

CLAIMS

1. An auto-injector (4) for administering a medicament, comprising:

- a housing (6);
- a cartridge receiver (300) configured to receive a cartridge (700) comprising a first stopper (708);
- a cartridge (700) comprising a first stopper (708), wherein the cartridge (700) is configured to be received in the cartridge receiver (300);
- a drive module (500) coupled to move a plunger rod (400) between a retracted plunger rod position (1228) and an extended plunger rod position (1229), the plunger rod (400) being configured to move the first stopper (708);
- a resistance sensor (34) configured to provide a resistance signal indicative of resistance against movement of the plunger rod (400); and
- a processing unit (20) coupled to the drive module (500) and to the resistance sensor (34),

the processing unit (20) being configured to:

- control the drive module (500) to move the plunger rod (400) towards the extended plunger rod position (1229) with a plunger rod speed;
- determine plunger rod position;
- receive the resistance signal; and

control the drive module (500) to adjust movement of the plunger rod (400) if the resistance signal is indicative of resistance against movement of the plunger rod (400) above a high resistance threshold, wherein the high resistance threshold is based on the plunger rod position,

wherein the high resistance threshold is a first high resistance threshold (1201) when the plunger rod position is between the retracted plunger rod position (1228) and a first plunger rod position (1220), and the high resistance threshold is a second high resistance threshold (1202) when the plunger rod position is between a second plunger rod position (1222) and the extended plunger rod position, and wherein the second high resistance threshold (1202) is higher than the first high resistance threshold (1201).

2. Auto-injector (4) according to claim 1, wherein the first high resistance threshold (1201) is between 50-80 N, such as 50 N, 55 N, 60 N, 65 N, 70 N, 75 N, or 80 N.

3. Auto-injector (4) according to claim 2, wherein the first high resistance threshold (1201) is 55 N.
- 5 4. Auto-injector (4) according to any preceding claim, wherein the second high resistance threshold (1202) is between 70-100 N, such as between 75-85 N, or such as between 80-90 N, or such as 70 N, 75 N, 80 N, 85 N, or 90 N.
- 10 5. Auto-injector (4) according to claim 4, wherein the second high resistance threshold (1202) is 80 N.
- 15 6. Auto-injector (4) according to any preceding claim, wherein the high resistance threshold is a third high resistance threshold (1204) when the plunger rod position is between the first plunger rod position (1220) and the second plunger rod position, the third high resistance threshold is higher than the first high resistance threshold (1201), and the third high resistance threshold (1204) is lower than the second high resistance threshold (1202).
- 20 7. Auto-injector (4) according to claim 6, wherein the third high resistance threshold (1204) is increasing as the plunger rod position is moved from the first plunger rod position to the second plunger rod position (1222).
- 25 8. Auto-injector (4) according to any preceding claim, wherein the distance between the extended plunger rod position (1228) and the first plunger rod position (1220) is between 1-3 mm, such as 2 mm.
- 30 9. Auto-injector (4) according to any preceding claim, wherein the distance between the retracted plunger rod position (1228) and the first plunger rod position (1220) is between 0-60 mm.
10. Auto-injector (4) according to any preceding claim, wherein the distance between the retracted plunger rod position (1228) and the first plunger rod position (1220) is between 50-60 mm, such as 55 mm, 56 mm, or 57 mm.

11. Auto-injector (4) according to any preceding claim comprising a code sensor (24) configured to read a cartridge code feature (1000), the processing unit (20) being coupled to the code sensor (24), the processing unit (20) being configured to receive from the code sensor (24) a code signal indicative of the cartridge code feature (1000), and wherein the processing unit (20) is configured to determine the first plunger rod position (1220) and/or the second plunger rod position (1222) based on the code signal.
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12. Auto-injector (4) according to any of the preceding claims, wherein the resistance sensor (34) is configured to determine electrical current through the drive module (500).
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13. Auto-injector (4) according to any of the preceding claims, wherein the resistance sensor (34) is configured to measure pressure and/or force applied to a plunger rod front end of the plunger rod (400).
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14. Auto-injector (4) according to any of the preceding claims comprising a tachometer configured to provide a tachometer signal indicative of a count of revolutions of the drive module (500), the processing unit (20) being coupled to the tachometer, and the processing unit (20) being configured to receive the tachometer signal and determine the plunger rod position based on the tachometer signal.
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15. Auto-injector (4) according to any of the preceding claims, wherein adjusting the movement of the plunger rod (400) comprises stopping the movement of the plunger rod (400).
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16. Auto-injector (4) according to 15, wherein adjusting the movement of the plunger rod (400) further comprises preventing movement of the plunger rod (400) towards the retracted plunger rod position (1228) for a dwell time.
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17. Auto-injector (4) according to any of the preceding claims, wherein adjusting the movement of the plunger rod (400) comprises moving the plunger rod (400) to the retracted plunger rod position.

18. Auto-injector (4) according to any of the preceding claims, wherein adjusting the movement of the plunger rod (400) comprises decreasing the plunger rod speed.
19. Auto-injector (4) according to any the preceding claims, wherein the processing unit (20) is further configured to control the drive module (500) to readjust the movement of the plunger rod (400) after adjusting the movement of the plunger rod (400), if the resistance signal is indicative of resistance against movement of the plunger rod (400) below the high resistance threshold.
20. Auto-injector (4) according to claim 19, wherein readjusting the movement of the plunger rod (400) comprises increasing the plunger rod speed.
21. Auto-injector (4) according to any of the preceding claims, wherein the plunger rod speed is based on the plunger rod position.
22. Auto-injector (4) according to claim 21, wherein the plunger rod speed is a first plunger rod speed (1240) when the plunger rod position is between the retracted plunger rod position (1228) and a fourth plunger rod position (1224), and the plunger rod speed is a second plunger rod speed when the plunger rod position is between a fifth plunger rod position (1226) and the extended plunger rod position (1229), and wherein the second plunger rod speed is lower than the first plunger rod speed.
23. Auto-injector (4) according to claim 21, wherein the plunger rod speed is a first plunger rod speed when the plunger rod position is between the retracted plunger rod position (1228) and a fourth plunger rod position (1224), and the plunger rod speed is a second plunger rod speed when the plunger rod position is between a fifth plunger rod position (1226) and the extended plunger rod position (1229), and wherein the second plunger rod speed is higher than the first plunger rod speed.
24. Auto-injector (4) according to any preceding claim, wherein the cartridge (700) is a dual chamber cartridge (701).
25. Method for controlling an auto-injector (4) according to any of the claims 1-24, the method comprising:

- receiving a cartridge (700) comprising a first stopper (708);
- moving a plunger rod (400) towards an extended plunger rod position (1229) with a plunger rod speed;
- determining plunger rod position;
- 5 - receiving a resistance signal indicative of resistance against movement of the plunger rod (400);
- adjusting movement of the plunger rod (400) if the resistance signal is indicative of resistance against movement of the plunger rod (400) above a high resistance threshold, wherein the high resistance threshold is based on
- 10 the plunger rod position.