CLAIMS

1. A door closer for mounting between a door leaf and a door frame, the door closer comprising: an elongate housing for mounting in one of the door leaf or door frame, the elongate housing having opposite forward and rear end parts, a plunger disposed in and movable along the housing, the plunger including a ferromagnetic material, a spring biasing element disposed in the housing and applying a first biasing force to bias the plunger inwardly of the housing and away from the forward end part and towards the rear end part, a tension member having a first end connected to the plunger and a second end connected to an anchor element assembly, the anchor element assembly comprising a mounting member for mounting in the other of the door leaf or door frame, the tension member and anchor element forming a tension assembly which extends through the forward end part, a magnetic biasing element disposed in the housing and applying a second biasing force to the ferromagnetic material to bias the plunger inwardly of the housing and away from the forward end part and towards the rear end part, wherein the spring biasing element is adapted to apply the first biasing force over a first movement range of the plunger within the housing and the magnetic biasing element is adapted to apply the second biasing force over a second movement range of the plunger within the housing, the first movement range defining a forwardmost position of the plunger within the housing and the second movement range defining a rearmost position of the plunger within the housing, and an adjustable fixing mechanism for the magnetic biasing element, the adjustable fixing mechanism being adapted to adjust the second movement range by adjusting a translational position of the magnetic biasing element within the housing, the adjustable fixing mechanism extending externally of the housing so that the adjustable fixing mechanism can be adjusted externally by the user.
2. A door closer according to claim 1 which is a variable power door closer, wherein the second movement range is externally adjustable to adjust a distance over which the second biasing force is applied to the plunger within the housing, the adjustment varying the minimum closing moment when the door leaf is closed by the door closer, and thereby varying the power of the door closer.
3. A door closer according to any foregoing claim further comprising an elongate fixing element slidably fitted to the plunger and extending along the housing and fitted to an end element at the rear end part, and the magnetic biasing element is fixed to the elongate fixing element.

4. A door closer according to claim 3 wherein the magnetic biasing element is movably fixed to the elongate fixing element and can be moved therealong.
5. A door closer according to claim 4 wherein the magnetic biasing element is threadably fixed to the elongate fixing element.
6. A door closer according to claim 5 wherein the elongate fixing element is rotatably fitted to the end element at the rear end part, and rotation of the elongate fixing element causes the magnetic biasing element to be moved translationally along the elongate fixing element.
7. A door closer according to claim 6 wherein the elongate fixing element is freely rotatably fitted to the end element, and further comprising a nut threadably fixed to the elongate fixing element externally of the housing.
8. A door closer according to claim 6 or claim 7 wherein the elongate fixing element and the magnetic biasing element are configured so that forward or rearward adjustment of the translational position of the magnetic biasing element relative to the plunger respectively increase or decrease the application of the magnetic biasing force on the plunger.
9. A door closer according to claim 8 wherein the forward or rearward adjustment of the translational position of the magnetic biasing element relative to the plunger respectively increase and decrease the second movement range and the proportion of the entire movement over which the magnetic biasing force is applied to the plunger.
10. A door closer according to claim 8 or claim 9 wherein the forward or rearward adjustment of the translational position of the magnetic biasing element relative to the plunger respectively increase and decrease the second movement range and the total biasing force applied to the plunger over the second movement range.
11. A door closer according to any one of claims 6 to 10 wherein the elongate fixing element and magnetic biasing element are configured so that each 360° revolution of the elongate fixing element increases or decreases the total biasing force applied to the plunger over the second movement range.
12. A door closer according to claim 11 wherein the elongate fixing element and magnetic biasing element are configured so that each 360° revolution of the elongate fixing element increases or decreases the total biasing force applied to the plunger over the second movement range by a biasing force of from 0.5 to 2 Nm, optionally from 0.75 to 1.5 Nm.

13. A door closer according to any foregoing claim wherein the first movement range defines a length of motion of the plunger within the housing and the second movement range overlaps with a rear part of the first movement range, and in the overlap of the first and second movement ranges the first and second biasing forces are additive to provide a total biasing force higher than the individual first and second biasing forces and wherein the first movement range defines the entire length of motion of the plunger within the housing and all of the second movement range overlaps with the rear part of the first movement range or wherein the first movement range defines a majority of the length of motion of the plunger within the housing and a front part of the second movement range overlaps with the rear part of the first movement range.
14. A door closer according to any one of claims 1 to 12 wherein the first movement range defines a length of motion of the plunger within the housing located towards the forward end part and the second movement range is adjacent to, and does not overlap with, the first movement range, and defines a length of motion of the plunger within the housing located towards the rear end part.
15. A door closer according to any foregoing claim wherein an entire movement range of the plunger from the forwardmost position to the rearmost position defines an angle of opening of a door.
16. A door closer according to any foregoing claim wherein the second biasing force is higher than the first biasing force.
17. A door closer according to any foregoing claim wherein a total biasing force over the second movement range is higher than the first biasing force.
18. A door closer according to any foregoing claim mounted between a door leaf and a door frame, wherein the door leaf has a closing angle which decreases to a closing angle of 0° as the door leaf is closed, and the magnetic biasing element is adapted to apply the second biasing force over only the range from 4 to 0° as the door leaf is closed.
19. A door closer according to claim 18 wherein over the range from 4 to 0° as the door leaf is closed the door closer applies a closing force on the door leaf of at least 13 Nm, or from greater than 13 Nm to up to 25 Nm, or from greater than 13 Nm to up to 21 Nm.
20. A door closer according to claim 18 or claim 19 wherein over the range of at least 5° as the door leaf is closed the door closer applies a closing force on the door leaf which is lower than the closing force over the range from 4 to 0°.