

- 16 -

Claims

1. A ball for a valve assembly comprising:
a first bore for communicating fluid through the ball;
5 a second bore for communicating fluid through the ball; and
a bore valve located in the first bore for selectively enabling fluid
communication through the first bore.
2. A ball as claimed in claim 1 wherein the second bore extends
10 through the first bore such that the first and second bores are in fluid
communication with one another.
3. A ball as claimed in claim 1 or claim 2 wherein the first and
second bores extend orthogonally to one another.
- 15 4. A ball as claimed in any one of the preceding claims wherein the
bore valve is a one-way valve.
5. A ball as claimed in any one of the preceding claims wherein the
20 valve comprises a selectively openable valve opening and the valve opening is
offset from the centre of the ball.
6. A ball as claimed in any one of the preceding claims wherein the
ball comprises a ball outer surface, the first bore extends between first bore first
25 and second openings at the ball outer surface, the second bore extends between
second bore first and second openings at the ball outer surface and the ball further
comprises first, second, third and fourth blocking surface regions between the
adjacent first and second bore first and second openings.

- 17 -

7. A ball as claimed in any one of the preceding claims wherein the ball comprises a stem mount for engaging and/or mounting with a valve actuation arrangement of the valve assembly.

5 8. A ball as claimed in any one of the preceding claims wherein the ball comprises a fluid vent extending from the first and/or second bore to outside of the ball.

9. A ball as claimed in any one of the preceding claims wherein the
10 bore valve comprises a bore valve housing mounted in the first bore, the first bore comprises a first bore step and the bore valve housing is mounted and abuts against the first bore step.

10. A valve assembly comprising:
15 a valve housing;
a ball according to any one of the preceding claims, wherein the ball is mounted in the valve housing for rotation about an axis of rotation; and
first and second valve ports in fluid communication with the first or
second bore based upon an angular position of the ball about the axis of rotation.

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11. A valve assembly as claimed in claim 10 wherein the valve assembly is configurable into at least one of:

at least one bidirectional open state in which the second bore is aligned
with the first and second valve port such that fluid is able to flow through the ball
25 in both directions;

at least one controlled open state in which the first bore is aligned with the
first and second valve port and fluid flow through the first bore is controlled by
the bore valve; and/or

at least one closed state in which the first or second bore are not aligned
30 with the first and second valve port such that fluid is blocked from flowing through the ball.

- 18 -

12. A valve assembly as claimed in claim 10 or claim 11 further comprising a seal arrangement for preventing fluid from passing from the first to second valve ports and/or vice versa.

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13. A machine comprising a fluid system comprising a valve assembly of any one of claims 10 to 12 configured to selectively control fluid flow through the fluid system.

10 14. A method of operating the valve assembly of any one of claims 10 to 12 comprising rotating the ball around the axis of rotation such that the first or second bore is aligned with or not aligned with the first and second valve ports.

15 15. A method as claimed in claim 14 comprising rotating the ball into at least one of:

at least one bidirectional open state in which the second bore is aligned with the first and second valve port such that fluid is able to flow through the ball in both directions;

20 at least one controlled open state in which the first bore is aligned with the first and second valve port and fluid flow through the first bore is controlled by the bore valve; and/or

at least one closed state in which the first or second bore are not aligned with the first and second valve port such that fluid is blocked from flowing through the ball.