

**FAG**



# **FAG Motion Guard CHAMPION.CONTROL-IMPULSE**

Automatic lubricator

User manual

**SCHAEFFLER GROUP**  
INDUSTRIAL

## FAG CHAMPION.CONTROL-IMPULSE

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# FAG CHAMPION.CONTROL-IMPULSE

**Features** This user manual describes how to work safely on and with the automatic lubricator FAG Motion Guard CHAMPION.CONTROL-IMPULSE. The safety guidelines must be observed.

**Attention!** Any persons working on and with the lubricator must have the user manual available for their work and must observe the relevant information and guidelines.

The user manual must always be complete and in a fully legible condition.

The relevant disposal guidelines must be observed.

From this point onward, the FAG Motion Guard CHAMPION.CONTROL-IMPULSE is referred to as the lubricator and the lubricant cartridge as the LC unit.

**Application** The lubricator is clearly identified by a sticker on the drive unit and the LC unit.

The lubricator is intended for machinery and plant where lubrication is to be carried out during running and feedback to the machine is required.

The lubricator supplies the lubrication point with oil or grease at a pressure up to max. 5 bar constantly, precisely and irrespective of temperature and can also be switched on and off under machine control.

Characteristic areas of application include the lubrication points on rolling and plain bearings, drive and conveyor chains, guidance systems, open gearboxes and seals.

**Attention!** The lubricator must only be used for the purposes stated in the order and confirmed by Schaeffler KG and in accordance with the conditions of use, settings and variations described in this user manual.

It must be ensured that the correct power supply and connection to the plant or controller (for example a PLC) are provided.

Connection should only be carried out using the original connection cable.

Connection should only be made by qualified skilled personnel and installation must comply with national standards such as IEC or VDE.

The lubrication system must only be equipped with connections and pressure-resistant feed lines from Schaeffler KG.

The lubricator must be protected against chemically aggressive ambient media.

# FAG CHAMPION.CONTROL-IMPULSE

## Scope of delivery

The lubricator can be used with three LC units of different sizes to meet individual requirements. The volume of the LC unit and the lubricator correspond to the specific order.

The delivery should be checked as soon as it is received.

Schaeffler KG accepts no liability for any defects that are the subject of subsequent complaints.

Any damage in transport must be reported as a complaint to the deliverer, any missing items or defects must be reported as a complaint to Schaeffler KG.

## Legal requirements

### Liability

The information, data and guidelines given in the user manual were current at the time of editorial approval. The data, illustrations and descriptions cannot be used as grounds for any claims relating to lubricators that have already been delivered.

### Attention!

Schaeffler KG accepts no liability for any damage or operational malfunctions that occur as a result of improper use or unauthorised changes to the drive unit or LC unit.

This also applies to incorrect work on or with the lubricator, errors in use or adjustment or incorrect variation sizes of the lubricator or a failure to observe the user manual.

## Safety guidelines

### Responsible persons

#### Operator

The operator is the natural or juristic person that uses the lubricator or on whose instruction the lubricator is used.

### Attention!

The operator or his safety co-ordinator are responsible for compliance with all relevant specifications, guidelines and regulations.

All work on and with the lubricator may only be carried out by qualified personnel.

In mounting and maintenance of the lubricator, the relevant accident preventions specifications and safety specifications must be observed.

### Qualified personnel

Persons that are authorised by the person responsible for safety of the plant, on the basis of their experience and knowledge, to carry out the activities required in the specific case.

## Principles

The lubricator must be filled with the correct oil or grease and adjusted such that, when it is correctly adjusted and mounted and used as specified, it functions without defects and does not cause any hazards. This also applies to the interaction with the complete plant and the points to be lubricated.

Material damage that could arise due to failure of the lubricator must be prevented by suitable measures.

All retrofitting, modification and conversion of the lubricator is prohibited.

### Attention!

While working on machinery and plant, the safety guidelines and user manuals of the manufacturers must be observed.

The LC unit must not be opened or refilled under any circumstances.

The safety data sheets for the oils and greases must be observed.

Only original LC units from Schaeffler KG may be used.

## Technical data

### Design

The lubricator corresponds to the state of technology at the time of delivery and is always regarded as operationally reliable.

It comprises, as shown in *Figure 1*:

- closing stopper ①
- LC unit ② containing lubricant, screw thread R<sup>1</sup>/<sub>4</sub> (to be ordered separately)
- drive system ③, comprising a geared motor and an electronic unit (state serial number on any queries)
- LED function display ④
- cover ⑤
- cable with plug ⑥ (to be ordered separately).

With the exception of the LC unit, all the components can be reused several times.

- ① Closing stopper
- ② LC unit
- ③ Drive system
- ④ LED function display
- ⑤ Cover
- ⑥ Cable with plug

*Figure 1*

Components of the FAG lubricator



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# FAG CHAMPION.CONTROL-IMPULSE

## Power supply Key data

Compilation of data:

Description		Technical data
Power supply		15 V DC to 25 V DC (max. 30 V DC, 5% residual ripple)
Current consumption		typically 0,2 A (max. starting current 1,2 A)
Conductor resistance		79,9 Ω/km at +20 °C
Permissible temperature	Stationary condition	-25 °C to +70 °C
	Moving condition	-5 °C to +70 °C

## Cable design

Description		Technical data
Cross-section area of conductor		4×0,25 mm <sup>2</sup>
Cord design, diameter		Cu cord 32×0,1 mm Ø, blk
Insulation		PVC, 1,3 + 0,05 mm Ø Wall thickness approx. 0,32 mm
Material: cable outer sheath		PUR/black
Outputs		each max. 400 mA, short circuit-proof

### Attention!

The cable is suitable for use in chain link trunking, the minimum bending radius is 60 mm.

The power supply must be active for at least two minutes in order to ensure the correct running time.

The maximum load on the outputs (Pin 2 and Pin 4) must not exceed 400 mA in each case.

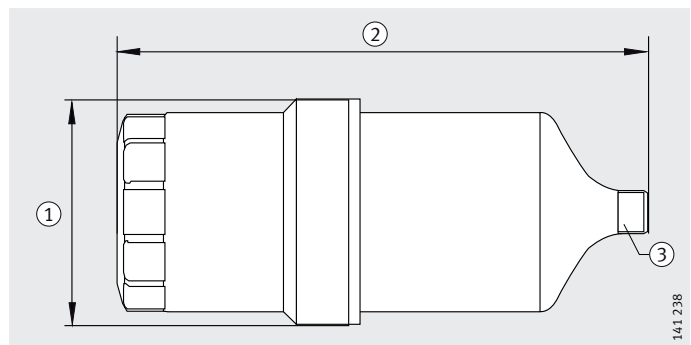
## LC unit, masses and dimensions

The drive unit and LC unit together form the lubricator.

Type	Volume cm <sup>3</sup>	Diameter D mm	Total length L mm	Mass	
				Empty kg	Filled with MULTITOP kg
LC60	60	71	142	0,310	approx. 0,360
LC120	120	71	165	0,320	approx. 0,430
LC250	250	71	215	0,360	approx. 0,590

- ① Diameter
- ② Length
- ③ Screw thread R<sup>1</sup>/<sub>4</sub>

Figure 2  
Lubricator



**Function** When voltage (as a impulse) is applied to the lubricator, it releases a single, adjustable dispensing quantity.

The lubricant is moved out of the LC unit by a driven spindle in the plunger. The plunger builds up a pressure of up to 5 bar in the LC unit; above this value, the automatic pressure limiter switches off the system after starting up several times.

The size of the LC unit and the dispensing quantity per impulse are set on the quadruplex encoder.

## **Operating conditions**

**Ambient temperature** A uniform dispensing behaviour and pressure build-up to a maximum of 5 bar can only be ensured in the temperature range from  $-10\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$ .

**Ambient conditions** If the individual components are fitted together correctly, the lubricators are resistant to dust and spray water. However, the sealing rings and plastics may be attacked by ambient media.

**Storage** Lubricators must only be stored in interior rooms that are dry, dust-free and protected against sunlight, at a storage temperature of  $+15\text{ }^{\circ}\text{C}$  to  $+25\text{ }^{\circ}\text{C}$ .

The LC unit can be stored for up to two years; the lubricant fill date should be taken as the controlling factor. All other components should be replaced after a maximum of two years.

# FAG CHAMPION.CONTROL-IMPULSE

## Dispensing quantity and dispensing time

### Attention!

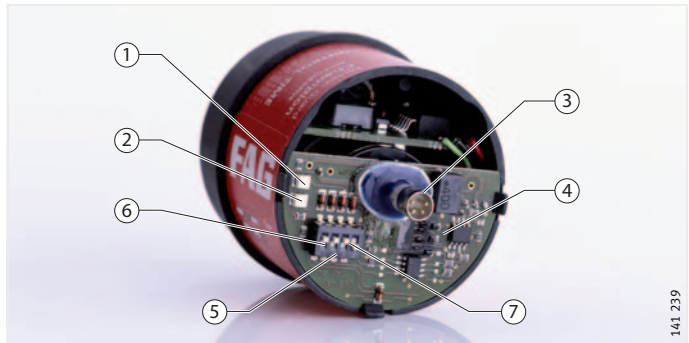
Incorrect settings will lead to overlubrication or underlubrication with the possibility of secondary damage.

### Settings on the drive unit

Unscrew the cover of the drive unit. The quadruplex encoder is located on the control circuit board, *Figure 3*.

The two switches ⑥ with the designation “TIME” are used to set the dispensing quantity. The position of the switch ⑦ with the designation “VOL” depends on the size of the LC unit. The switches can be adjusted with the aid of a small screwdriver. Screw the cover back onto the drive unit.

- ① Red LED
- ② Green LED
- ③ Jack
- ④ Circuit board
- ⑤ Quadruplex encoder
- ⑥ TIME (time adjustment)
- ⑦ VOL (volume of LC unit)



*Figure 3*

Control circuit board of drive unit

### LED signals








The LEDs on the control circuit board, *Figure 3*, ① and ② are interpreted as follows:

LED lit	Signal	Description
Green	Green continuous signal	System running
Red	Red continuous signal $\leq 30$ s	Motor running: dispensing operation
Red	Red continuous signal $\geq 30$ s	Error or malfunction
Red and green	Red and green continuous signal	Replace LC unit immediately



**Dispensing table**  
**Settings**  
**on quadruplex encoder**

Possible positions of quadruplex encoder

Quadruplex encoder			
Switch 1 and switch 2 "TIME"	Switches 3 and 4 "VOL"		
	Dispensing quantity in cm <sup>3</sup> per impulse, 1 cm <sup>3</sup> ≈ 0,9 g lubricant		
	LC60	LC120	LC250
			
	2,11	2,11	2,11
			
	1,06	1,06	1,06
			
	0,53	0,53	0,53
			
	0,26	0,26	0,26

**Attention!** As soon as the voltage is applied (15 V DC to 25 V DC, max. 30 V DC), the lubricator releases the set lubricant quantity once only.

The voltage must be applied for at least as long such that the dispensing operation is completed after a maximum of two minutes.

Before each additional dispensing operation, the voltage must be disconnected for at least 15 seconds and then switched on again.

# FAG CHAMPION.CONTROL-IMPULSE

## Initial operation

The FAG Motion Guard CHAMPION.CONTROL-IMPULSE is delivered as standard without an LC unit and with a preset dispensing quantity of 0,53 cm<sup>3</sup>.

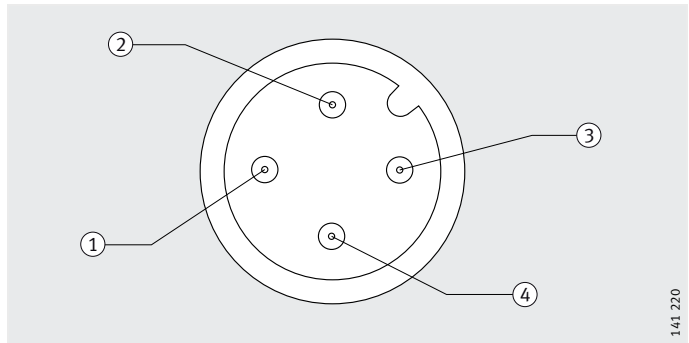
Before the lubricator is installed, the lubrication points and the lubricant feed lines must be sufficiently prelubricated using the same lubricant as is contained in the lubricator.

Appropriate 400 g lubricant cartridges or oil containers are available as accessories.

- Support adapters (accessories) should be used for mounting.
- If the lubricator is mounted vertically, it should be secured using a retaining clip (accessory).

- ① Brown cable = power supply (plus)
- ② White cable = Green digital LED (output)
- ③ Blue cable = power supply (minus)
- ④ Black cable = Red digital LED (output)

Figure 4  
Pin assignment



## Initial operation

### Attention!

Mount the lubricator using a support adapter or retaining clip.

Always check the settings of the lubricator before initial operation and make corrections as necessary.

Make connections precisely in accordance with the user manual. An incorrect connection can lead to destruction of the electronics.

Mount the lubricator filled with oil vertically, with the outlet facing down. Fit the oil valve. Provide additional sealing of the connectors using a suitable sealing material.

### Work steps:

- Check the lubricator for external damage.
- Prelubricate the lubrication point and the feed lines.
- The thread of the LC unit must match the thread of the screw mounting point (R<sup>1</sup>/<sub>4</sub>).
- Connect the power cable in accordance with the PLC circuit diagrams to the status display in the switch cabinet.
- Check the settings on the encoder.

- Remove the closing stopper from the LC unit and screw the completed lubricator finger tight into the lubrication point. Do not screw in a second time since this can impair the self-sealing effect of the thread.
- Connect to the power grid.
- After Reset, operation will start with the set pause time.

#### During operation

Check seal integrity and the lubricant fill level as well as the correct position and finger tight screw mounting of all components regularly.

### Changing the LC unit

#### Attention!

The LC unit must not be opened or refilled under any circumstances. Only new, completely filled FAG LC units should be used.

Protect the drive system and control circuit board against moisture. The unit should only be changed in dry conditions.

Dispose of old parts in accordance with the applicable regulations.

Once the red and green LEDs light at the same time, the empty LC unit must be replaced immediately.

Work steps:

- Disconnect from the power grid.
- Unscrew the lubricator completely from the lubrication point.
- Unscrew the cover of the drive system.
- Remove the drive system from the LC unit.
- If necessary, set the new size of the LC unit and dispensing quantity, page 9.
- Position the drive system on the new LC unit, ensuring that the teeth engage with each other.
- Screw mount the cover of the drive system finger tight to the LC unit.

Continue the steps in accordance with “Initial operation”, page 10.

### Changing the dispensing quantity Reset function

The Reset function switches the lubricator to its base condition by restoring the stored parameters.

The process:

- Disconnect from the power grid.
- Unscrew the lubricator completely from the lubrication point.
- Unscrew the LC unit from the drive unit.
- Set the two switches “VOL” of the quadruplex encoder to the position “Reset”, *Figure 5 ②*, page 12.

# FAG CHAMPION.CONTROL-IMPULSE

After these steps:

- Reconnect to the power grid.
- Once the motor has run for approximately 2 seconds, LED ① and LED ②, *Figure 3*, page 8 will light.
- Disconnect from the power grid.
- Make the new settings, see page 8.
- During setting, keep the Reset pin pressed, *Figure 5* ①.
- Reconnect to the power grid.
- After three seconds, release the Reset pin and disconnect from the power grid.
- Screw together the lubricator.

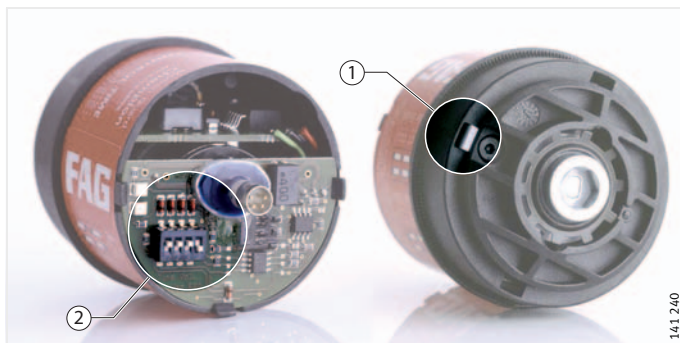
**Attention!** During this operation, the requirement for replacement of the LC unit according to the fill level of the LC unit (continuous signal of the red and green LEDs) may be inappropriate.

Ensure that the condition is correct and monitor the end of the lubrication period on site.

- ① Reset pin on the drive unit (changes)
- ② Reset position of switch "VOL" (initial operation)

*Figure 5*

Reset for initial operation and for subsequent modifications



## Troubleshooting

Malfunctions of the lubricator should be analysed and rectified using the table. Please contact Schaeffler Customer Service if a defect occurs that is not listed in the table.

Defect	Possible cause	Remedy
Lubricator not functioning	Cable connected incorrectly Cable breakage No power Machine relay defective	<ul style="list-style-type: none"> <li>■ Check connection assignment</li> <li>■ Check power, connect new cable</li> <li>■ Power supply too low for the number of lubricators connected</li> <li>■ Replace relay</li> </ul>
Green LED indicating "System running" although LC unit is empty	Setting of "VOL" switch does not correspond to volume of LC unit Partially filled LC unit was replaced by almost empty LC unit	<ul style="list-style-type: none"> <li>■ Fit full LC unit</li> </ul>
Red LED indicating "Defect, malfunction"	Feed line and connectors are blocked Counterpressure too high	<ul style="list-style-type: none"> <li>■ Clean feed line and connectors, then switch off and on, see page 11</li> </ul>
Lubricator dispensing too quickly	Switch "TIME" set incorrectly	<ul style="list-style-type: none"> <li>■ Correct switch settings, see page 9</li> </ul>
Lubricator indicating "LC unit empty" (red and green LEDs) although lubricant is still present in the LC unit	Setting of "VOL" switch does not correspond to LC unit Almost empty LC unit was replaced by partially filled LC unit Reset pin was not pressed during assembly	<ul style="list-style-type: none"> <li>■ Fit full LC unit</li> <li>■ Move drive unit by a few teeth so that the Reset pin can be pressed</li> </ul>
Incorrect dispensing quantity	Encoder set incorrectly	<ul style="list-style-type: none"> <li>■ Make corrections, see page 8</li> </ul>

# FAG CHAMPION.CONTROL-IMPULSE

## Accessories and service

Accessories and replacement parts must conform to the technical requirements. This is ensured when using original replacement parts from Schaeffler KG.

### Accessories

Description	Technical data	Ordering designation
Cable with jack plug	5 m	ARCALUB-CONTROL.CABLE-5M
Support bracket	Thread G <sup>1</sup> / <sub>4</sub> , external	ARCALUB.ADAPTER
Retaining clip	–	ARCALUB.CLIP
Holder with insert	–	ARCALUB.HOLDER-KIT
Oil valve	–	ARCALUB.OILVALV-G <sup>1</sup> / <sub>4</sub>
400 gram grease cartridge or oil in container for prelubrication	–	Available by agreement

Other accessories available by agreement.

### Service

The operator has the option of returning the empty lubricator FAG Motion Guard CHAMPION.CONTROL-IMPULSE to Schaeffler KG for:

- disposal of the used parts in an environmentally-friendly manner,
- replacement of the LC unit,
- setting of the required dispensing quantity.

EU Declaration of Conformity



**EU Declaration of Conformity**

In accordance with EG Machinery Directive 98/37/EG  
and EMC Directive 89/336EWG

*We hereby declare that the product described below is in conformity with the applicable health and requirements of the EU Directive in terms of its design and type and in the execution we have brought into circulation. This declaration shall cease to be valid if any modification is made to the product without our agreement.*

Product description: Automatic lubricator  
Product name: FAG Motion Guard CHAMPION.CONTROL-IMPULSE  
Type: LC60, LC120 and LC250

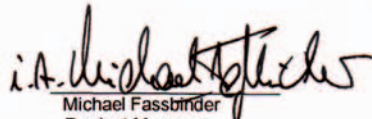
**Applicable harmonised standards:**

- EN ISO 12100-1:2003 Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology and methodology
- EN ISO 12100-2:2003 Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles
- EN 60204-1:1998 Electrical equipment of machines

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Schweinfurt, 31.01.2008

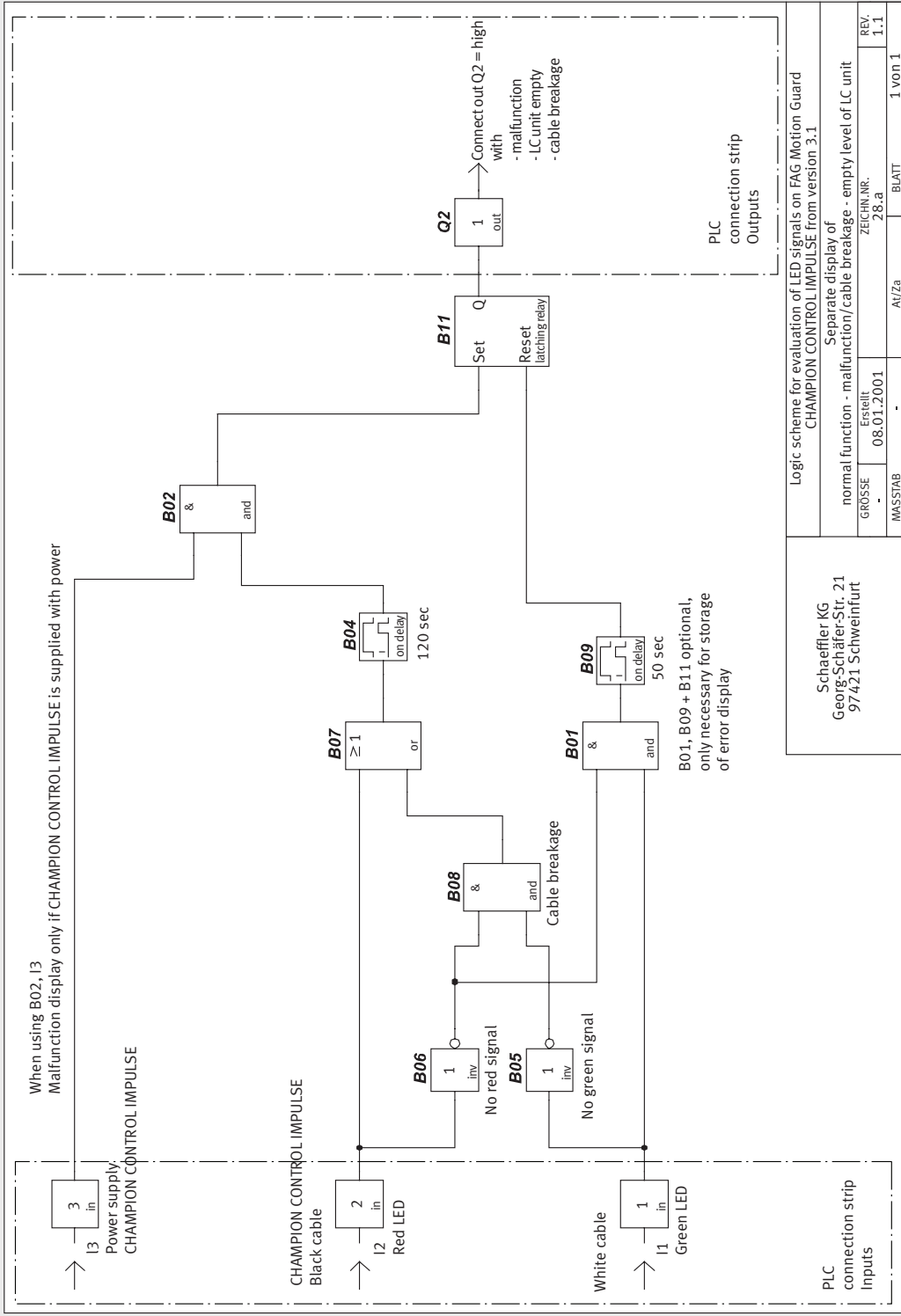
This declaration certifies conformity with the stated directives but does not represent a guarantee of characteristics. The safety guidelines in the user manual must be observed.

Schaeffler KG • Georg-Schäfer Straße 30 • D-97421 Schweinfurt • Tel.: +49/2407/9149-99

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# FAG CHAMPION.CONTROL-IMPULSE

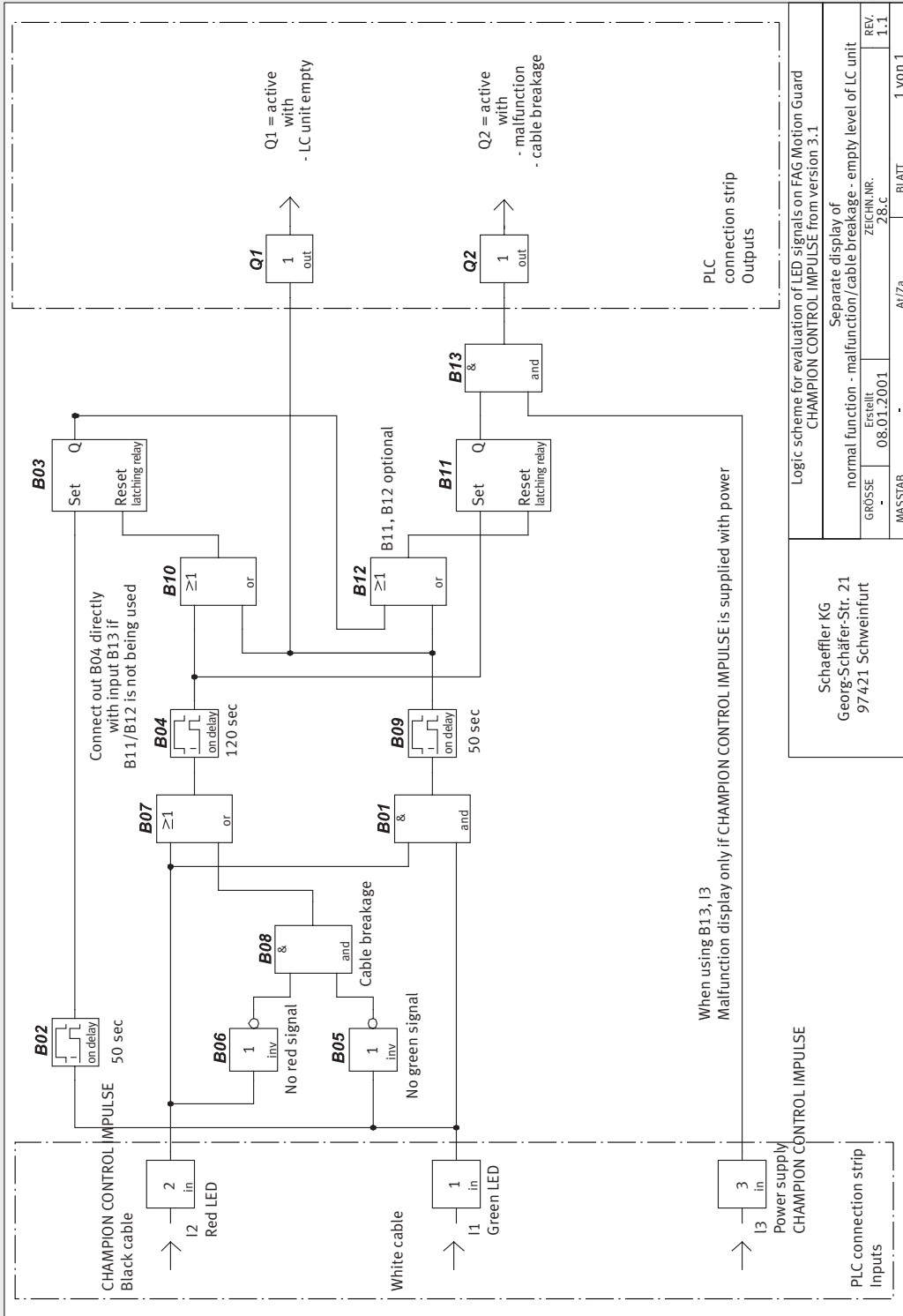
## PLC programming suggestion with one output signal



0013803



# PLC programming suggestion with two output signals

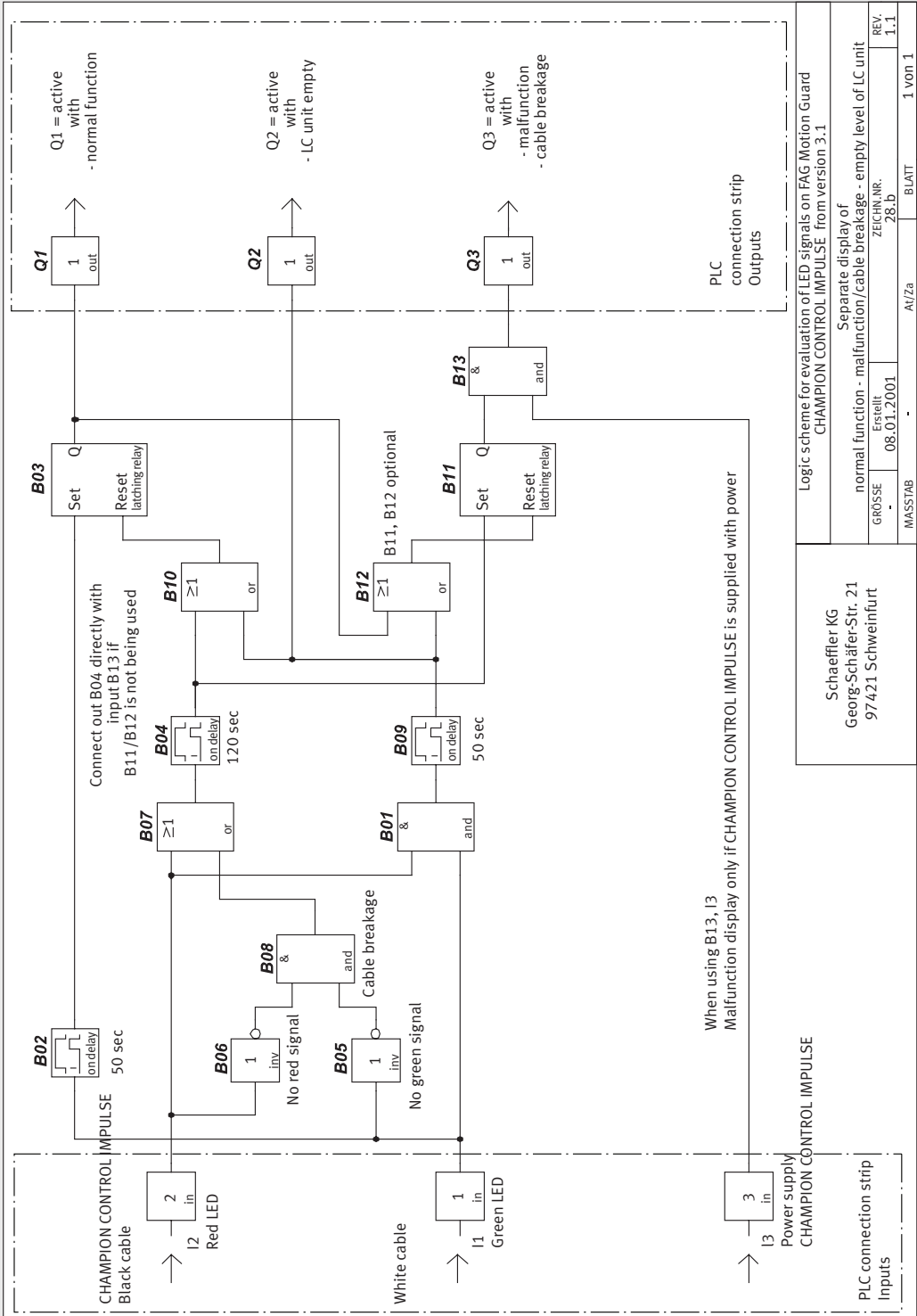


Schaeffler KG Georg-Schäfer-Str. 21 97421 Schweinfurt		Logic scheme for evaluation of LED signals on FAG Motion Guard CHAMPION CONTROL IMPULSE from version 3.1	
GRÖSSE	normal function - malfunction/cable breakage - empty level of LC unit	ZEICHN.NR.	28.C
Erstellt	08.01.2001	Blatt	1 von 1
MASSTAB	-	At/Za	BLATT

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# FAG CHAMPION.CONTROL-IMPULSE

## PLC programming suggestion with three output signals



## Notes

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