boldsymbol{M}_9, \boldsymbol{v}_2$
14	$P112_1/n$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{11}, \boldsymbol{v}_2$
14	$P112_1/b$	$\boldsymbol{M}_8, \boldsymbol{v}_2$
15	$C12/c1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_{12}, \boldsymbol{v}_9$
15	$A12/n1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_{13}, \boldsymbol{v}_{10}$
15	$I12/a1$	$\boldsymbol{M}_6, \boldsymbol{v}_2$; $\boldsymbol{M}_7, \boldsymbol{v}_{11}$
15	$A112/a$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{14}, \boldsymbol{v}_{10}$
15	$B112/n$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{15}, \boldsymbol{v}_{12}$
15	$I112/b$	$\boldsymbol{M}_{10}, \boldsymbol{v}_2$; $\boldsymbol{M}_{11}, \boldsymbol{v}_{11}$

Table 15.2.2.2. *Matrices and vectors used in Table 15.2.2.1 for the description of the affine normalizers of monoclinic and triclinic space groups*

n, g and u represent integer, even and odd numbers, respectively, r, s and t real numbers. For all matrices, $\det(\boldsymbol{M}_i) = \pm 1$ must hold.

$$\boldsymbol{M}_1 = \begin{pmatrix} n_{11} & n_{12} & n_{13} \\ n_{21} & n_{22} & n_{23} \\ n_{31} & n_{32} & n_{33} \end{pmatrix} \quad \boldsymbol{M}_2 = \begin{pmatrix} n_{11} & 0 & n_{13} \\ 0 & \pm 1 & 0 \\ n_{31} & 0 & n_{33} \end{pmatrix} \quad \boldsymbol{M}_3 = \begin{pmatrix} n_{11} & n_{12} & 0 \\ n_{21} & n_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix} \quad \boldsymbol{M}_4 = \begin{pmatrix} u_{11} & 0 & n_{13} \\ 0 & \pm 1 & 0 \\ g_{31} & 0 & u_{33} \end{pmatrix} \quad \boldsymbol{M}_5 = \begin{pmatrix} u_{11} & 0 & g_{13} \\ 0 & \pm 1 & 0 \\ n_{31} & 0 & u_{33} \end{pmatrix}$$

$$\boldsymbol{M}_6 = \begin{pmatrix} u_{11} & 0 & g_{13} \\ 0 & \pm 1 & 0 \\ g_{31} & 0 & u_{33} \end{pmatrix} \quad \boldsymbol{M}_7 = \begin{pmatrix} g_{11} & 0 & u_{13} \\ 0 & \pm 1 & 0 \\ u_{31} & 0 & g_{33} \end{pmatrix} \quad \boldsymbol{M}_8 = \begin{pmatrix} u_{11} & g_{12} & 0 \\ n_{21} & u_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix} \quad \boldsymbol{M}_9 = \begin{pmatrix} u_{11} & n_{12} & 0 \\ g_{21} & u_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix} \quad \boldsymbol{M}_{10} = \begin{pmatrix} u_{11} & g_{12} & 0 \\ g_{21} & u_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix}$$

$$\boldsymbol{M}_{11} = \begin{pmatrix} g_{11} & u_{12} & 0 \\ u_{21} & g_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix} \quad \boldsymbol{M}_{12} = \begin{pmatrix} u_{11} & 0 & u_{13} \\ 0 & \pm 1 & 0 \\ g_{31} & 0 & u_{33} \end{pmatrix} \quad \boldsymbol{M}_{13} = \begin{pmatrix} u_{11} & 0 & g_{13} \\ 0 & \pm 1 & 0 \\ u_{31} & 0 & u_{33} \end{pmatrix} \quad \boldsymbol{M}_{14} = \begin{pmatrix} u_{11} & g_{12} & 0 \\ u_{21} & u_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix} \quad \boldsymbol{M}_{15} = \begin{pmatrix} u_{11} & u_{12} & 0 \\ g_{21} & u_{22} & 0 \\ 0 & 0 & \pm 1 \end{pmatrix}$$

$$\boldsymbol{v}_1 = \begin{pmatrix} r \\ s \\ t \end{pmatrix} \quad \boldsymbol{v}_2 = \begin{pmatrix} \frac{1}{2}n_1 \\ \frac{1}{2}n_2 \\ \frac{1}{2}n_3 \end{pmatrix} \quad \boldsymbol{v}_3 = \begin{pmatrix} \frac{1}{2}n_1 \\ s \\ \frac{1}{2}n_3 \end{pmatrix} \quad \boldsymbol{v}_4 = \begin{pmatrix} \frac{1}{2}n_1 \\ \frac{1}{2}n_2 \\ t \end{pmatrix} \quad \boldsymbol{v}_5 = \begin{pmatrix} r \\ \frac{1}{2}n_2 \\ t \end{pmatrix}$$

$$\boldsymbol{v}_6 = \begin{pmatrix} r \\ s \\ \frac{1}{2}n_3 \end{pmatrix} \quad \boldsymbol{v}_7 = \begin{pmatrix} r \\ \frac{1}{4}u_2 \\ t \end{pmatrix} \quad \boldsymbol{v}_8 = \begin{pmatrix} r \\ s \\ \frac{1}{4}u_3 \end{pmatrix} \quad \boldsymbol{v}_9 = \begin{pmatrix} \frac{1}{4}u_1 \\ \frac{1}{4}u_2 \\ \frac{1}{2}n_3 \end{pmatrix} \quad \boldsymbol{v}_{10} = \begin{pmatrix} \frac{1}{2}n_1 \\ \frac{1}{4}u_2 \\ \frac{1}{4}u_3 \end{pmatrix}$$

$$\boldsymbol{v}_{11} = \begin{pmatrix} \frac{1}{4}u_1 \\ \frac{1}{4}u_2 \\ \frac{1}{4}u_3 \end{pmatrix} \quad \boldsymbol{v}_{12} = \begin{pmatrix} \frac{1}{4}u_1 \\ \frac{1}{2}n_2 \\ \frac{1}{4}u_3 \end{pmatrix}$$

references