CLAIMS

What is claimed is:

1. A transfer device (104, 1604, 2004) comprising:

a body (160, 1660, 2060) having a bore (161, 1661, 2061) therethrough;

a transfer coupling member (125, 1625, 2025) configured to close the body (160, 1660, 2060) and to couple to an interface device (102, 1502, 1902) and open the body (160, 1660, 2060) to the interface device (102, 1502, 1902); and

a plunger (170, 172, 1670, 1672, 2070, 2072) slidably disposed in the bore (161, 1661, 2061) of the body (160, 1660, 2060), wherein

the plunger (170, 172, 1670, 1672, 2070, 2072) is configured to extend through the transfer coupling member (125, 1625, 2025) and cooperate with the interface device (102, 1502, 1902) to open a reservoir port (108, 1508,1908) of the interface device (102, 1502, 1902) and the transfer coupling member (125, 1625, 2025) comprises a disc (127, 1627, 2027), the disc (127, 1627, 2027) having an opening (129, 1629, 2029) to receive the plunger (170, 172, 1670, 1672, 2070, 2072), the disc (127, 1627, 2027) being configured for rotation about an axis of rotation to bring the opening (129, 1629, 2029) into alignment with the bore (161, 1661, 2061) to permit the plunger (170, 172, 1670, 1672, 2070, 2072) to extend through the opening (129, 1629, 2029) into the interface device (102, 1502, 1902), the axis of rotation being parallel to the bore (161, 1661, 2061) of the body (160, 1660, 2060); and

wherein the interface device (102, 1502, 1902) comprises

a reservoir port (108, 1508, 1908);

a sliding seal (110, 1510, 1910) having a hole (111, 1511, 1911) therethrough, the hole (111, 1511, 1911) initially being out of alignment with the reservoir port (108, 1508, 1908) to close the reservoir port (108, 1508, 1908),

the sliding seal (110, 1510, 1910) being configured to receive the plunger (170, 172, 1670, 1672, 2070, 2072) of the transfer device (104, 1604, 2004) through the hole (111, 1511, 1911) in the sliding seal (110, 1510, 1910), the sliding seal

(110, 1510, 1910) being slidable to align the hole (111, 1511, 1911) and received plunger with the reservoir port (108, 1508, 1908), the reservoir port (108, 1508, 1908) configured to be sealed or opened by the received plunger to provide a fluid path from the reservoir port (108, 1508, 1908) to the transfer device (104, 1604, 2004); and

an interface coupling member (124, 1524, 1924) configured to couple to the transfer device (104, 1604, 2004), the interface coupling member (124, 1524, 1924) comprising a rotatable disc (126, 1626, 2026), the disc having an opening (128, 1628, 2028) to receive the plunger (170, 172, 1670, 1672, 2070, 2072).

2. The device (104, 1604, 2004) of claim 1, wherein the disc (127, 1627, 2027) is configured to couple to a collar (134, 1634, 2034) to cause rotation of the disc (127, 1627, 2027) with rotation of the collar (134,1634, 2034).

3. The device (104, 1604, 2004) of claim 1 or claim 2, wherein the disc (127, 1627, 2027) includes a mating face (133, 1633, 2033) configured to rotationally couple the disc (127, 1627, 2027) to a corresponding disc (126, 1526, 1926) of the interface device (102, 1502, 1902).

4. The device of any one of claims 1-3, wherein the plunger (170, 172, 1670, 1672, 2070, 2072) is part of a plunger assembly (164, 1664, 2064) that comprises an inner plunger (170, 1670, 2070) slidably disposed in an intermediate or outer plunger (172, 1672, 2072).

5. The device (104, 1604, 2004) of any one of claims 1-4, wherein the plunger (170, 172, 1670, 1672, 2070, 2072) is part of a plunger assembly (164, 1664, 2064) that comprises an inner plunger (170, 1670, 2070) and an intermediate or outer plunger (172, 1672, 2072), further comprising one or more seals (190, 192, 194) configured to provide a sterile barrier between the environment and a fluid path from the reservoir port (108, 1508,1908) to a transfer port (162, 1662, 2062), the transfer device (104, 1604, 2004) maintaining a sterile path for fluid being transferred through the fluid path.

6. The device (104, 1604, 2004) of any one of claims 1-5, further comprising an interlock (1682, 2082) configured for rotation with the disc (127, 1627, 2027) of the transfer coupling member (125, 1625, 2025), the interlock preventing the plunger (170, 172, 1670, 1672, 2070, 2072) from extending toward the transfer coupling member (125, 1625, 2025) until the opening (129, 1629, 2029) in the disc (127, 1627, 2027) is aligned with the bore (161, 1661, 2061) of the body (160, 1660, 2060).

7. An interface device (102, 1502, 1902) comprising:

a reservoir port (108, 1508, 1908);

a sliding seal (110, 1510, 1910) having a hole (111, 1511, 1911) therethrough, the hole (111, 1511, 1911) initially being out of alignment with the reservoir port (108, 1508, 1908) to close the reservoir port (108, 1508, 1908),

the sliding seal (110, 1510, 1910) being configured to receive a plunger (170, 172, 1670, 1672, 2070, 2072) of the transfer device (104, 1604, 2004) of claim 1 through the hole (111, 1511, 1911) in the sliding seal (110, 1510, 1910), the sliding seal (110, 1510, 1910) being slidable to align the hole (111, 1511, 1911) and received plunger with the reservoir port (108, 1508, 1908), the reservoir port (108, 1508, 1908) configured to be sealed or opened by the received plunger to provide a fluid path from the reservoir port (108, 1508, 1908) to the transfer device (104, 1604, 2004) of claim 1; and

an interface coupling member (124, 1524, 1924) configured to couple to the transfer device (104, 1604, 2004) of claim 1, the interface coupling member (124, 1524, 1924) comprising a rotatable disc (126, 1626, 2026), the disc having an opening (128, 1628, 2028) to receive the plunger (170, 172, 1670, 1672, 2070, 2072).

8. The interface device (102, 1502, 1902) of claim 7, further comprising a seal locking element (112) retaining the sliding seal (110, 1510, 1910) in position to close the reservoir port (108, 1508, 1908), the seal locking element (112) being releasable by the plunger (170, 172, 1670, 1672, 2070, 2072).

9. The interface device (1502, 1902) of claim 7 or claim 8, wherein the plunger (1670, 1672, 2070, 2072) is configured to move the sliding seal (1510, 1910) to open or close the reservoir port (1508, 1908).

10. A fluid transfer system (100, 1700, 2100) comprising:
the transfer device (104, 1604, 2004) of claim 1; and
the interface device (102, 1502, 1902) of claim 7.

11. The fluid transfer system (100, 1700, 2100) of claim 10, further comprising a seal locking element (112) retaining the sliding seal (110, 1510, 1910) in position to close the reservoir port (108, 1508, 1908), and wherein the plunger (170, 172, 1670, 1672, 2070, 2072) is configured to extend through the hole (111, 1511, 1911) in the sliding seal (110, 1510, 1910) to release the seal locking element (112).

12. The fluid transfer system (1700, 2100) of claim 10 or claim 11, wherein the plunger (1670, 1672, 2070, 2072) is configured to move the sliding seal (1510, 1910) to open or close the reservoir port (1508, 1908).

13. A method of transferring fluid comprising:
providing the interface device (102, 1502, 1902) of claim 7;
the method further comprising:
extending a plunger (170, 172, 1670, 1672, 2070, 2072) of the transfer device of claim 1 (104, 1604, 2004) through the hole (111, 1511, 1911) in the sliding seal (110, 1510, 1910);
with the plunger (170, 172, 1670, 1672, 2070, 2072) positioned in the hole of the sliding seal (110, 1510, 1910), sliding the sliding seal (110, 1510, 1910) to align the hole (111, 1511, 1911) and plunger (170, 172, 1670, 1672, 2070, 2072) with the reservoir port (108, 1508, 1908); and
opening the reservoir port (108, 1508, 1908) with the plunger (170, 172, 1670, 1672, 2070, 2072) to provide a fluid path from the reservoir port

(108, 1508, 1908) to a transfer port (162, 1662, 2062) of the transfer device (104, 1604, 2004) of claim 1.

14. The method of claim 13, further comprising sealing the reservoir port (108, 1508, 1908) with the plunger (170, 172, 1670, 1672, 2070, 2072).

15. The method of claim 13 or claim 14, further comprising, with a seal locking element (112), retaining the sliding seal (110, 1510, 1910) in position to close the reservoir port (108, 1508, 1908), and wherein the plunger (170, 172, 1670, 1672, 2070, 2072) is extended through the hole (111, 1511, 1911) in the sliding seal (110, 1510, 1910) to release the seal locking element (112).