PG No. 5 $C_{2\mathrm{h}}$ $2/m$ (b-axis setting) [monoclinic] (polar, internal axial octupole)

* Harmonics for rank 0
* Harmonics for rank 1

$\vec{\mathbb{Q}}_1^{(3,2)}[g](A_u)$

** symmetry

y

** expression

$$-\frac{3\sqrt{70}G_1xyz}{28}-\frac{3\sqrt{70}G_2z\left(x-y\right)\left(x+y\right)}{56}+\frac{\sqrt{105}G_3y\left(x-z\right)\left(x+z\right)}{14}+\frac{\sqrt{42}G_{3x}z\left(11x^2+y^2-4z^2\right)}{56}$$
$$+\frac{5\sqrt{42}G_{3y}xyz}{28}-\frac{3\sqrt{7}G_{az}x\left(x^2+y^2-4z^2\right)}{28}+\frac{\sqrt{105}G_{bz}x\left(x^2-y^2-2z^2\right)}{28}$$

$\vec{\mathbb{Q}}_1^{(3,2)}[g](B_u,1)$

** symmetry

x

** expression

$$\frac{3\sqrt{70}G_1z\left(x-y\right)\left(x+y\right)}{56}-\frac{3\sqrt{70}G_2xyz}{28}-\frac{\sqrt{105}G_3x\left(y-z\right)\left(y+z\right)}{14}-\frac{5\sqrt{42}G_{3x}xyz}{28}$$
$$-\frac{\sqrt{42}G_{3y}z\left(x^2+11y^2-4z^2\right)}{56}+\frac{3\sqrt{7}G_{az}y\left(x^2+y^2-4z^2\right)}{28}-\frac{\sqrt{105}G_{bz}y\left(x^2-y^2+2z^2\right)}{28}$$

$\vec{\mathbb{Q}}_1^{(3,2)}[g](B_u,2)$

** symmetry

z

** expression

$$-\frac{3\sqrt{70}G_1x\left(x^2-3y^2\right)}{56}+\frac{3\sqrt{70}G_2y\left(3x^2-y^2\right)}{56}-\frac{\sqrt{105}G_3z\left(x-y\right)\left(x+y\right)}{14}-\frac{\sqrt{42}G_{3x}y\left(x^2+y^2-4z^2\right)}{56}+\frac{\sqrt{42}G_{3y}x\left(x^2+y^2-4z^2\right)}{56}+\frac{\sqrt{105}G_{bz}xyz}{7}$$

* Harmonics for rank 2

$\vec{\mathbb{Q}}_2^{(3,0)}[g](A_g,1)$

** symmetry

$$-\frac{x^2}{2}-\frac{y^2}{2}+z^2$$

** expression

$$-\frac{\sqrt{210}G_3\left(x-y\right)\left(x+y\right)}{28}+\frac{\sqrt{21}G_{3x}yz}{7}-\frac{\sqrt{21}G_{3y}xz}{7}+\frac{\sqrt{210}G_{bz}xy}{14}$$

$\vec{\mathbb{Q}}_2^{(3,0)}[g](A_g,2)$

** symmetry

$$\frac{\sqrt{3}\left(x-y\right)\left(x+y\right)}{2}$$

** expression

$$\frac{\sqrt{105}G_1xz}{14}-\frac{\sqrt{105}G_2yz}{14}-\frac{\sqrt{70}G_3\left(x^2+y^2-2z^2\right)}{28}-\frac{3\sqrt{7}G_{3x}yz}{14}-\frac{3\sqrt{7}G_{3y}xz}{14}+\frac{\sqrt{42}G_{az}xy}{14}$$

$\vec{\mathbb{Q}}_2^{(3,0)}[g](A_g,3)$

** symmetry

$$\sqrt{3}xz$$

** expression

$$-\frac{\sqrt{105}G_1\left(x-y\right)\left(x+y\right)}{28}+\frac{\sqrt{105}G_2xy}{14}-\frac{3\sqrt{7}G_{3x}xy}{14}+\frac{\sqrt{7}G_{3y}\left(x^2-5y^2+4z^2\right)}{28}-\frac{\sqrt{42}G_{az}yz}{7}$$

$\vec{\mathbb{Q}}_2^{(3,2)}[g](A_g,1)$

** symmetry

$$-\frac{x^2}{2}-\frac{y^2}{2}+z^2$$

** expression

$$-\frac{\sqrt{70}G_1xz\left(x^2-3y^2\right)}{8}+\frac{\sqrt{70}G_2yz\left(3x^2-y^2\right)}{8}+\frac{\sqrt{105}G_3\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{42}$$
$$-\frac{5\sqrt{42}G_{3x}yz\left(3x^2+3y^2-4z^2\right)}{168}+\frac{5\sqrt{42}G_{3y}xz\left(3x^2+3y^2-4z^2\right)}{168}-\frac{\sqrt{105}G_{bz}xy\left(x^2+y^2-6z^2\right)}{21}$$

$\vec{\mathbb{Q}}_2^{(3,2)}[g](A_g,2)$
** symmetry

$$\frac{\sqrt{3}\,(x-y)\,(x+y)}{2}$$

** expression

$$\frac{\sqrt{210}G_1xz\left(3x^2+3y^2-4z^2\right)}{168}-\frac{\sqrt{210}G_2yz\left(3x^2+3y^2-4z^2\right)}{168}+\frac{\sqrt{35}G_3\left(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4\right)}{42}$$
$$-\frac{5\sqrt{14}G_{3x}yz\left(27x^2-y^2-8z^2\right)}{168}+\frac{5\sqrt{14}G_{3y}xz\left(x^2-27y^2+8z^2\right)}{168}+\frac{5\sqrt{21}G_{az}xy\left(x^2+y^2-6z^2\right)}{42}-\frac{\sqrt{35}G_{bz}xy\,(x-y)\,(x+y)}{6}$$

$\vec{\mathbb{Q}}_2^{(3,2)}[g](A_g,3)$
** symmetry

$$\sqrt{3}xz$$

** expression

$$-\frac{\sqrt{210}G_1\left(5x^4-21x^2y^2-9x^2z^2+2y^4+9y^2z^2\right)}{168}+\frac{\sqrt{210}G_2xy\left(17x^2-11y^2-18z^2\right)}{168}-\frac{\sqrt{35}G_3xz\,(x-z)\,(x+z)}{6}+\frac{5\sqrt{14}G_{3x}xy\left(x^2+y^2-6z^2\right)}{168}$$
$$+\frac{5\sqrt{14}G_{3y}\left(x^4+3x^2y^2-9x^2z^2+2y^4-15y^2z^2+4z^4\right)}{168}+\frac{5\sqrt{21}G_{az}yz\left(3x^2+3y^2-4z^2\right)}{84}+\frac{\sqrt{35}G_{bz}yz\left(3x^2+y^2-2z^2\right)}{12}$$

$\vec{\mathbb{Q}}_2^{(3,0)}[g](B_g,1)$
** symmetry

$$\sqrt{3}yz$$

** expression

$$\frac{\sqrt{105}G_1xy}{14}+\frac{\sqrt{105}G_2\,(x-y)\,(x+y)}{28}+\frac{\sqrt{7}G_{3x}\left(5x^2-y^2-4z^2\right)}{28}+\frac{3\sqrt{7}G_{3y}xy}{14}+\frac{\sqrt{42}G_{az}xz}{7}$$

$\vec{\mathbb{Q}}_2^{(3,0)}[g](B_g,2)$
** symmetry

$$\sqrt{3}xy$$

** expression

$$-\frac{\sqrt{105}G_1yz}{14}-\frac{\sqrt{105}G_2xz}{14}+\frac{3\sqrt{7}G_{3x}xz}{14}-\frac{3\sqrt{7}G_{3y}yz}{14}-\frac{\sqrt{42}G_{az}\,(x-y)\,(x+y)}{28}+\frac{\sqrt{70}G_{bz}\left(x^2+y^2-2z^2\right)}{28}$$

$\vec{\mathbb{Q}}_2^{(3,2)}[g](B_g,1)$
** symmetry

$$\sqrt{3}yz$$

** expression

$$-\frac{\sqrt{210}G_1xy\left(11x^2-17y^2+18z^2\right)}{168}-\frac{\sqrt{210}G_2\left(2x^4-21x^2y^2+9x^2z^2+5y^4-9y^2z^2\right)}{168}$$
$$+\frac{\sqrt{35}G_3yz\,(y-z)\,(y+z)}{6}-\frac{5\sqrt{14}G_{3x}\left(2x^4+3x^2y^2-15x^2z^2+y^4-9y^2z^2+4z^4\right)}{168}$$
$$-\frac{5\sqrt{14}G_{3y}xy\left(x^2+y^2-6z^2\right)}{168}-\frac{5\sqrt{21}G_{az}xz\left(3x^2+3y^2-4z^2\right)}{84}+\frac{\sqrt{35}G_{bz}xz\left(x^2+3y^2-2z^2\right)}{12}$$

$\vec{\mathbb{Q}}_2^{(3,2)}[g](B_g,2)$
** symmetry

$$\sqrt{3}xy$$

** expression

$$-\frac{\sqrt{210}G_1yz\left(3x^2+3y^2-4z^2\right)}{168}-\frac{\sqrt{210}G_2xz\left(3x^2+3y^2-4z^2\right)}{168}+\frac{\sqrt{35}G_3xy\,(x-y)\,(x+y)}{6}+\frac{5\sqrt{14}G_{3x}xz\left(13x^2-15y^2-8z^2\right)}{168}$$
$$+\frac{5\sqrt{14}G_{3y}yz\left(15x^2-13y^2+8z^2\right)}{168}-\frac{5\sqrt{21}G_{az}\,(x-y)\,(x+y)\left(x^2+y^2-6z^2\right)}{84}+\frac{\sqrt{35}G_{bz}\left(5x^4-18x^2y^2-12x^2z^2+5y^4-12y^2z^2+4z^4\right)}{84}$$

* Harmonics for rank 3
$\vec{\mathbb{Q}}_3^{(3,-2)}[g](A_u,1)$
** symmetry

$$\sqrt{15}xyz$$

** expression

$$\frac{\sqrt{2}G_1y}{4}+\frac{\sqrt{2}G_2x}{4}+\frac{\sqrt{30}G_{3x}x}{12}-\frac{\sqrt{30}G_{3y}y}{12}-\frac{\sqrt{3}G_{bz}z}{3}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](A_u,2)$
** symmetry

$$-\frac{y\left(3x^2-2y^2+3z^2\right)}{2}$$

** expression

$$\frac{\sqrt{30}G_2z}{8}+\frac{\sqrt{2}G_{3x}z}{8}-\frac{\sqrt{3}G_{az}x}{4}-\frac{\sqrt{5}G_{bz}x}{4}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](A_u,3)$
** symmetry

$$-\frac{\sqrt{15}y\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$\frac{3\sqrt{2}G_2z}{8}+\frac{\sqrt{3}G_3y}{3}-\frac{\sqrt{30}G_{3x}z}{24}+\frac{\sqrt{5}G_{az}x}{4}+\frac{\sqrt{3}G_{bz}x}{12}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](A_u,1)$
** symmetry

$$\sqrt{15}xyz$$

** expression

$$\frac{G_1y\left(x^2+y^2-4z^2\right)}{4}+\frac{G_2x\left(x^2+y^2-4z^2\right)}{4}+\frac{\sqrt{15}G_{3x}x\left(x^2-3y^2\right)}{12}+\frac{\sqrt{15}G_{3y}y\left(3x^2-y^2\right)}{12}+\frac{\sqrt{10}G_{az}z\left(x-y\right)\left(x+y\right)}{4}+\frac{\sqrt{6}G_{bz}z\left(3x^2+3y^2-2z^2\right)}{12}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](A_u,2)$
** symmetry

$$-\frac{y\left(3x^2-2y^2+3z^2\right)}{2}$$

** expression

$$-\frac{\sqrt{15}G_1xyz}{4}+\frac{\sqrt{15}G_2z\left(3y^2-z^2\right)}{12}+\frac{\sqrt{10}G_3y\left(x-z\right)\left(x+z\right)}{4}-\frac{G_{3x}z\left(4x^2-y^2-z^2\right)}{4}+\frac{5G_{3y}xyz}{4}+\frac{\sqrt{6}G_{az}x\left(2x^2-3y^2-3z^2\right)}{12}-\frac{\sqrt{10}G_{bz}x\left(y-z\right)\left(y+z\right)}{4}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](A_u,3)$
** symmetry

$$-\frac{\sqrt{15}y\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$\frac{5G_1xyz}{4}+\frac{G_2z\left(4x^2-y^2-z^2\right)}{4}-\frac{\sqrt{6}G_3y\left(3x^2-2y^2+3z^2\right)}{12}+\frac{\sqrt{15}G_{3x}z\left(3y^2-z^2\right)}{12}+\frac{\sqrt{15}G_{3y}xyz}{4}-\frac{\sqrt{10}G_{az}x\left(y-z\right)\left(y+z\right)}{4}-\frac{\sqrt{6}G_{bz}x\left(2x^2-3y^2-3z^2\right)}{12}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](A_u,1)$
** symmetry

$$\sqrt{15}xyz$$

** expression

$$-\frac{\sqrt{22}G_1y\left(25x^4-55x^2y^2+15x^2z^2+4y^4+15y^2z^2-10z^4\right)}{88}-\frac{\sqrt{22}G_2x\left(4x^4-55x^2y^2+15x^2z^2+25y^4+15y^2z^2-10z^4\right)}{88}-\frac{\sqrt{330}G_{3x}x\left(4x^4+x^2y^2-41x^2z^2-3y^4+15y^2z^2+18z^4\right)}{264}-\frac{\sqrt{330}G_{3y}y\left(3x^4-x^2y^2-15x^2z^2-4y^4+41y^2z^2-18z^4\right)}{264}-\frac{7\sqrt{55}G_{az}z\left(x-y\right)\left(x+y\right)\left(x^2+y^2-2z^2\right)}{44}+\frac{\sqrt{33}G_{bz}z\left(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4\right)}{132}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](A_u,2)$

** symmetry

$$-\frac{y\left(3x^2-2y^2+3z^2\right)}{2}$$

** expression

$$\frac{7\sqrt{330}G_1xyz\left(x^2-2y^2+z^2\right)}{88}+\frac{\sqrt{330}G_2z\left(9x^4-87x^2y^2+11x^2z^2+30y^4-31y^2z^2+2z^4\right)}{528}-\frac{7\sqrt{55}G_3y\left(x-z\right)\left(x+z\right)\left(x^2-2y^2+z^2\right)}{44}$$
$$-\frac{5\sqrt{22}G_{3x}z\left(5x^4-39x^2y^2+3x^2z^2-2y^4+17y^2z^2-2z^4\right)}{176}-\frac{35\sqrt{22}G_{3y}xyz\left(x^2-2y^2+z^2\right)}{88}$$
$$+\frac{5\sqrt{33}G_{az}x\left(x^4-5x^2y^2-5x^2z^2-6y^4+51y^2z^2-6z^4\right)}{264}-\frac{\sqrt{55}G_{bz}x\left(3x^4-29x^2y^2-x^2z^2+10y^4+27y^2z^2-4z^4\right)}{88}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](A_u,3)$
** symmetry

$$-\frac{\sqrt{15}y\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$-\frac{35\sqrt{22}G_1xyz\left(x^2-2y^2+z^2\right)}{88}-\frac{\sqrt{22}G_2z\left(5x^4-165x^2y^2+45x^2z^2+40y^4-25y^2z^2-2z^4\right)}{176}$$
$$-\frac{\sqrt{33}G_3y\left(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4\right)}{132}-\frac{\sqrt{330}G_{3x}z\left(45x^4-57x^2y^2-71x^2z^2+24y^4-29y^2z^2+10z^4\right)}{528}$$
$$-\frac{7\sqrt{330}G_{3y}xyz\left(x^2-2y^2+z^2\right)}{88}+\frac{\sqrt{55}G_{az}x\left(3x^4-x^2y^2-29x^2z^2-4y^4+27y^2z^2+10z^4\right)}{88}$$
$$-\frac{\sqrt{33}G_{bz}x\left(11x^4-55x^2y^2-55x^2z^2+60y^4-195y^2z^2+60z^4\right)}{264}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](B_u,1)$
** symmetry

$$\frac{x\left(2x^2-3y^2-3z^2\right)}{2}$$

** expression

$$\frac{\sqrt{30}G_1z}{8}-\frac{\sqrt{2}G_{3y}z}{8}+\frac{\sqrt{3}G_{az}y}{4}-\frac{\sqrt{5}G_{bz}y}{4}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](B_u,2)$
** symmetry

$$-\frac{z\left(3x^2+3y^2-2z^2\right)}{2}$$

** expression

$$\frac{\sqrt{2}G_{3x}y}{2}-\frac{\sqrt{2}G_{3y}x}{2}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](B_u,3)$
** symmetry

$$\frac{\sqrt{15}x\left(y-z\right)\left(y+z\right)}{2}$$

** expression

$$-\frac{3\sqrt{2}G_1z}{8}+\frac{\sqrt{3}G_3x}{3}-\frac{\sqrt{30}G_{3y}z}{24}+\frac{\sqrt{5}G_{az}y}{4}-\frac{\sqrt{3}G_{bz}y}{12}$$

$\vec{\mathbb{Q}}_3^{(3,-2)}[g](B_u,4)$
** symmetry

$$\frac{\sqrt{15}z\left(x-y\right)\left(x+y\right)}{2}$$

** expression

$$-\frac{\sqrt{2}G_1x}{4}+\frac{\sqrt{2}G_2y}{4}+\frac{\sqrt{3}G_3z}{3}-\frac{\sqrt{30}G_{3x}y}{12}-\frac{\sqrt{30}G_{3y}x}{12}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](B_u,1)$
** symmetry

$$\frac{x\left(2x^2-3y^2-3z^2\right)}{2}$$

** expression

$$\frac{\sqrt{15}G_1 z\left(3x^2-z^2\right)}{12}-\frac{\sqrt{15}G_2 xyz}{4}-\frac{\sqrt{10}G_3 x\left(y-z\right)\left(y+z\right)}{4}-\frac{5G_{3x}xyz}{4}$$
$$-\frac{G_{3y}z\left(x^2-4y^2+z^2\right)}{4}+\frac{\sqrt{6}G_{az}y\left(3x^2-2y^2+3z^2\right)}{12}-\frac{\sqrt{10}G_{bz}y\left(x-z\right)\left(x+z\right)}{4}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](B_u,2)$
** symmetry

$$-\frac{z\left(3x^2+3y^2-2z^2\right)}{2}$$

** expression

$$\frac{\sqrt{15}G_1 x\left(x^2-3y^2\right)}{12}-\frac{\sqrt{15}G_2 y\left(3x^2-y^2\right)}{12}-\frac{\sqrt{10}G_3 z\left(x-y\right)\left(x+y\right)}{4}-\frac{G_{3x}y\left(x^2+y^2-4z^2\right)}{4}+\frac{G_{3y}x\left(x^2+y^2-4z^2\right)}{4}+\frac{\sqrt{10}G_{bz}xyz}{2}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](B_u,3)$
** symmetry

$$\frac{\sqrt{15}x\left(y-z\right)\left(y+z\right)}{2}$$

** expression

$$\frac{G_1 z\left(x^2-4y^2+z^2\right)}{4}-\frac{5G_2 xyz}{4}+\frac{\sqrt{6}G_3 x\left(2x^2-3y^2-3z^2\right)}{12}+\frac{\sqrt{15}G_{3x}xyz}{4}$$
$$+\frac{\sqrt{15}G_{3y}z\left(3x^2-z^2\right)}{12}-\frac{\sqrt{10}G_{az}y\left(x-z\right)\left(x+z\right)}{4}-\frac{\sqrt{6}G_{bz}y\left(3x^2-2y^2+3z^2\right)}{12}$$

$\vec{\mathbb{Q}}_3^{(3,0)}[g](B_u,4)$
** symmetry

$$\frac{\sqrt{15}z\left(x-y\right)\left(x+y\right)}{2}$$

** expression

$$-\frac{G_1 x\left(x^2+y^2-4z^2\right)}{4}+\frac{G_2 y\left(x^2+y^2-4z^2\right)}{4}-\frac{\sqrt{6}G_3 z\left(3x^2+3y^2-2z^2\right)}{12}-\frac{\sqrt{15}G_{3x}y\left(3x^2-y^2\right)}{12}+\frac{\sqrt{15}G_{3y}x\left(x^2-3y^2\right)}{12}-\frac{\sqrt{10}G_{az}xyz}{2}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](B_u,1)$
** symmetry

$$\frac{x\left(2x^2-3y^2-3z^2\right)}{2}$$

** expression

$$\frac{\sqrt{330}G_1 z\left(30x^4-87x^2y^2-31x^2z^2+9y^4+11y^2z^2+2z^4\right)}{528}-\frac{7\sqrt{330}G_2 xyz\left(2x^2-y^2-z^2\right)}{88}-\frac{7\sqrt{55}G_3 x\left(y-z\right)\left(y+z\right)\left(2x^2-y^2-z^2\right)}{44}$$
$$-\frac{35\sqrt{22}G_{3x}xyz\left(2x^2-y^2-z^2\right)}{88}-\frac{5\sqrt{22}G_{3y}z\left(2x^4+39x^2y^2-17x^2z^2-5y^4-3y^2z^2+2z^4\right)}{176}$$
$$+\frac{5\sqrt{33}G_{az}y\left(6x^4+5x^2y^2-51x^2z^2-y^4+5y^2z^2+6z^4\right)}{264}-\frac{\sqrt{55}G_{bz}y\left(10x^4-29x^2y^2+27x^2z^2+3y^4-y^2z^2-4z^4\right)}{88}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](B_u,2)$
** symmetry

$$-\frac{z\left(3x^2+3y^2-2z^2\right)}{2}$$

** expression

$$\frac{7\sqrt{330}G_1 x\left(x^2-3y^2\right)\left(x^2+y^2-8z^2\right)}{528}-\frac{7\sqrt{330}G_2 y\left(3x^2-y^2\right)\left(x^2+y^2-8z^2\right)}{528}+\frac{7\sqrt{55}G_3 z\left(x-y\right)\left(x+y\right)\left(x^2+y^2-2z^2\right)}{44}$$
$$+\frac{5\sqrt{22}G_{3x}y\left(x^4+2x^2y^2-12x^2z^2+y^4-12y^2z^2+8z^4\right)}{176}-\frac{5\sqrt{22}G_{3y}x\left(x^4+2x^2y^2-12x^2z^2+y^4-12y^2z^2+8z^4\right)}{176}-\frac{7\sqrt{55}G_{bz}xyz\left(x^2+y^2-2z^2\right)}{22}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](B_u,3)$
** symmetry

$$\frac{\sqrt{15}x\left(y-z\right)\left(y+z\right)}{2}$$

** expression

$$\frac{\sqrt{22}G_1z\left(40x^4-165x^2y^2-25x^2z^2+5y^4+45y^2z^2-2z^4\right)}{176}-\frac{35\sqrt{22}G_2xyz\left(2x^2-y^2-z^2\right)}{88}$$
$$-\frac{\sqrt{33}G_3x\left(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4\right)}{132}+\frac{7\sqrt{330}G_{3x}xyz\left(2x^2-y^2-z^2\right)}{88}$$
$$-\frac{\sqrt{330}G_{3y}z\left(24x^4-57x^2y^2-29x^2z^2+45y^4-71y^2z^2+10z^4\right)}{528}$$
$$-\frac{\sqrt{55}G_{az}y\left(4x^4+x^2y^2-27x^2z^2-3y^4+29y^2z^2-10z^4\right)}{88}+\frac{\sqrt{33}G_{bz}y\left(60x^4-55x^2y^2-195x^2z^2+11y^4-55y^2z^2+60z^4\right)}{264}$$

$\vec{\mathbb{Q}}_3^{(3,2)}[g](B_u,4)$

** symmetry

$$\frac{\sqrt{15}z\left(x-y\right)\left(x+y\right)}{2}$$

** expression

$$-\frac{\sqrt{22}G_1x\left(13x^4-100x^2y^2-30x^2z^2+55y^4-30y^2z^2+20z^4\right)}{176}+\frac{\sqrt{22}G_2y\left(55x^4-100x^2y^2-30x^2z^2+13y^4-30y^2z^2+20z^4\right)}{176}$$
$$-\frac{\sqrt{33}G_3z\left(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4\right)}{132}+\frac{\sqrt{330}G_{3x}y\left(15x^4+16x^2y^2-138x^2z^2+y^4-26y^2z^2+36z^4\right)}{528}$$
$$+\frac{\sqrt{330}G_{3y}x\left(x^4+16x^2y^2-26x^2z^2+15y^4-138y^2z^2+36z^4\right)}{528}+\frac{7\sqrt{55}G_{az}xyz\left(x^2+y^2-2z^2\right)}{22}$$

* Harmonics for rank 4

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](A_g,1)$

** symmetry

$$\frac{\sqrt{21}\left(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4\right)}{6}$$

** expression

$$\frac{\sqrt{6}G_1xz}{4}+\frac{\sqrt{6}G_2yz}{4}+\frac{\sqrt{10}G_{3x}yz}{4}-\frac{\sqrt{10}G_{3y}xz}{4}-G_{bz}xy$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](A_g,2)$

** symmetry

$$-\frac{\sqrt{15}\left(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4\right)}{12}$$

** expression

$$-\frac{\sqrt{210}G_1xz}{20}-\frac{\sqrt{210}G_2yz}{20}+\frac{3\sqrt{35}G_3\left(x-y\right)\left(x+y\right)}{35}+\frac{5\sqrt{14}G_{3x}yz}{28}-\frac{5\sqrt{14}G_{3y}xz}{28}+\frac{\sqrt{35}G_{bz}xy}{35}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](A_g,3)$

** symmetry

$$\frac{\sqrt{5}\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{4}$$

** expression

$$\frac{9\sqrt{70}G_1xz}{140}-\frac{9\sqrt{70}G_2yz}{140}+\frac{\sqrt{105}G_3\left(x^2+y^2-2z^2\right)}{35}+\frac{\sqrt{42}G_{3x}yz}{28}+\frac{\sqrt{42}G_{3y}xz}{28}+\frac{3\sqrt{7}G_{az}xy}{7}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](A_g,4)$

** symmetry

$$-\frac{\sqrt{35}xz\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$\frac{3\sqrt{10}G_1\left(x-z\right)\left(x+z\right)}{40}-\frac{3\sqrt{10}G_2xy}{40}-\frac{\sqrt{15}G_3xz}{5}+\frac{3\sqrt{6}G_{3x}xy}{8}-\frac{\sqrt{6}G_{3y}\left(x-z\right)\left(x+z\right)}{8}-\frac{3G_{az}yz}{4}+\frac{3\sqrt{15}G_{bz}yz}{20}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](A_g,5)$

** symmetry

$$-\frac{\sqrt{5}xz\left(x^2-6y^2+z^2\right)}{2}$$

** expression

$$\frac{3\sqrt{70}G_1\left(3x^2+4y^2-7z^2\right)}{280}+\frac{3\sqrt{70}G_2xy}{280}+\frac{5\sqrt{42}G_{3x}xy}{56}+\frac{\sqrt{42}G_{3y}\left(5x^2-4y^2-z^2\right)}{56}+\frac{3\sqrt{7}G_{az}yz}{28}-\frac{\sqrt{105}G_{bz}yz}{20}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](A_g,1)$

** symmetry

$$\frac{\sqrt{21}\left(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4\right)}{6}$$

** expression

$$\frac{5\sqrt{33}G_1xz\left(5x^2-9y^2-2z^2\right)}{132}-\frac{5\sqrt{33}G_2yz\left(9x^2-5y^2+2z^2\right)}{132}-\frac{\sqrt{55}G_{3x}yz\left(15x^2+y^2-6z^2\right)}{44}$$
$$+\frac{\sqrt{55}G_{3y}xz\left(x^2+15y^2-6z^2\right)}{44}+\frac{7\sqrt{330}G_{az}xy\left(x-y\right)\left(x+y\right)}{132}-\frac{5\sqrt{22}G_{bz}xy\left(x^2+y^2-6z^2\right)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](A_g,2)$

** symmetry

$$-\frac{\sqrt{15}\left(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4\right)}{12}$$

** expression

$$\frac{\sqrt{1155}G_1xz\left(x^2-9y^2+2z^2\right)}{132}-\frac{\sqrt{1155}G_2yz\left(9x^2-y^2-2z^2\right)}{132}+\frac{3\sqrt{770}G_3\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{308}$$
$$+\frac{\sqrt{77}G_{3x}yz\left(51x^2-47y^2+30z^2\right)}{308}+\frac{\sqrt{77}G_{3y}xz\left(47x^2-51y^2-30z^2\right)}{308}-\frac{7\sqrt{462}G_{az}xy\left(x-y\right)\left(x+y\right)}{132}+\frac{\sqrt{770}G_{bz}xy\left(x^2+y^2-6z^2\right)}{308}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](A_g,3)$

** symmetry

$$\frac{\sqrt{5}\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{4}$$

** expression

$$\frac{5\sqrt{385}G_1xz\left(3x^2+3y^2-4z^2\right)}{308}-\frac{5\sqrt{385}G_2yz\left(3x^2+3y^2-4z^2\right)}{308}+\frac{\sqrt{2310}G_3\left(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4\right)}{308}$$
$$+\frac{\sqrt{231}G_{3x}yz\left(27x^2-y^2-8z^2\right)}{308}-\frac{\sqrt{231}G_{3y}xz\left(x^2-27y^2+8z^2\right)}{308}-\frac{13\sqrt{154}G_{az}xy\left(x^2+y^2-6z^2\right)}{308}-\frac{\sqrt{2310}G_{bz}xy\left(x-y\right)\left(x+y\right)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](A_g,4)$

** symmetry

$$-\frac{\sqrt{35}xz\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$\frac{\sqrt{55}G_1\left(5x^4-9x^2y^2-21x^2z^2+9y^2z^2+2z^4\right)}{88}-\frac{\sqrt{55}G_2xy\left(6x^2-y^2-15z^2\right)}{44}-\frac{\sqrt{330}G_3xz\left(x^2-6y^2+z^2\right)}{44}+\frac{\sqrt{33}G_{3x}xy\left(2x^2-5y^2+9z^2\right)}{44}$$
$$+\frac{\sqrt{33}G_{3y}\left(x^4+15x^2y^2-21x^2z^2-15y^2z^2+6z^4\right)}{88}+\frac{\sqrt{22}G_{az}yz\left(12x^2+5y^2-9z^2\right)}{44}+\frac{\sqrt{330}G_{bz}yz\left(6x^2-y^2-z^2\right)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](A_g,5)$

** symmetry

$$-\frac{\sqrt{5}xz\left(x^2-6y^2+z^2\right)}{2}$$

** expression

$$\frac{\sqrt{385}G_1\left(x^4+21x^2y^2-27x^2z^2+6y^4-57y^2z^2+14z^4\right)}{616}+\frac{\sqrt{385}G_2xy\left(6x^2-y^2-15z^2\right)}{308}+\frac{\sqrt{2310}G_3xz\left(x-z\right)\left(x+z\right)}{44}$$
$$+\frac{\sqrt{231}G_{3x}xy\left(22x^2-27y^2+15z^2\right)}{308}-\frac{\sqrt{231}G_{3y}\left(19x^4-69x^2y^2-45x^2z^2+10y^4+9y^2z^2+6z^4\right)}{616}$$
$$+\frac{\sqrt{154}G_{az}yz\left(30x^2-19y^2+9z^2\right)}{308}+\frac{\sqrt{2310}G_{bz}yz\left(y-z\right)\left(y+z\right)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](A_g,1)$

** symmetry

$$\frac{\sqrt{21}\left(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4\right)}{6}$$

** expression

$$\frac{\sqrt{4290}G_1xz\left(17x^4-29x^2y^2-47x^2z^2-46y^4+121y^2z^2+2z^4\right)}{1144}-\frac{\sqrt{4290}G_2yz\left(46x^4+29x^2y^2-121x^2z^2-17y^4+47y^2z^2-2z^4\right)}{1144}$$
$$-\frac{3\sqrt{715}G_3\left(x-y\right)\left(x+y\right)\left(x-z\right)\left(x+z\right)\left(y-z\right)\left(y+z\right)}{26}-\frac{5\sqrt{286}G_{3x}yz\left(46x^4-91x^2y^2-x^2z^2-5y^4+47y^2z^2-14z^4\right)}{1144}$$
$$-\frac{5\sqrt{286}G_{3y}xz\left(5x^4+91x^2y^2-47x^2z^2-46y^4+y^2z^2+14z^4\right)}{1144}+\frac{15\sqrt{429}G_{az}xy\left(x-y\right)\left(x+y\right)\left(x^2+y^2-10z^2\right)}{572}$$
$$-\frac{\sqrt{715}G_{bz}xy\left(19x^4-94x^2y^2+92x^2z^2+19y^4+92y^2z^2-92z^4\right)}{572}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](A_g,2)$

** symmetry

$$-\frac{\sqrt{15}\left(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4\right)}{12}$$

** expression

$$\frac{\sqrt{6006}G_1xz\left(10x^4-25x^2y^2-25x^2z^2-35y^4+95y^2z^2-2z^4\right)}{1144}-\frac{\sqrt{6006}G_2yz\left(35x^4+25x^2y^2-95x^2z^2-10y^4+25y^2z^2+2z^4\right)}{1144}$$
$$-\frac{3\sqrt{1001}G_3\left(x-y\right)\left(x+y\right)\left(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4\right)}{286}$$
$$+\frac{\sqrt{10010}G_{3x}yz\left(61x^4-61x^2y^2-61x^2z^2+10y^4-13y^2z^2+10z^4\right)}{1144}-\frac{\sqrt{10010}G_{3y}xz\left(10x^4-61x^2y^2-13x^2z^2+61y^4-61y^2z^2+10z^4\right)}{1144}$$
$$-\frac{3\sqrt{15015}G_{az}xy\left(x-y\right)\left(x+y\right)\left(x^2+y^2-10z^2\right)}{572}+\frac{\sqrt{1001}G_{bz}xy\left(31x^4-70x^2y^2-100x^2z^2+31y^4-100y^2z^2+100z^4\right)}{572}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](A_g,3)$

** symmetry

$$\frac{\sqrt{5}\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{4}$$

** expression

$$\frac{9\sqrt{2002}G_1xz\left(4x^4-25x^2y^2-5x^2z^2+15y^4-5y^2z^2+2z^4\right)}{1144}-\frac{9\sqrt{2002}G_2yz\left(15x^4-25x^2y^2-5x^2z^2+4y^4-5y^2z^2+2z^4\right)}{1144}$$
$$-\frac{\sqrt{3003}G_3\left(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6\right)}{286}$$
$$-\frac{\sqrt{30030}G_{3x}yz\left(13x^4+17x^2y^2-43x^2z^2+4y^4-19y^2z^2+10z^4\right)}{1144}-\frac{\sqrt{30030}G_{3y}xz\left(4x^4+17x^2y^2-19x^2z^2+13y^4-43y^2z^2+10z^4\right)}{1144}$$
$$+\frac{3\sqrt{5005}G_{az}xy\left(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4\right)}{572}+\frac{3\sqrt{3003}G_{bz}xy\left(x-y\right)\left(x+y\right)\left(x^2+y^2-10z^2\right)}{572}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](A_g,4)$

** symmetry

$$-\frac{\sqrt{35}xz\left(x-z\right)\left(x+z\right)}{2}$$

** expression

$$\frac{3\sqrt{286}G_1\left(17x^6-95x^4y^2-160x^4z^2+20x^2y^4+450x^2y^2z^2+85x^2z^4-20y^4z^2-55y^2z^4-2z^6\right)}{2288}$$
$$-\frac{3\sqrt{286}G_2xy\left(65x^4-65x^2y^2-455x^2z^2+2y^4+175y^2z^2+140z^4\right)}{2288}$$
$$+\frac{\sqrt{429}G_3xz\left(47x^4+40x^2y^2-170x^2z^2-40y^4+40y^2z^2+47z^4\right)}{572}-\frac{3\sqrt{4290}G_{3x}xy\left(3x^4+x^2y^2-33x^2z^2-2y^4+17y^2z^2+8z^4\right)}{2288}$$
$$-\frac{\sqrt{4290}G_{3y}\left(5x^6+25x^4y^2-100x^4z^2+20x^2y^4-270x^2y^2z^2+145x^2z^4-20y^4z^2+65y^2z^4-14z^6\right)}{2288}$$
$$-\frac{3\sqrt{715}G_{az}yz\left(29x^4+31x^2y^2-89x^2z^2+2y^4-17y^2z^2+14z^4\right)}{1144}-\frac{3\sqrt{429}G_{bz}yz\left(45x^4+65x^2y^2-155x^2z^2-2y^4-15y^2z^2+20z^4\right)}{1144}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](A_g,5)$

** symmetry

$$-\frac{\sqrt{5}xz\left(x^2-6y^2+z^2\right)}{2}$$

** expression

$$\frac{3\sqrt{2002}G_1\left(3x^6-55x^4y^2+10x^4z^2+70x^2y^4-90x^2y^2z^2+5x^2z^4-4y^6-10y^4z^2+25y^2z^4-2z^6\right)}{2288}$$
$$-\frac{3\sqrt{2002}G_2xy\left(19x^4-85x^2y^2+65x^2z^2+28y^4-25y^2z^2-20z^4\right)}{2288}$$
$$-\frac{3\sqrt{3003}G_3xz\left(x-z\right)\left(x+z\right)\left(x^2-10y^2+z^2\right)}{572}-\frac{\sqrt{30030}G_{3x}xy\left(11x^4+7x^2y^2-131x^2z^2-4y^4+19y^2z^2+56z^4\right)}{2288}$$
$$+\frac{\sqrt{30030}G_{3y}\left(x^6-9x^4y^2-6x^4z^2-6x^2y^4+90x^2y^2z^2-9x^2z^4+4y^6-54y^4z^2+39y^2z^4-2z^6\right)}{2288}$$
$$-\frac{3\sqrt{5005}G_{az}yz\left(19x^4+11x^2y^2-49x^2z^2-8y^4+23y^2z^2-2z^4\right)}{1144}+\frac{\sqrt{3003}G_{bz}yz\left(55x^4+5x^2y^2-115x^2z^2+16y^4-55y^2z^2+28z^4\right)}{1144}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](B_g,1)$

** symmetry

$$\frac{\sqrt{35}yz\left(y-z\right)\left(y+z\right)}{2}$$

** expression

$$\frac{3\sqrt{10}G_1xy}{40} - \frac{3\sqrt{10}G_2\,(y-z)\,(y+z)}{40} - \frac{\sqrt{15}G_3yz}{5} - \frac{\sqrt{6}G_{3x}\,(y-z)\,(y+z)}{8} + \frac{3\sqrt{6}G_{3y}xy}{8} - \frac{3G_{az}xz}{4} - \frac{3\sqrt{15}G_{bz}xz}{20}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](B_g, 2)$
** symmetry

$$\frac{\sqrt{35}xy\,(x-y)\,(x+y)}{2}$$

** expression

$$\frac{3\sqrt{10}G_1yz}{10} - \frac{3\sqrt{10}G_2xz}{10} - \frac{\sqrt{15}G_3xy}{5} + \frac{\sqrt{15}G_{bz}\,(x-y)\,(x+y)}{10}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](B_g, 3)$
** symmetry

$$\frac{\sqrt{5}yz\left(6x^2-y^2-z^2\right)}{2}$$

** expression

$$\frac{3\sqrt{70}G_1xy}{280} + \frac{3\sqrt{70}G_2\left(4x^2+3y^2-7z^2\right)}{280} + \frac{\sqrt{42}G_{3x}\left(4x^2-5y^2+z^2\right)}{56} - \frac{5\sqrt{42}G_{3y}xy}{56} - \frac{3\sqrt{7}G_{az}xz}{28} - \frac{\sqrt{105}G_{bz}xz}{20}$$

$\vec{\mathbb{Q}}_4^{(3,-2)}[g](B_g, 4)$
** symmetry

$$-\frac{\sqrt{5}xy\left(x^2+y^2-6z^2\right)}{2}$$

** expression

$$\frac{9\sqrt{70}G_1yz}{140} + \frac{9\sqrt{70}G_2xz}{140} + \frac{\sqrt{42}G_{3x}xz}{28} - \frac{\sqrt{42}G_{3y}yz}{28} + \frac{3\sqrt{7}G_{az}\,(x-y)\,(x+y)}{14} + \frac{\sqrt{105}G_{bz}\left(x^2+y^2-2z^2\right)}{35}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](B_g, 1)$
** symmetry

$$\frac{\sqrt{35}yz\,(y-z)\,(y+z)}{2}$$

** expression

$$-\frac{\sqrt{55}G_1xy\left(x^2-6y^2+15z^2\right)}{44} + \frac{\sqrt{55}G_2\left(9x^2y^2-9x^2z^2-5y^4+21y^2z^2-2z^4\right)}{88} + \frac{\sqrt{330}G_3yz\left(6x^2-y^2-z^2\right)}{44}$$
$$+\frac{\sqrt{33}G_{3x}\left(15x^2y^2-15x^2z^2+y^4-21y^2z^2+6z^4\right)}{88} - \frac{\sqrt{33}G_{3y}xy\left(5x^2-2y^2-9z^2\right)}{44} + \frac{\sqrt{22}G_{az}xz\left(5x^2+12y^2-9z^2\right)}{44} + \frac{\sqrt{330}G_{bz}xz\left(x^2-6y^2+z^2\right)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](B_g, 2)$
** symmetry

$$\frac{\sqrt{35}xy\,(x-y)\,(x+y)}{2}$$

** expression

$$\frac{\sqrt{55}G_1yz\left(3x^2+3y^2-4z^2\right)}{44} - \frac{\sqrt{55}G_2xz\left(3x^2+3y^2-4z^2\right)}{44} - \frac{\sqrt{330}G_3xy\left(x^2+y^2-6z^2\right)}{44} + \frac{7\sqrt{33}G_{3x}xz\left(x^2-3y^2\right)}{44}$$
$$-\frac{7\sqrt{33}G_{3y}yz\left(3x^2-y^2\right)}{44} - \frac{7\sqrt{22}G_{az}\left(x^2-2xy-y^2\right)\left(x^2+2xy-y^2\right)}{88} + \frac{\sqrt{330}G_{bz}\,(x-y)\,(x+y)\left(x^2+y^2-6z^2\right)}{88}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](B_g, 3)$
** symmetry

$$\frac{\sqrt{5}yz\left(6x^2-y^2-z^2\right)}{2}$$

** expression

$$-\frac{\sqrt{385}G_1xy\left(x^2-6y^2+15z^2\right)}{308} + \frac{\sqrt{385}G_2\left(6x^4+21x^2y^2-57x^2z^2+y^4-27y^2z^2+14z^4\right)}{616}$$
$$-\frac{\sqrt{2310}G_3yz\,(y-z)\,(y+z)}{44} + \frac{\sqrt{231}G_{3x}\left(10x^4-69x^2y^2+9x^2z^2+19y^4-45y^2z^2+6z^4\right)}{616}$$
$$+\frac{\sqrt{231}G_{3y}xy\left(27x^2-22y^2-15z^2\right)}{308} + \frac{\sqrt{154}G_{az}xz\left(19x^2-30y^2-9z^2\right)}{308} + \frac{\sqrt{2310}G_{bz}xz\,(x-z)\,(x+z)}{44}$$

$\vec{\mathbb{Q}}_4^{(3,0)}[g](B_g, 4)$

** symmetry

$$-\frac{\sqrt{5}xy\left(x^2+y^2-6z^2\right)}{2}$$

** expression

$$\frac{5\sqrt{385}G_1yz\left(3x^2+3y^2-4z^2\right)}{308}+\frac{5\sqrt{385}G_2xz\left(3x^2+3y^2-4z^2\right)}{308}-\frac{\sqrt{2310}G_3xy\left(x-y\right)\left(x+y\right)}{44}+\frac{\sqrt{231}G_{3x}xz\left(13x^2-15y^2-8z^2\right)}{308}$$
$$+\frac{\sqrt{231}G_{3y}yz\left(15x^2-13y^2+8z^2\right)}{308}-\frac{13\sqrt{154}G_{az}\left(x-y\right)\left(x+y\right)\left(x^2+y^2-6z^2\right)}{616}-\frac{\sqrt{2310}G_{bz}\left(5x^4-18x^2y^2-12x^2z^2+5y^4-12y^2z^2+4z^4\right)}{616}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](B_g,1)$

** symmetry

$$\frac{\sqrt{35}yz\left(y-z\right)\left(y+z\right)}{2}$$

** expression

$$\frac{3\sqrt{286}G_1xy\left(2x^4-65x^2y^2+175x^2z^2+65y^4-455y^2z^2+140z^4\right)}{2288}$$
$$-\frac{3\sqrt{286}G_2\left(20x^4y^2-20x^4z^2-95x^2y^4+450x^2y^2z^2-55x^2z^4+17y^6-160y^4z^2+85y^2z^4-2z^6\right)}{2288}$$
$$-\frac{\sqrt{429}G_3yz\left(40x^4-40x^2y^2-40x^2z^2-47y^4+170y^2z^2-47z^4\right)}{572}$$
$$-\frac{\sqrt{4290}G_{3x}\left(20x^4y^2-20x^4z^2+25x^2y^4-270x^2y^2z^2+65x^2z^4+5y^6-100y^4z^2+145y^2z^4-14z^6\right)}{2288}$$
$$+\frac{3\sqrt{4290}G_{3y}xy\left(2x^4-x^2y^2-17x^2z^2-3y^4+33y^2z^2-8z^4\right)}{2288}-\frac{3\sqrt{715}G_{az}xz\left(2x^4+31x^2y^2-17x^2z^2+29y^4-89y^2z^2+14z^4\right)}{1144}$$
$$-\frac{3\sqrt{429}G_{bz}xz\left(2x^4-65x^2y^2+15x^2z^2-45y^4+155y^2z^2-20z^4\right)}{1144}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](B_g,2)$

** symmetry

$$\frac{\sqrt{35}xy\left(x-y\right)\left(x+y\right)}{2}$$

** expression

$$\frac{3\sqrt{286}G_1yz\left(5x^4+10x^2y^2-20x^2z^2+5y^4-20y^2z^2+8z^4\right)}{2288}-\frac{3\sqrt{286}G_2xz\left(5x^4+10x^2y^2-20x^2z^2+5y^4-20y^2z^2+8z^4\right)}{2288}$$
$$+\frac{\sqrt{429}G_3xy\left(47x^4-170x^2y^2+40x^2z^2+47y^4+40y^2z^2-40z^4\right)}{572}+\frac{3\sqrt{4290}G_{3x}xz\left(17x^4-122x^2y^2-16x^2z^2+37y^4+48y^2z^2\right)}{2288}$$
$$+\frac{3\sqrt{4290}G_{3y}yz\left(37x^4-122x^2y^2+48x^2z^2+17y^4-16y^2z^2\right)}{2288}-\frac{9\sqrt{715}G_{az}\left(x^2+y^2-10z^2\right)\left(x^2-2xy-y^2\right)\left(x^2+2xy-y^2\right)}{1144}$$
$$+\frac{\sqrt{429}G_{bz}\left(x-y\right)\left(x+y\right)\left(19x^4-226x^2y^2-40x^2z^2+19y^4-40y^2z^2+40z^4\right)}{1144}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](B_g,3)$

** symmetry

$$\frac{\sqrt{5}yz\left(6x^2-y^2-z^2\right)}{2}$$

** expression

$$-\frac{3\sqrt{2002}G_1xy\left(28x^4-85x^2y^2-25x^2z^2+19y^4+65y^2z^2-20z^4\right)}{2288}$$
$$-\frac{3\sqrt{2002}G_2\left(4x^6-70x^4y^2+10x^4z^2+55x^2y^4+90x^2y^2z^2-25x^2z^4-3y^6-10y^4z^2-5y^2z^4+2z^6\right)}{2288}$$
$$-\frac{3\sqrt{3003}G_3yz\left(y-z\right)\left(y+z\right)\left(10x^2-y^2-z^2\right)}{572}-\frac{\sqrt{30030}G_{3x}\left(4x^6-6x^4y^2-54x^4z^2-9x^2y^4+90x^2y^2z^2+39x^2z^4+y^6-6y^4z^2-9y^2z^4-2z^6\right)}{2288}$$
$$-\frac{\sqrt{30030}G_{3y}xy\left(4x^4-7x^2y^2-19x^2z^2-11y^4+131y^2z^2-56z^4\right)}{2288}-\frac{3\sqrt{5005}G_{az}xz\left(8x^4-11x^2y^2-23x^2z^2-19y^4+49y^2z^2+2z^4\right)}{1144}$$
$$+\frac{\sqrt{3003}G_{bz}xz\left(16x^4+5x^2y^2-55x^2z^2+55y^4-115y^2z^2+28z^4\right)}{1144}$$

$\vec{\mathbb{Q}}_4^{(3,2)}[g](B_g,4)$

** symmetry

$$-\frac{\sqrt{5}xy\left(x^2+y^2-6z^2\right)}{2}$$

** expression

$$-\frac{9\sqrt{2002}G_1yz\left(25x^4-60x^2y^2+10x^2z^2+3y^4+10y^2z^2-4z^4\right)}{2288}-\frac{9\sqrt{2002}G_2xz\left(3x^4-60x^2y^2+10x^2z^2+25y^4+10y^2z^2-4z^4\right)}{2288}$$
$$+\frac{3\sqrt{3003}G_3xy\left(x-y\right)\left(x+y\right)\left(x^2+y^2-10z^2\right)}{572}-\frac{\sqrt{30030}G_{3x}xz\left(17x^4+16x^2y^2-62x^2z^2-y^4-14y^2z^2+20z^4\right)}{2288}$$
$$-\frac{\sqrt{30030}G_{3y}yz\left(x^4-16x^2y^2+14x^2z^2-17y^4+62y^2z^2-20z^4\right)}{2288}+\frac{3\sqrt{5005}G_{az}\left(x-y\right)\left(x+y\right)\left(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4\right)}{1144}$$
$$-\frac{\sqrt{3003}G_{bz}\left(x^6+15x^4y^2-30x^4z^2+15x^2y^4-180x^2y^2z^2+60x^2z^4+y^6-30y^4z^2+60y^2z^4-8z^6\right)}{1144}$$