

Regulating valve for a door drive and to a door drive

The invention relates to a regulating valve for a door drive, wherein the regulating valve includes an axis of rotation, wherein the regulating valve includes at least two ends, 5 wherein the regulating valve includes at least two sealing sections, wherein the regulating valve includes a regulating section, wherein the regulating section is disposed between the sealing sections. Furthermore, the invention relates to a door drive.

10 The EP 3 103 949 B1 discloses a door drive having a housing and at least one regulating valve for the adjustable regulation of a fluid flow within the door drive. This regulating valve is disadvantageous in that it includes many components and requires complicated processing steps 15 during manufacturing. Hereby, it is neither inexpensive nor simply manufacturable.

Therefore, it is the object of the invention to indicate a regulating valve for a door drive, which is particularly simply manufacturable. Furthermore, it is the object of the invention to indicate a regulating valve for a door drive, 20 which is particularly inexpensively manufacturable. Furthermore, it is the object of the invention to indicate a door drive, which is particularly simply manufacturable. Furthermore, it is the object of the invention to indicate a 25 door drive, which is particularly inexpensively manufacturable.

The above-developed and indicated object is achieved based on the regulating valve for a door drive described in the introduction, in that at least one of the sealing sections is formed by at least one radial thickening, wherein the regulating section is formed by at least one radial tapering of the regulating valve. Advantageous further developments of the invention are indicated in the dependent claims, the description and in the Figures. Herein, radial thickening means that the diameter of the regulating valve is greater at this location than the diameter of directly neighbouring areas seen along the axis of rotation. Herein, tapering means that the diameter of the regulating valve is smaller at this location than the diameter of directly neighbouring areas seen along the axis of rotation.

Furthermore, it can be provided that the radial thickening or at least one of the radial thickenings is formed integrally with the regulating valve. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

Furthermore, it can be provided that the tapering or at least one of the taperings includes a symmetric cross-section in the direction of the axis of rotation. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

Furthermore, it can be provided that the regulating valve includes at least one engagement. Hereby, achieving that the regulating valve is simply operable, for example with a tool or by hand.

- 5 Furthermore, it can be provided that the one engagement or at least one of the engagements is disposed at one of the ends. Hereby achieving that the engagement is easily accessible.

- 10 Furthermore, it can be provided that each end includes at least one engagement. Hereby achieving that the regulating valve is operable from both ends.

- 15 Furthermore, it can be provided that the regulating valve is rotatable about the axis of rotation by means of the one engagement or by means of at least one of the engagements.

Furthermore, it can be provided that the regulating valve includes a thread.

- 20 Furthermore, it can be provided that the thread or the at least one of the threads is formed coaxially to the axis of rotation.

Furthermore, it can be provided that the thread or at least one of the threads is disposed at one of the ends.

Furthermore, it can be provided that at least one end includes both a thread and an engagement.

Furthermore, it can be provided that the regulating valve includes a guiding section at one of the ends.

Furthermore, it can be provided that the guiding section has a smaller diameter than another end.

5 Furthermore, it can be provided that the radial thickening or at least one of the radial thickenings extends rotationally symmetrically about the axis of rotation. Hereby achieving that the thickenings reliably fulfil the sealing function thereof.

10 Furthermore, it can be provided that the tapering or at least one of the taperings extends rotationally symmetrically about the axis of rotation. Hereby achieving that the regulating effect of the tapering is independent of a pure rotation of the regulating valve about the axis of rotation
15 thereof.

Furthermore, it can be provided that several radial thickenings form at least one of the sealing sections, wherein the thickenings are spaced apart from each other along the axis of rotation. Hereby achieving that the
20 thickenings particularly reliably fulfil the sealing function thereof.

Furthermore, it can be provided that the regulating valve is screwable into a door drive by means of the one thread or by means of one of the threads. Hereby achieving that the
25 regulating valve is reliably adjustable and guidable in a door drive.

Furthermore, it can be provided that the regulating valve is made from plastic material. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

- 5 Furthermore, it can be provided that the plastic material is polyamide. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

Furthermore, it can be provided that the plastic material contains fibres.

- 10 Furthermore, it can be provided that the fibres include glass fibres.

- Furthermore, it can be provided that the fibres amount to 5 to 50 mass percentage, preferably 20 to 40 mass percentage, particularly preferred 25 to 35 mass percentage of the plastic material.
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Furthermore, it can be provided that the regulating valve includes at least one surrounding annular sealing groove.

Furthermore, it can be provided that the regulating valve includes at least one sealing ring.

- 20 Furthermore, it can be provided that the sealing ring or at least one of the sealing rings is disposed in the annular sealing groove or one of the annular sealing grooves.

- Furthermore, it can be provided that the annular sealing groove or at least one of the annular sealing grooves is disposed between an end and the nearest sealing section.
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Furthermore, it can be provided that the regulating valve includes at least two sealing rings, wherein at least one sealing ring has a smaller diameter than another sealing ring. Hereby achieving that, when inserting the regulating valve into the door drive, the sealing ring with the smaller diameter is protected from damages, in particular by a receiving thread of the regulating valve reception. Hereby, the diameter of a sealing ring denotes the outer diameter of said sealing ring.

Furthermore, it can be provided that the regulating valve is an injection-moulded part. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

Furthermore, it can be provided that the regulating valve is a turned part. Hereby, achieving that the regulating valve is simply and inexpensively manufacturable.

Furthermore, the above-developed and indicated object is achieved based on the initially described door drive in that the door drive includes a regulating valve according to any of the aforementioned claims. Hereby, achieving that the door drive is particularly simply manufacturable. Advantageous further developments of the invention are indicated in the dependent claims, the description and in the Figures.

Furthermore, it can be provided that the door drive includes at least one regulating valve reception, wherein the

regulating valve or at least one of the regulating valves is accommodated in a regulating valve reception of the door drive. Hereby achieving that the regulating valve is reliably accommodated in the door drive.

5 Furthermore, it can be provided that at least one of the sealing sections has a larger diameter than the diameter of the associated regulating valve reception. Hereby achieving that the sealing section, respectively at least one of the sealing sections in the respective associated
10 regulating valve reception can reliably fulfil the sealing function thereof. This is realized in that the sealing section, or at least one of the sealing sections is elastically deformed, this means reversibly. Thus, the sealing section adapts to the surface of the regulating valve reception
15 facing the regulating valve.

Furthermore, it can be provided that the door drive has a longitudinal axis, wherein the longitudinal axis is defined by the direction of movement of a piston disposed in the door drive or a spring disposed in the door drive, wherein the
20 regulating valve or at least one of the regulating valves is disposed vertically to the longitudinal axis. Hereby, achieving that the door drive is particularly simply manufacturable.

Furthermore, it can be provided that at least one regulating
25 valve reception includes a guide section reception, wherein the guide section reception accommodates the guide

section of the associated regulating valve. Hereby, achieving that the door drive is particularly simply manufacturable. Furthermore, hereby achieving that the associated regulating valve is reliably guided in the regulating valve reception.

Furthermore, it can be provided that a stepped bore forms the regulating valve reception, wherein the stepped bore includes at least two sections in longitudinal direction, wherein one of the sections forms the guide section reception. Hereby, achieving that the door drive is particularly simply manufacturable.

Furthermore, it can be provided that the section with the smallest diameter forms the guide section reception.

Furthermore, it can be provided that the door drive includes an output shaft, wherein the output shaft is supported in the door drive, wherein the output shaft is rotatable about an output axis, wherein the output shaft includes at least one connection, wherein the connection or at least one of the connections serves for connecting an arm assembly.

Furthermore, it can be provided that the regulating valve or at least one of the regulating valves is disposed vertically to the output axis. Hereby achieving that the regulating valve, respectively at least one of the regulating valves is easily accessible in the state mounted to the door.

Furthermore, it can be provided that the regulating valve or at least one of the regulating valves connects at least two

hydraulic channels in the door drive. Hereby, achieving that the door drive is particularly simply manufacturable.

Furthermore, it can be provided that the regulating valve or at least one of the regulating valves serves for controlling
5 the hydraulic flow between the hydraulic channels. Hereby achieving that the hydraulic flow is particularly reliably controllable.

Furthermore, it can be provided that the hydraulic channels extend vertically to the axis of rotation. Hereby, achieving
10 that the door drive is particularly simply manufacturable.

Furthermore, it can be provided that the hydraulic channels extend coaxially. Hereby, achieving that the door drive is particularly simply manufacturable.

Furthermore, it can be provided that at least one of the
15 sealing sections is made from a softer material than the respective associated regulating valve reception. Hereby achieving that the sealing section, respectively at least one of the sealing sections in the respective associated regulating valve reception, by elastic deformation, adapts
20 to the inner diameter of the regulating valve reception.

Furthermore, it can be provided that the regulating valve reception or at least one of the regulating valve receptions includes at least one reception thread, wherein the reception thread or at least one of the reception threads
25 cooperates with an associated thread of the associated

regulating valve. Hereby achieving that the regulating valve is movable along the axis of rotation thereof.

Furthermore, it can be provided that the door drive includes an arm assembly, wherein the arm assembly is connected
5 to the output shaft of the door drive, wherein the arm assembly serves for transferring force between the door drive and a door leaf or door frame.

Furthermore, it can be provided that the arm assembly is a scissor arm assembly.

10 Furthermore, it can be provided that the arm assembly is a sliding rail arm assembly.

Furthermore, it can be provided that the output shaft protrudes from the door drive on two opposite sides, wherein the output shaft includes a connection on both
15 sides. Depending on the mounting orientation of the door drive, for example, one of the two connections can be used and is accordingly connected to the arm assembly. The other connection remains unused.

Hereinafter, the invention is explained in more detail based
20 on exemplary embodiments. Technical features having the same function are identified in the Figures with identical reference numerals. It shows:

Figures 1a and 1b the inventive regulating valve 1 for a door drive 2, and

25 Figure 2 the inventive door drive 2.

Figure 1a shows the inventive regulating valve 1 for a door drive 2, wherein the regulating valve 1 has an axis of rotation 3, wherein the regulating valve 1 includes at least two ends 8, wherein the regulating valve 1 includes at least
5 two sealing sections 12, wherein the regulating valve 1 includes a regulating section 4, wherein the regulating section 4 is disposed between the sealing sections 12.

Three respective radial thickenings 5 form both sealing sections 12. The radial thickenings 5 are spaced apart from
10 each other along the axis of rotation 3. A radial tapering 6 forms the regulating section 4. The radial thickenings 5 are integrally formed with the regulating valve 1. The radial thickenings 5 extend rotation-symmetrically about the axis of rotation 3. The tapering 6 likewise extends rotation-
15 symmetrically about the axis of rotation 3. In the direction of the axis of rotation 3, the tapering 6 has a symmetric cross-section.

The regulating valve 1 has two engagements 7. The regulating valve 1 has two ends 8. One engagement 7 is
20 disposed at each end 8. Thus, each end 8 has an engagement 7. In Figure 1b, the regulating valve 1 of Figure 1a is illustrated in a perspective view, so that the engagements 7 are better visible. Respectively one hexagon socket forms the engagements 7.

25 The regulating valve 1 includes a thread 9. The thread 9 is disposed at the right of the two ends 8 of the regulating

valve 1. Thus, the right one of the two ends 8 includes both an engagement 7 and a thread 9. The thread 9 is formed coaxially to the axis of rotation 3.

The regulating valve 1 includes a guide section 10. The
5 guide section 10 is disposed at the left one of the two ends 8. The guide section 10 has a smaller diameter than the right one of the two ends 8.

The regulating valve 1 includes two surrounding annular sealing grooves 11. The annular sealing grooves 11 serve
10 for accommodating non-illustrated sealing rings. The annular sealing grooves 11 are disposed between one of the ends 8 and the nearest sealing section 12.

The thread 9 allows for screwing the regulating valve 1 into the regulating valve reception 14 of a door drive 2 (see
15 Figure 2). For this purpose, the regulating valve reception 14 has a receiving thread. The regulating valve 1 is rotatable about the axis of rotation 3 thereof via the engagement 7. When rotating the regulating valve 1 in the regulating valve reception 14, the regulating valve 1 is
20 displaced along the axis of rotation 3 thereof. Hereby, the regulating valve 1 is also displaced in relation to hydraulic channels disposed in the door drive 1. Depending on the position of the regulating valve 1 in the door drive 2, hydraulic fluid can flow along the tapering 6 of the
25 regulating valve 1 or is blocked.

Figure 2 shows the inventive door drive 2. The door drive 2 includes a regulating valve reception 14. An inventive regulating valve 1 is disposed in the regulating valve reception 14. One end 8 of the regulating valve 1 is visible in Figure 2. The end 8 of the regulating valve 1 includes an engagement 7. A hexagon socket forms the engagement 7.

The door drive 2 has a longitudinal axis 13. The door drive 2 includes an output shaft 18. The output shaft 18 is supported in the door drive 2. The output shaft 18 extends vertically to the longitudinal axis 13. The output shaft 18 is rotatable about an output axis 19. The output axis 19 extends vertically to the longitudinal axis 13. The output shaft 18 protrudes from the top side and from the bottom side of the door drive 1 from the door drive 1. At the two ends thereof, the output shaft 18 has a connection 20. In the Figure just the upper connection 20 is visible. The connections 20 serve for connecting a non-illustrated arm assembly. The regulating valve 1 is disposed vertically to the output axis 19.

List of references numerals

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|----|----|----------------------------|
| | 1 | regulating valve |
| | 2 | door drive |
| | 3 | axis of rotation |
| 5 | 4 | regulating section |
| | 5 | thickening |
| | 6 | tapering |
| | 7 | engagement |
| | 8 | end |
| 10 | 9 | thread |
| | 10 | guiding section |
| | 11 | annular sealing groove |
| | 12 | sealing section |
| | 13 | longitudinal axis |
| 15 | 14 | regulating valve reception |
| | 18 | output shaft |
| | 19 | output axis |
| | 20 | connection |

Patent claims

1. A regulating valve (1) for a door drive (2), wherein the regulating valve (1) has an axis of rotation (3), wherein the regulating valve (1) includes at least two ends (8),
5 wherein the regulating valve (1) includes at least two sealing sections (12), wherein the regulating valve (1) includes a regulating section (4), wherein the regulating section (4) is disposed between the sealing sections (12), **characterized in** that
10 at least one radial thickening (5) forms at least one of the sealing sections (12),
wherein at least one radial tapering (6) of the regulating valve (1) forms the regulating section (4).
2. The regulating valve (1) for a door drive (2) according
15 to any of the preceding claims, **characterized in** that the radial thickening (5) or at least one of the radial thickenings (5) is formed integrally with the regulating valve (1).
3. The regulating valve (1) for a door drive (2) according
20 to any of the preceding claims, **characterized in** that the regulating valve (1) includes at least one engagement (7).
4. The regulating valve (1) for a door drive (2) according
25 to any of the preceding claims, **characterized in** that each end (8) includes at least one engagement (7).

5. The regulating valve (1) for a door drive (2) according to any of the preceding claims, **characterized in** that several radial thickenings (5) form at least one of the sealing sections (12),
5 wherein the thickenings (5) are spaced apart from each other along the axis of rotation (3).
6. The regulating valve (1) for a door drive (2) according to any of the preceding claims, **characterized in** that the regulating valve (1) is made from plastic material.
- 10 7. The regulating valve (1) for a door drive (2) according to any of the preceding claims, **characterized in** that the regulating valve (1) is an injection-moulded part.
8. A door drive (2), **characterized in** that the door drive (2) includes a regulating valve (1) according to any of the preceding claims.
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9. The door drive (2) according to any of the preceding claims, **characterized in** that the door drive (2) includes at least one regulating valve reception (14),
20 wherein the regulating valve (1) or at least one of the regulating valves (1) is accommodated in a regulating valve reception (14) of the door drive (2).
10. The door drive (2) according to any of the preceding claims, **characterized in** that

at least one of the sealing sections (12) has a larger diameter than the diameter of the associated regulating valve reception (14).

- 5 11. The door drive (2) according to any of the preceding claims, **characterized in** that
the door drive (2) includes an output shaft (18),
wherein the output shaft (18) is supported in the door drive (2),
wherein the output shaft (18) is rotatable about an
10 output axis (19),
wherein the output shaft (18) includes at least one connection (20),
wherein the connection (20) or at least one of the connections serves for connecting an arm assembly.
- 15 12. The door drive (2) according to any of the preceding claims, **characterized in** that
that the regulating valve (1) or at least one of the regulating valves (1) is disposed vertically to the output axis (19).
- 20 13. The door drive (2) according to any of the preceding claims, **characterized in** that
the regulating valve (1) or at least one of the regulating valves (1) connects at least two hydraulic channels in the door drive (2).
- 25 14. The door drive (2) according to any of the preceding claims, **characterized in** that

the regulating valve (1) or at least one of the regulating valves (1) serves for controlling the hydraulic flow between the hydraulic channels.

- 5 15. The door drive (2) according to any of the preceding claims, **characterized in** that
at least one of the sealing sections (12) is made from a softer material than the respective associated regulating valve reception (14).