7.2 Safety Brake – Q 409 710

1 Description and Mode of Operation

The safety brake acts directly on the main shaft (1).

1.1 Description

- The safety brake is designed as an annular disk brake and is accommodated in the drive sprocket (2). It is always installed together with the speed monitor and the drive chain contact.
- The brake disk (4) which is provided with brake pads (3) on both sides, is pivoted in the drive sprocket (2).
- Twelve retainer blocks (5) are arranged on the outside of the brake disk. The brake disk (4) is pressed against the drive sprocket (2) by means of a pressure disk (6).
- A pawl-type lock (7) which is actuated by a solenoid, is fastened to the truss. In the case of danger, this lock blocks the brake disk (4). The safety brake only works in the **downward** direction.

Fig. 710-01

1) Main shaft  
2) Drive sprocket  
4) Brake disk  
5) Retainer blocks  
6) Pressure disk  
7) Pawl-type lock  
8) Pawl  
9) Solenoid
3) Brake linings
10) Thrust bolt
11) Disk spring assembly

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**Hint!**

For rises of up to approx. 10 m (depending on load regulations and speed) only **one** safety brake is installed on the right side of the main shaft. For higher rises, **two** safety brakes are installed – one on the right and one on the left side of the main shaft.

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### 1.2 Mode of Operation

- The safety brake is an **active** brake, i.e. the pawl (8) locks when the escalator is idle and is released by the solenoid (9) when the escalator is started.
- The main shaft (1) can turn freely with the brake disk (4).

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**Fig. 710-03: Start**

9) Solenoid
12) Rubber cushion
15) Spring

16) Armature
17) Break contact (safety circuit)
18) Make contact (signaling)

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**Hint!**

When the solenoid (9) picks up, the armature (16) actuates the break contact (17), the safety circuit is completed, and the motor can start.
• In the case of danger, the solenoid (9) drops out, and the pawl (8) locks.
  – The retainer block (5) of the brake disk (4) is stopped by the pawl (8), and the brake disk is blocked.

Stop

The contact (17) opens the safety circuit.

Hint!
The entire pawl-type lock (7) is mounted in the truss and can be shifted longitudinally. A rubber cushion (12) dampens the blow when the braking process is initiated.

• The escalator is brought to a standstill due to the friction between the brake disk (4), the pressure disk (6) and the drive sprocket (2).

Hint!
The contact pressure of the brake disk (4) against the drive sprocket (2) – and thus the braking distance – can be adjusted by means of the 6 disk spring assemblies (11).

Fig. 710-05

2) Drive sprocket
3) Brake linings
4) Brake disk
6) Pressure disk
10) Thrust bolt
11) Disk spring assembly
13) Nut
14) Counternut
• The tightening torque VCBN (Nm) of the nut (13) depends on the production order and is set at the factory.

<table>
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<tr>
<th>Identification</th>
<th>Tightening Torque VCBN</th>
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<tr>
<td>Schindler</td>
<td>WMATA</td>
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<td>ESF4548</td>
<td>01</td>
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<td>02</td>
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<td>ESF4549</td>
<td>03</td>
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</table>

**Hint!**

Verification: The tightening torque VCBN is indicated on the data sheet (see the installation folder which comes with every escalator).

• When the escalator is stopped normally or by a safety device not listed below, the pawl (8) engages with a time delay of approx. 3 seconds.

• In the following cases of danger, the pawl engages without delay:
  – breakage or excessive elongation of the drive chain
  – overspeed 125%
  – power failure with delay

## 2 Maintenance

### 2.1 Functional Check

**Hint!**

The functional check is carried out with the speed monitor by simulating over- or underspeed.

For more detailed information, see Controller Instructions J 595 027, Operator Interface Terminal (OIT)

**Hint!**

For more detailed information, see Controller Instructions J 595 027, Operator Interface Terminal (OIT)
• Press one of the marked touch buttons to select one of the speed tests.

• Start the escalator with the key switch in the downward direction within 30 seconds, and keep the service brake disengaged.

• Following start-up delay (15 sec.), over- or underspeed will be detected and the pawl (8) will engage. The escalator is shut off electronically and interlocked.

  The faults screen appears indicating the error code related to the technical test.

  Error codes:
  "E_3E" for 15% master overspeed
  "E_CF" for 25% master overspeed
  "E_3F" for master underspeed
  "E_30" for 15% slave overspeed
  "E_CE" for 25% slave overspeed
  "E_31" for slave underspeed
  No error code "Safety brake engaged": "E_35"

• Visual check of the braking distance:
  The braking distance should be more or less the same as the braking distance of the service brake.

• Reset:
  – Touch the RESET touch button on the faults screen to reset the error.
  – Speed simulation is deactivated by exiting the test screen or after 30 seconds has elapsed without any activities.
  – If the fault is still active press RESET to reset the error.

• Start the escalator with the key switch in the downward direction (direction of the tension station):
  – The pawl cannot open.
  – The escalator is shut down but not interlocked after 3 seconds.
  – Error code: "E_35"

• Release the pawl:
  Turn the key switch to run the escalator for a short distance in the upward direction (direction of the drive station) until the pawl (8) can swing out past the retainer block (5).
2.2 Readjusting the Braking Distance

**Hint!**

If the visually determined braking distance deviates from the braking distance of the service brake by more than 30%, the braking distance must be readjusted.

- Adjust the braking distance by changing the preset tension of the disk spring assemblies (11).

**Fig. 710-06**

- Remove the counternuts (14).
- Use the nuts (13) to change the preset tension of all 6 disk spring assemblies (11) by the same value.

**Hints!**

- Use a torque wrench.
- For the theoretical tightening torque VCBN [Nm] preset at the factory, see the table below.

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<tr>
<td>ESF4548 01</td>
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<td>ESF4548 02</td>
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<td>ESF4549 03</td>
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**Hint!**

Verification: The tightening torque VCBN is indicated on the data sheet (see the installation folder which comes with every escalator).

- Retighten the counternuts.
2.3 Lubrication

- Lubricate the pivots of the rod and the pawl.

For more detailed information, see Maintenance Instructions Q 594 036, Lubrication System, Lubrication Schedule

Fig. 710-07