We claim:

1. A pressure regulator comprising:

a valve body module including a valve body housing block retaining a poppet and a seat seal;

a loading module including a loading block retaining a loading element configured to apply a load force to a sensing member disposed between the loading element and the poppet;

a piston module including a piston adapter block secured to the valve body housing block and retaining the sensing member in engagement with the poppet, wherein the sensing member comprises a piston and the piston adapter block includes a piston bore retaining a stepped fluid driven portion of the piston; and

a venting module including a venting adapter block secured between the piston adapter block and the loading block and defining a vent port in fluid communication with a vent passage in the sensing member;

wherein the valve body housing block and the piston adapter block each include a uniformly sized first assembly interface, and the piston adapter block and the venting adapter block each include a uniformly sized second assembly interface in mating and sealing engagement with the first assembly interface of the adjacent one of the valve body housing block and the piston adapter block, such that the valve body housing block is configured for assembly directly to the venting adapter block after removing the piston module from between the valve body housing block and the venting adapter block.

2. The pressure regulator of claim 1, wherein the first assembly interface comprises a trepan seal groove recessed from an end face counterbore or groove and retaining an annular gasket seal, and the second assembly interface comprises an annular shoulder or rib received in the counterbore or groove of the mating first assembly interface to sealingly compress the annular gasket seal.

3. The pressure regulator of claim 1, wherein each of the valve body housing block, the loading block, the piston adapter block and the venting adapter block includes aligned holes receiving elongated bolts to secure the valve body housing block, the loading block, the piston adapter block and the venting adapter block together as a stacked assembly.

4. The pressure regulator of claim 1, wherein the piston block is configured for assembly directly to the loading block after removing the venting module from between the piston adapter block and the loading block.

5. The pressure regulator of claim 1, wherein the loading module comprises one of a dome loading module and a spring loading module.

6. The pressure regulator of claim 1, wherein the valve body housing block is configured for assembly directly to the loading block after removing both the piston module and the venting module from between the valve body housing block and the loading block.

7. The pressure regulator of claim 1, wherein the venting adapter block includes a first assembly interface uniformly sized with the first assembly interfaces of the valve body housing block and the piston adapter block, and the loading block includes a second assembly interface uniformly sized with the second assembly interfaces of the piston adapter block and the venting adapter block, the second assembly interface of the loading block being in mating and sealing engagement with the first assembly interface of the venting adapter block, such that the loading block is configured for assembly directly to the piston block after removing the venting module from between the piston adapter block and the loading block.

8. A pressure regulator comprising:

a valve body module including a valve body housing block retaining a poppet and a seat seal;

a loading module including a loading block retaining a loading element configured to apply a load force to a sensing member disposed between the loading element and the poppet;

a piston module including a piston adapter block secured to the valve body housing block and retaining the sensing member in engagement with the poppet, wherein the sensing member comprises a piston and the piston adapter block includes a piston bore retaining a stepped fluid driven portion of the piston; and

a venting module including a venting adapter block secured between the piston adapter block and the loading block and defining a vent port in fluid communication with a vent passage in the sensing member;

wherein the piston adapter block and the venting adapter block each include a uniformly sized first assembly interface, and the venting adapter block and the loading block each include a uniformly sized second assembly interface in mating and sealing engagement with the first assembly interface of the adjacent one of the piston adapter block and the venting adapter block, such that the piston adapter block is configured for assembly directly to the loading block after removing the venting module from between the piston adapter block and the loading block.

9. The pressure regulator of claim 8, wherein the first assembly interface comprises a trepan seal groove recessed from an end face counterbore or groove and retaining an annular gasket seal, and the second assembly interface comprises an annular shoulder or rib received in the counterbore or groove of the mating first assembly interface to sealingly compress the annular gasket seal.

10. The pressure regulator of claim 8, wherein each of the valve body housing block, the loading block, the piston adapter block and the venting adapter block includes aligned holes receiving elongated bolts to secure the valve body housing block, the loading block, the piston adapter block and the venting adapter block together as a stacked assembly.

11. The pressure regulator of claim 8, wherein the valve body housing block is configured for assembly directly to the venting block after removing the piston module from between the valve body housing block and the venting block.

12. The pressure regulator of claim 8, wherein the loading module comprises one of a dome loading module and a spring loading module.

13. The pressure regulator of claim 8, wherein the valve body housing block is configured for assembly directly to the loading block after removing both the piston module and the venting module from between the valve body housing block and the loading block.