Claims

1. A microwave or RF bandpass filter comprising:
a housing (702) of a conductive material defining a cylindrical cavity (705);
at least one cylindrical dielectric resonator (100) having an outer contour defined by a parallel pair of face surfaces (105, 106), each face surface having at least two symmetry axes, the dielectric resonator having a center axis (109),
wherein the dielectric resonator is held by holding means within the cavity, characterized in that
at least two tuning rods (410, 420, 430, 440, 510, 520, 530, 540) comprising a dielectric material are fastened to the housing (702) and protruding into the cavity (705) outside of the cylindrical dielectric resonator (100) and into a direction towards the center axis (109) above or under at least one of the face surfaces (105, 106) and whereby the projection of an end of at least one tuning rod in a direction parallel to the center axis is within one of the face surfaces (105, 106), and
at least one first internal coupling element (230, 240) comprising a conductive bar (232, 242) is provided in a plane orthogonal to the cylinder axis (109), and wherein
the at least one first internal coupling element (230, 240) is moveable parallel to the dielectric resonator center axis or
at least one of the tuning rods comprising a dielectric material is fastened to the housing and protruding into the cavity between the ends of the first internal coupling element and the dielectric resonator.

2. The microwave or RF bandpass filter according to claim 1,
characterized in that

at least one tuning rod (410, 420, 430, 440, 510, 520, 530, 540) of the at least two tuning rods has a circular cross section.

3. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
if more than two tuning rods (410, 420, 430, 440, 510, 520, 530, 540) are provided, the at least two of the tuning rods (410, 420, 430, 440, 510, 520, 530, 540) are evenly arranged in a plane orthogonal to the center axis (109).

4. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
one, two or four of the tuning rods (410, 420, 430, 440) are arranged in a first plane above and parallel to a first face surface (105) of the pair of face surfaces and further, one, two or four of the tuning rods (510, 520, 530, 540) are arranged in a second plane above and parallel to a second face surface (106) of the pair of face surfaces.

5. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
the at least one conductive bar (232, 242) comprises a coupling button (235, 245, 236, 246) at each end.

6. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
the at least one dielectric resonator (150) comprising at least two different

sections (151, 152), each section having an outer contour defined by a parallel pair of face surfaces, each face surface having at least two symmetry axes, and the dielectric resonator having a center axis (109).

7. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
the at least one cylindrical dielectric resonator (100) having an outer contour defined by a parallel pair of circular face surfaces (105, 106) and/or
the dielectric resonator comprises two cylindrical outer sections (103) distant from each other and may have at least one cylindrical inner section (104) between the outer sections.

8. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
the holding means comprise at least one support plate of a dielectric material, arranged parallel to at least one of the face surfaces (105, 106), which is further held by the housing.

9. The microwave or RF bandpass filter according to any one of the preceding claims,
characterized in that
the dielectric resonator comprises a ceramic material and/or
the ratio of dielectric resonator diameter (102) to dielectric resonator height (101) is in the range of 0.9 to 3.1 or in the range between 1.7 and 2.3.

10. The microwave or RF bandpass filter according to any one of the preceding claims,

characterized in that

the bandpass filter further comprises at least one external coupling element (210, 220) which extends from the housing orthogonally to the dielectric resonator center axis (109) and/or

the at least one first internal coupling element (230, 240) is provided above and/or below the cylindrical dielectric resonator (100).

11. The microwave or RF bandpass filter according to any one of the preceding claims,

characterized in that

the bandpass filter further comprises at least one of a plurality of conductive third internal coupling elements (260, 270, 280, 290) which is protruding into the cavity (705) and being arranged within a plane orthogonally to the dielectric resonator center axis (109) above or under the dielectric resonator.

12. The microwave or RF bandpass filter according to any one of the preceding claims,

characterized in that

the dielectric resonator is displaced axially with respect to the center of the cavity for coupling from the HEHx mode and the HEHy mode to a HEEx and a HEEy mode.

13. The microwave or RF bandpass filter according to any one of the preceding claims,

characterized in that

the dielectric material of the dielectric components with exception of the dielectric resonator itself has a dielectric constant which is lower than the dielectric constant of the material of the dielectric resonator and/or has a

thickness which is significantly less than the height of the dielectric resonator.