

1. Supporting documents



**Note:** The documents mentioned below are available for download on our website [www.zimmer-group.de](http://www.zimmer-group.de). Only the documents currently available on the website are valid.

- Catalogs, drawings, CAD data, performance data
- Detailed installation and operating instructions
- General Terms and Conditions of Business with specifications for the warranty entitlement

2. Safety notes

These installation and operating instructions are intended for installation and maintenance technicians as well as design engineers requiring the element for an application. Please read through all of the installation and operating instructions carefully before start-up and pay special attention to the following hazard warnings and notes.



**Caution:** Non-compliance may result in severe injuries. Injuries/malfunctions can occur especially with:

- Pinching during installation due to an unsecured mounting piece
- Missing or loose mounting screws
- Human error
- Improper connection or removal of the transmission lines during mounting, adjusting, converting or performing maintenance
- Failure to observe the safety and warning instructions during installation and start-up

3. Personnel qualifications

The installation, start-up, maintenance and repairs may be undertaken only in accordance with these installation and operating instructions and only by qualified personnel who have the professional expertise and know the conditions, as well as the dangers, of the machine into which the element is being installed.



**Danger:** Never open the housing. Intervention is not permitted and can lead to serious injuries. Warranty and disclaimer.

4. Proper use



**Note:** The element should only be used in its original state with its original accessories, without any unauthorized changes and within the scope of its defined parameters for use. Zimmer GmbH accepts no liability for any damage caused by improper use.

In accordance with EN ISO 13849-1, the LCE element is a safety related component of control systems. Furthermore, we can confirm the manufacture of the product using the basic and proven safety principles (Appendix D.1 and D.2 of EN 13849-2) and thus define the clamping element DHS as a proven component in accordance with EN 13849-1, Chap. 6.2.4, Par. b).

The element can be used without any control engineering measures in control systems of Category B or 1; for category 2 control systems, a test channel must be provided. For use in higher control categories, the control must be implemented using multiple channels, where each channel must implement the safety function for itself.

The element may not be used in any application other than those approved by the manufacturer.

**Without additional protection or control engineering measures, the element may not...**

- ...be installed in facilities that are used for transporting people (e.g. elevators).
- ...be used in vehicles.
- ...be used underwater or in other fluids.
- ...be used in a corrosive environment (for example, in connection with acids).
- ...come in contact with abrasive media (such as grinding dust).
- ...be used in a vacuum.
- ...come in direct contact with food.
- ...be used in areas with a potentially explosive atmosphere.

For questions regarding use of the LCE series element, please contact Zimmer GmbH.

5. Product description

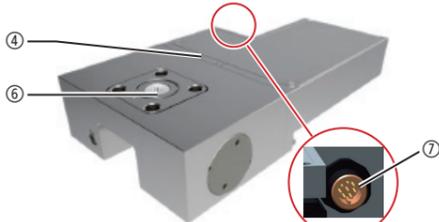
The element of the LCE series is a bistable element and is designed for static clamping or positioning of system components on profile rail guides. Due to the self-locking functional principle, when the clamp is closed there is no need for any supply voltage for the actuator to achieve the clamping force. This means that only the control voltage is present when the clamp is open or closed.

The LCE series elements are preset to the respective rail measurement at the factory. The contact profiles are pressed onto the free surfaces of the profile rail guide. Therefore, the clamping process has no influence on the accuracy and service life of the profile rails.



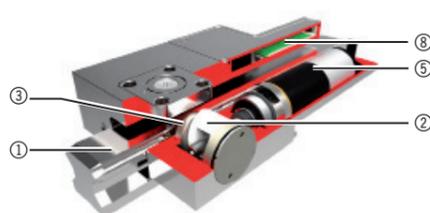
**Note:** The clamping process during a movement (dynamic clamping) in the case of pure elements can lead to destruction or damage of the profile rail or element itself.

Fig. 1: Element LCE



- ① Profile rails
- ② Wedge-type gear
- ③ Clamping jaw
- ④ Clamping element / terminal box

Fig. 2: Cutaway view of LCE element



- ⑤ Electrical drive
- ⑥ Sliding block, floating bearing
- ⑦ Electrical connection
- ⑧ Internal control system

Fig. 3



The element is provided with a serial number. If possible, use this serial number with your project and/or end customer to achieve a clear and, above all, consistent assignment in the event of an update or overhaul. The serial number is located on the terminal box and the control electronics (see Fig. 3).

6. Connections

The element and the external control electronics are connected via an 8-pin, shielded M12x1 plug cable with a maximum length of 10 m. Various versions of this plug cable are available in the line of accessories.

Fig. 4: PIN assignment of the control line

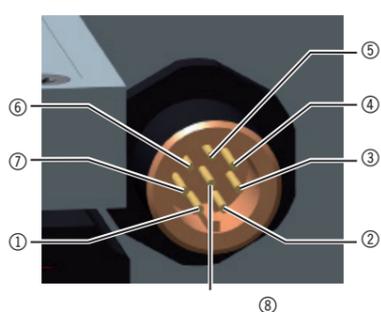
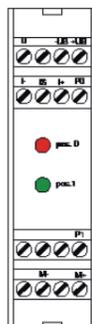


Fig. 5: Assignment of the external control system

| Color LED | Designation   | Display                 |
|-----------|---------------|-------------------------|
| Red       | Pos. 0        | Clamping element opened |
| Green     | Pos. 1        | Clamping element closed |
| Red       | Pos 0 + Pos 1 | Error message           |
| Green     |               |                         |

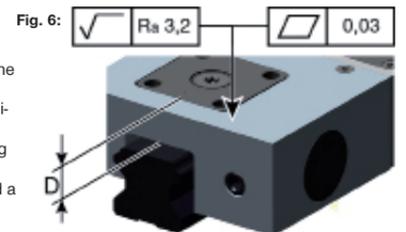


| Terminal | Function   | PIN | Color |
|----------|--|-----|-------|
| +UB      | +24VDC supply voltage                              |     |       |
| -UB      | 0V, GND supply voltage                             |     |       |
| D        | 24 VDC control input, clamping element open/closed |     |       |
| P0       | Clamping element output opened                     |     |       |
| P1       | Clamping element output closed                     |     |       |
| I+       | + Encoder supply voltage                           | 8   | Red   |
| I-       | - Encoder supply voltage                           | 7   | Blue  |
| IS       | Encoder input                                      | 3   | Green |
| M+       | + Motor  | 2   | Brown |
| M-       | - Motor  | 1   | White |

7. Installation

7.1 Design of the mounting piece

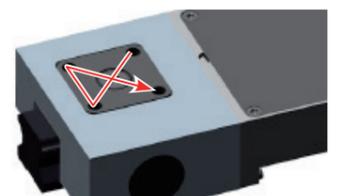
- ▶ Make sure the mounting piece is rigid. The thickness of the mounting piece should correspond to at least 1x the thickness of the terminal box (D) of the element used and should cover the terminal box completely.
- ▶ Make sure the mounting faces are flat. The flatness of the terminal box is 0.03 mm.
- ▶ The roughness of the surface (contact surface) of the mounting piece should not exceed the value Ra = 3.2 µm.
- ▶ The extension cord installed on connection ③ must not exceed a length of 10 m and must be shielded.
- ▶ The electric connecting cable must be relieved of strain at the mounting piece. The cable must be installed such that the cable cannot rub against the rail or get pinched.
- ▶ The 3D data for the profile rails are not necessarily true to detail in the area of the rail groove. Refer to the catalog or product selection to see whether an element fits on the selected rail.
- ▶ The mounting piece design must ensure subsequent accessibility to the clamping element.



7.2 Installation procedure

- ▶ Set the element on the profile rail
  - When an adapter plate is used, it is inserted between the clamping element and the mounting piece as level compensation
- ▶ Screw in screws of strength class 8.8 into the fastening thread and slightly tighten in a cross pattern
- ▶ Connect electrical connection
- ▶ Open and close the element multiple times
- ▶ Close the element
- ▶ Tighten the mounting screws crosswise with the specified torque
  - ⇒ <http://www.schrauben-normen.de/anziehmomente.html>

Fig. 7:



**Note:** If the mounting screws are tightened when the element is not closed, the element can shift and therefore be unable to achieve the optimum clamping force! Furthermore, the guide rail could become damaged.

- ▶ Open the element
- ▶ Check tightening torque once more in an open position, because clamping can affect the tightening torques.

7.3. Installation and connecting the external control electronics:

- ▶ Installation can be carried out in any operating position
  - ▶ The control electronics are installed to be 35 mm wide on a DIN rail by the automatic clamping mechanism in accordance with EN 60715.
    - ⇒ Hook the electronics into the upper part of the rail
    - ⇒ Fold down the electronics and latch it into the rail
  - ▶ When installing the cable, a flawless, fixed connection must be ensured.
  - ▶ Maximum torque of the clamping screws: 1.2 Nm.
- The control electronics are included in the scope of delivery. The control electronics must be operated with the supplied element only. This is ensured by the serial number marking.

Fig. 8:



7.4 Disassembly

Disassembly of the elements is carried out in the reverse order of that described in Chapter 7.2.



**Information:** Never transport the element when it is clamped and mounted. The elements and/or floating bearing could get damaged in the process. The element must not be stored while closed.

8. Initialization

8.1 LCE element is opened (delivery condition)

- If the control voltage "open" (high) is present at control input "D" when the system is switched on (applying operating voltage), the element remains open and the red LED lights up on the external control electronics.
- If the control voltage "close" (low) is present at control input "D" when the system is switched on (applying operating voltage), the clamping element remains open and the red LED lights up on the external control electronics.
  - ⇒ When the "open" (high) control voltage is switched on, the LED continues to be red; only upon the next signal change of the "close" (low) control voltage does the element close and the green LED light up.

8.2 LCE element is closed

- After a power failure, for example
- If the control voltage "close" (low = closed) is present at control input "D" when the system is switched on (applying operating voltage), the clamping element remains closed and the green LED lights up on the external control electronics.
  - If the control voltage "open" (high) is present at control input "D" when the system is switched on (applying operating voltage), the clamping element remains open and the green LED (defined state) lights up on the external control electronics.
    - ⇒ When the "close" (low) control voltage is switched on, the LED continues to be green; only upon the next signal change of the "open" (high) control voltage does the element open and the red LED light up.

9. Normal operation

- Depending on the state of the control input "D" (high = open/low = close) the clamp moves into the respective end position.
- The force is monitored here.
- Once the end position is reached, it indicates the status at outputs P0 and P1.
- If the force is outside of the clearly defined area, both LEDs light up, i.e. both outputs are "High".
  - ⇒ This status must be evaluated as an error message and can only be deleted by "Reset", i.e. by switching the operating voltage off and back on.



**Information:** The element is allowed to be closed only if the associated profile rail is between the contact surfaces! There must be no control voltage present when an electrical connection ③ is connected or disconnected! Avoid changing signals before the specified opening and closing time, otherwise there may be a malfunction. When multiple LCE elements are in use, swapping the control electronics or the clamping elements can cause errors or malfunctions, particularly in the event of different statuses ("open" or "closed"). Unauthorized opening of the housing shall void any warranty claim.

|   |   |
|---|---|
| Installation and operating instructions | Im Salmenkopf 5<br>D-77866 Rheinau, Germany<br>☎ +49 7844 9138-5556<br>☎ +49 7844 9138 80 |
| <b>LCE</b>                              |   |
| DDOC00146<br>Index b                    | www.zimmer-group.de   |

### 10. Function check

After the element has been properly installed, check whether it is ready to be operated according to the following characteristics:

- ▶ Check whether the element moves perpendicular to the rail by manually sliding the element.  
⇒ When doing so, make sure the floating bearing Ⓢ moves freely.
- ▶ Check whether the element moves on the profile rail by manually sliding the rail carriages.
- ▶ The clamping operation must be checked by shifting the mounting piece against the closed element  
⇒ while making sure not to exceed the maximum holding force.
- ▶ Visually inspect the entire connecting cable to make sure it is properly installed.
- ▶ Check all mounting screws for the specified tightening torque.

### 11. Technical data

**Information:**  
Die Technischen Daten entnehmen Sie bitte unserer Homepage [www.zimmer-group.de](http://www.zimmer-group.de). Sollten Sie noch weitere Fragen zum Produkt oder zu den Technischen Daten haben, wenden Sie sich bitte an den Kunden-Service der ZIMMER GmbH. Hierfür steht Ihnen unsere Technik-Hotline ☎ +49 7844 9138-5556 zur Verfügung.

**Information:**  
A system running time of 400 ms is required after switching on.

### 12. Accessories

| Item number | Designation      | Version   | Length [m] |
|-------------|------------------|-----------|------------|
| CSTE00-10   | Connecting cable | Straight  | 10         |
| CSTE90-10   | Connecting cable | 90° angle | 10         |

**Information:**  
The connecting cable is suitable for drag chains. (Bend radius: ≤ 66 mm moving / ≤ 33 mm fixed in place). The connecting cable is **not** suitable for robots **nor** for torsion. The connecting cable must have a maximum length of 10 m. For more information, please contact our customer service ☎ +49 7844 9138 0. We reserve the right to make changes in design and technical data.

### 13. Troubleshooting

**Information:**  
For an accurate and detailed overview of possible faults and their remedies, visit our website at [www.zimmer-group.de](http://www.zimmer-group.de). If the described measures for corrective actions are unsuccessful, contact the customer service department at ZIMMER GmbH. For this purpose, please call our technology hotline at ☎ +49 7844 9138-5556. For questions related to electronics, please call our electronics hotline at ☎ +49 7844 9138-5557.

### 14. "Free run" operation mode

The "free run" operation mode makes it possible to release the element from a closed – i.e. "stopped" – or blocked state.

Requirements:

- The clamping element is closed
- Both LEDs light up

- ▶ Apply control voltage 24VDC ± 10%.

Both LEDs light up due to the error message.

- When connecting new control electronics to a closed clamping element, no LEDs light up when switching on (applying the operating voltage). Only when a signal is switched on the "D" control input does the green or red LED light up on the control electronics (depending on which control signal is present – "open" (high) or "close" (low))

- ▶ Now, create a jumper fusing a cable (min. 0.5mm<sup>2</sup>), as shown in **Figure 10** from position ① to position ②.

(Caution: First at position ① and then at position ②).

The control electronics are now in "Free run" operation mode, at which point both LEDs (red + green) flash.

Fig. 9:

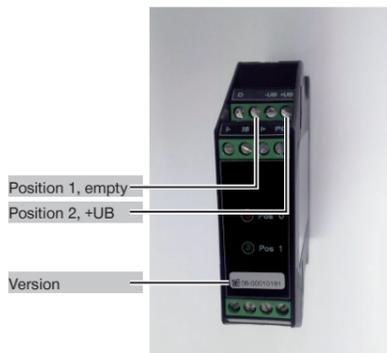
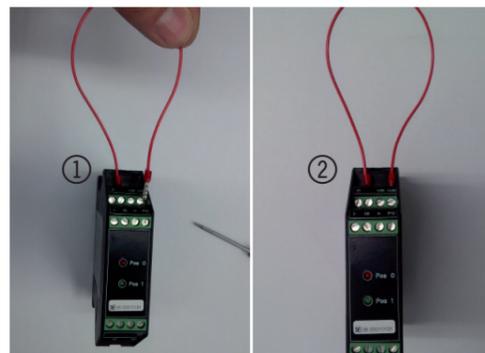


Fig. 10:



- ▶ If the control input "D" changes from "close" to "open", the motor is activated for a defined period in "open" direction.  
⇒ Repeat this control signal change until only the green LED is flashing.  
(potentially up to 10x or more; depending on how far the element is already closed, the engine requires multiple startups in this situation)  
⇒ A further signal change has no effect as soon as the green LED flashes.
- ▶ If the jumper is removed (first from position 2 and then from position 1), the control electronics are back in "normal" operating mode and both LEDs are not illuminated
- ▶ After changing the "D" control input, the element moves into the corresponding position and the LEDs light up again according to the "normal" operation mode.

### 15. Maintenance

The element is maintenance-free up to the number of cycles listed in point 10 under the following conditions:

- Adherence to the operating parameters
- Proper installation
- The profile rail must be clean and as free of lubricant as possible.

Even though the element is, as mentioned, maintenance-free, perform a regular visual inspection to check for corrosion, damage and contamination.

### 16. Transport and storage

The element is to be transported and stored only in the packaging supplied by Zimmer GmbH. If the element is stored differently, it must be provided with corrosion protection to prevent any corrosion.

**Information:**  
Never transport the clamping element when it is clamped and mounted. The elements and/or floating bearing could get damaged in the process.

### 17. Declaration of incorporation in terms of the EC directive 2006/42/EC on Machinery (Annex II 1 B)

**Name and address of the manufacturer:**

ZIMMER GmbH • Im Salmenkopf 5 • D-77866 Rheinau • Phone: +49 7844 9138 0 • Fax: +49 7844 9138 80  
www.zimmer-group.de

**We hereby declare that, as incomplete machines, the following, identically constructed elements**

**Product designation:** Clamping element, electric  
**Type designation:** LCE

conforms to the requirements of the 2006/42/EC directive in their design and the version we put on the market.  
**The following harmonized standards have been used:** (The manufacturer has a full list of the applied standards.)  
DIN EN ISO 12100:2011-03 Safety of machinery - General principles - Risk assessment and risk reduction  
DIN EN ISO 13849-1 Safety of machinery – Safety-related parts of control systems  
DIN EN 62061 Safety of machinery – Functional safety... of electrical, electronic,... control systems

We also declare that the specific technical documents were produced in accordance with Annex VII Part B of this Directive. We undertake to provide the market supervisory bodies with electronic versions of special documents for the incomplete machine through our documentation department, should they have reason to request them.

**The incomplete machine may only be commissioned if the machine or system in which the incomplete machine is to be installed has been determined to satisfy the conditions of the Machinery Directive 2006/42/EC and the EC Declaration of Conformity has been produced in accordance with Annex II 1 A.**

Authorized representative for compiling the relevant documents:

|   |                              |                            |
|---|------------------------------|----------------------------|
| Michael Hemler (see manufacturer's address) | Rheinau, Germany, 2016-07-01 | Martin Zimmer              |
| First name, last name                       | Address                      | Place and date of issuance |
|   |                              | Legally binding signature  |