

CLAIMS

What is claimed is:

1. A downhole assembly comprising:
 - a base pipe defining an interior for receiving a fluid from an exterior of the base pipe;
 - a power generator configured generate power with the fluid and direct the fluid to the interior of the base pipe; and
 - a flow control device configured to receive a flow of the fluid from the exterior of the base pipe, the flow control device comprising:
 - a nozzle;
 - a valve; and
 - a piston having a first head and a second head, the piston being moveable between multiple positions to simultaneously move the first head within the nozzle to adjust an amount of the flow directed to the power generator and to move the second head within the valve to adjust an amount of the flow directed to the interior of the base pipe without passing through the power generator.
2. The downhole assembly of Claim 1, wherein movement of the piston in a first direction increases the amount of the flow directed to the power generator and the amount of the flow directed to the interior of the base pipe without passing through the power generator.
3. The downhole assembly of Claim 1, wherein the nozzle provides multiple flow ports between the exterior of the base pipe and the power generator, and the first head of the piston is moveable to controllably obstruct one or more of the flow ports.
4. The downhole assembly of Claim 1, wherein the first head of the piston is moveable to adjust a flow area defined by a space between the first head and the nozzle.
5. The downhole assembly of Claim 1, wherein the piston is moveable between a first position and a second position, wherein:
 - in the first position, the amount of the flow directed to the power generator is a first amount, and the amount of the flow directed to the interior of the base pipe without passing through the power generator is prevented; and
 - in the second position, the amount of the flow directed to the power generator is a second amount, greater than the first amount, and the amount of the flow directed to the interior of the base pipe without passing through the power generator is facilitated.

6. The downhole assembly of Claim 1, further comprising a sand screen between the flow control device and the exterior of the base pipe.

7. The downhole assembly of Claim 1, further comprising an electronics module communicably coupled to the flow control device to operate the piston.

8. The downhole assembly of Claim 7, further comprising a sensor module communicably coupled to the electronics module and including a sensor for obtaining measurement data corresponding to the fluid.

9. The downhole assembly of Claim 7, further comprising a communications module communicably coupled to the electronics module and a well surface location to transfer data and/or control signals between the electronics module and the well surface location.

10. A downhole assembly comprising:

- a base pipe defining an interior for receiving a fluid from an exterior of the base pipe;

- a power generator configured generate power with the fluid and direct the fluid to the interior of the base pipe;

- a flow control device configured to receive a first flow of the fluid from the exterior of the base pipe and adjustably control an amount of the first flow directed to the power generator and an amount of the first flow directed to the interior of the base pipe without passing through the power generator; and

- a bypass line configured to receive a second flow of the fluid from the exterior of the base pipe and direct the second flow to the power generator without passing through the flow control device.

11. The downhole assembly of Claim 10, wherein the flow control device is adjustable between a first configuration and a second configuration, wherein:

- in the first configuration, the amount of the first flow directed from the flow control device and to the power generator is prevented, and the amount of the first flow directed to the interior of the base pipe without passing through the power generator is facilitated; and

- in the second configuration, the amount of the first flow directed from the flow control device and to the power generator is facilitated, and the amount of the first flow directed to the interior of the base pipe without passing through the power generator is facilitated.

12. The downhole assembly of Claim 10, further comprising a sand screen between the flow control device and the exterior of the base pipe.

13. A downhole assembly comprising:

a base pipe defining an interior for receiving a fluid from an exterior of the base pipe;

a power generator configured generate power with the fluid and direct the fluid to the interior of the base pipe; and

a flow control device configured to receive a flow of the fluid from the exterior of the base pipe, the flow control device comprising:

a piston head moveable between multiple positions within a piston chamber to control an amount of the flow directed to the power generator; and

an opening extending through the piston head and providing fluid communication between the exterior of the base pipe and the power generator while the piston head is in any one of the multiple positions.

14. The downhole assembly of Claim 13, wherein the piston head is a first piston head, the opening is a first opening, and the flow control device further comprises a pressure-balanced piston comprising:

a piston rod;

the first piston head and a second piston head coupled to the piston rod and axially spaced from each other; and

a second opening extending through the second piston head and providing fluid communication between the exterior of the base pipe and the power generator.

15. The downhole assembly of Claim 14, wherein the flow control device further comprises:

a first branch communicating with the piston chamber upstream from a first choke point provided in the piston chamber; and

a second branch communicating with the piston chamber upstream from a second choke point provided in the piston chamber and axially offset from the first choke point, wherein the first piston head and the second piston head axially align with the first choke point and the second choke point, respectively, when the pressure-balanced piston is in a closed position.

16. The downhole assembly of Claim 13, wherein the piston head is adjustable between a first position and a second position, wherein:

in the first position, the amount of the flow directed to the power generator is a first amount; and

in the second position, the amount of the flow directed to the power generator is a second amount, greater than the first amount.

17. The downhole assembly of Claim 13, further comprising a sand screen between the flow control device and the exterior of the base pipe.

18. The downhole assembly of Claim 13, further comprising an electronics module communicably coupled to the flow control device to operate the piston head.

19. The downhole assembly of Claim 18, further comprising a sensor module communicably coupled to the electronics module and including a sensor for obtaining measurement data corresponding to the fluid.

20. The downhole assembly of Claim 18, further comprising a communications module communicably coupled to the electronics module and a well surface location to transfer data and/or control signals between the electronics module and the well surface location.