Manual for installing

ZKL 3000 Remote Control (RC) Line Blockage System

ZKL 3000 RC

DualInventive
Ubiquitous Rail

CONTENTS

1. INTRODUCTION

This manual details the correct method for installing the ZKL 3000 Remote Control (RC) Line Blockage System safely. The ZKL 3000 RC system protects a section of track efficiently and effectively by producing and monitoring a short circuit in the track, simulating a train in the section. This causes the track circuit to be 'OCCUPIED', thus placing the protecting signals danger. This section is immediately closed to rail traffic, enabling rail workers to perform work on the infrastructure safely.

The ZKL 3000 RC can be operated using either the MTInfo 3000 app or through the web interface MTinfo 3000.

This manual describes how to operate the ZKL 3000 RC using the MTinfo 3000 version 5 webplatform and MTinfo 3000 app. The Remote Switch (RS) 3000 cannot be used on MTinfo 3000 version 5 to switch a ZKL 3000 RC.
This manual is part of a set that details the entire ZKL 3000 RC system: The web interface (MTinfo 3000), the Line Blockage System (ZKL 3000 RC), and the MTinfo 3000 app.

2. DEFINITIONS & TECHNICAL SPECIFICATIONS

a. Application of ZKL 3000 RC
The ZKL 3000 RC can be applied in track types with a width of 1,435mm, such as:

- NP46
- UIC54
- UIC60
- 95 lb RBS
- 85 lb RBS
- 109 lb
- 110 lb
- 113 lb

Additionally, the ZKL 3000 RC can be used for mains voltage of both 1500 V and 25kV.

The ZKL 3000 RC can be used with the following track circuit systems:

- Jeumont-Schneider Peak Voltage track circuit section
- Classic track circuit: 12V alternating voltage 75 Hz
- Siemens electronic ripple control track circuits FTGS46 & FTGS917
- GRS Overlay Track Circuit (OTC)
- Alstom Jade system

- Bi-rail type CV50B3P
- High power pulses type CVTHBG
- EBI track 400 OL (open line)
- Aster SF 15 type track circuit
- FS2600,
- Reed,
- HVI

You must NOT use a ZKL 3000 RC in locations with any of the following:
- Level crossings and/or service roads (or alongside)
- Axle counters
- Switches and Points
- Within 3m of the Tuning Zone
- In track circuits which have a frequency of 16.kHz or above
To connect to the ZKL 3000 RC the MTinfo 3000 app uses Dual Inventive's wireless 3G network.

3. CONDITIONS & SAFETY INSTRUCTIONS

WARNING!
Please read all safety instructions carefully before using the ZKL 3000 RC, ensuring you fully understand the system and how it works. When precautionary measures and safety instructions are not followed properly there is a risk of electric shock, entrapment, fire or even death.

a. Conditions of use

You are only allowed to install the ZKL 3000 RC if:
- you hold the ZKL 3000 RC competencies, and they are in date
- you have been assigned the appropriate user rights on MTinfo 3000
- you have been authorised to install the ZKL 3000 RC

As a competent user you are responsible for:
- any relevant paperwork, user names and passwords (and any authorisation codes via text message or PIN that you have been assigned)
- managing your password and your PIN. You must **never** share this information with others

b. Instructions

Other important instructions
- There are certain situations where it is not possible to switch the ZKL 3000 RC.
  Please see the "Troubleshooting" section for more information should you encounter any problems
- Never perform any repairs to a ZKL 3000 RC. Please contact Dual Inventive for maintenance and repairs
- Override keys must only be handed out to those who hold the ZKL 3000 RC competency
- Please take good care of the ZKL 3000 RC override keys by organising proper key management to ensure they are not lost, stolen or damaged
- If the track circuit has been tuned including ZKL 3000 RC, the track circuit must be tuned again after removal of the ZKL 3000 RC.

The batteries of the ZKL 3000 RC, both back-up and main, are lithium batteries and therefore considered 'dangerous goods'. Please ensure you follow the local laws and regulations when storing and transporting these batteries. In case of damaged batteries, please avoid exposure and discharge the battery in its original package conform the local laws and regulations. When you are no longer in the possession of the packaging, we can deliver new packaging if required.

Instructions for first use
- Check whether the ZKL 3000 RC has the correct certification. Please consult our website for the required certificates: www.dualinventive.com
- Please check whether local restrictions, regulations or certification apply to the use of the ZKL 3000 RC
- Always take care of your own safety within the railway environment using the most current applicable legislation
- Always visually inspect the ZKL 3000 RC for damage and perform a function test
  DO NOT USE any ZKL 3000 RC if any damage or defects are detected. Please apply a label, quarantine and return to your stores to be sent to Dual Inventive
- Always use the installation procedure set out in this manual for the ZKL 3000 RC
- Always start the installation with two fully charged batteries

4. COMPONENTS

A complete ZKL 3000 RC set consists of the following:
- Case including ZKL 3000 RC and ancillaries
- Batteries for ZKL 3000 RC with chargers

## a. ZKL 3000 RC and Ancillaries

A ZKL 3000 RC set contains:
1. The ZKL 3000 RC including bypass clamps and override keys
2. Transport case
3. Backup battery
4. Battery compartment key
5. Manual
6. Key ring
7. Carrying strap
8. Test-Tool
9. Backup battery charger
10. USB (contains manual)
11. ZKL Clamp
12. Padlock
13. External battery
14. Charger external battery
15. Connection cable external battery
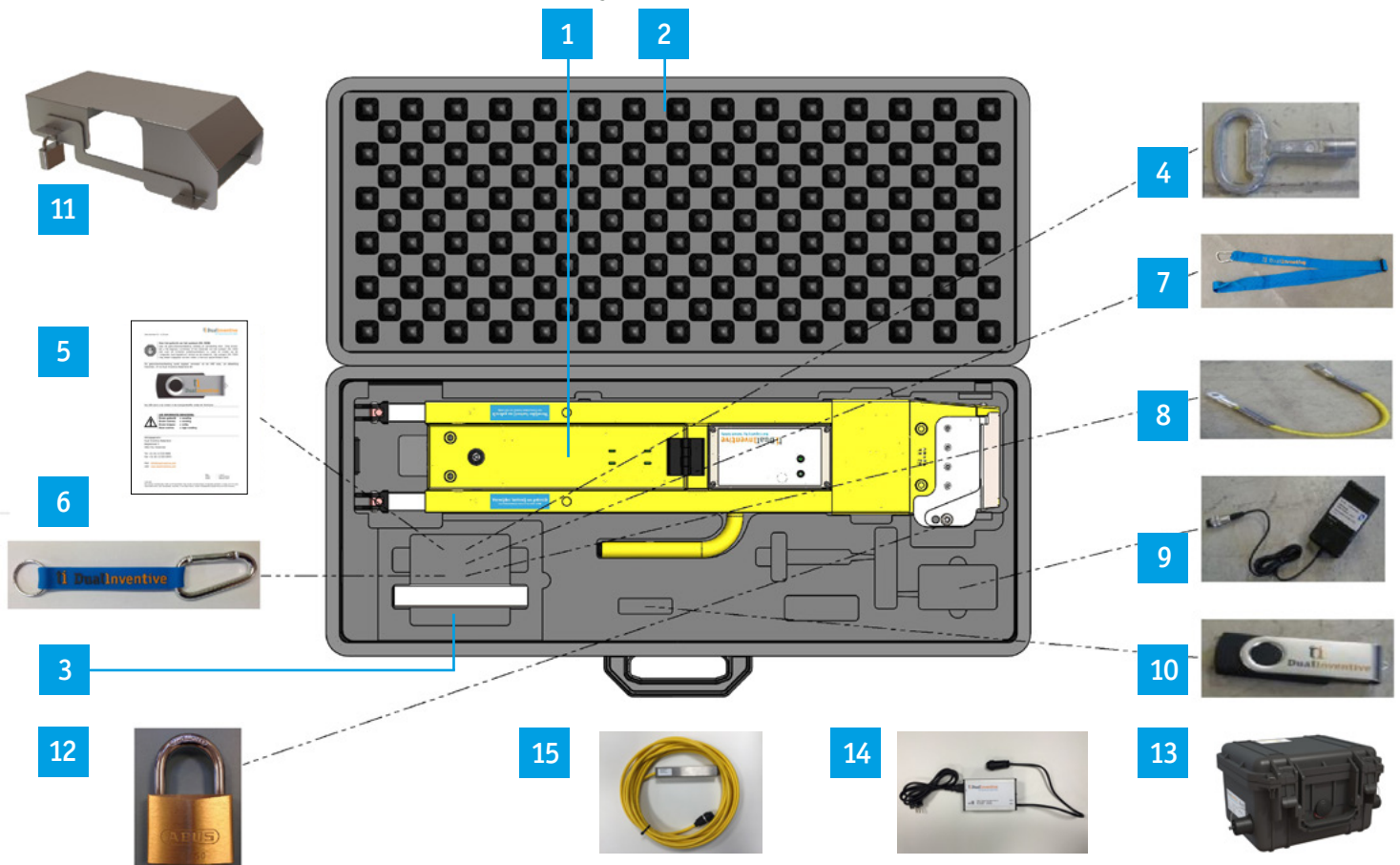
b. The ZKL 3000 RC Unit

1. A hinged frame
2. SWITCH 3000
3. Electronics casing (LEDs, GPS and black box recorder)
4. Battery compartment
5. Contact points
6. Locking mechanism
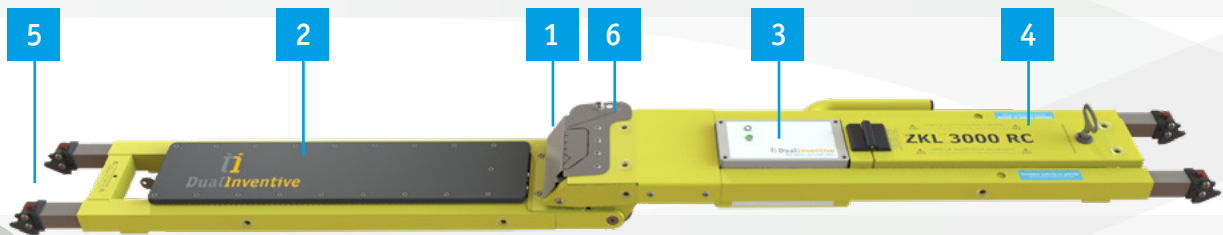
c. Batteries and Chargers

1. Backup battery
2. Charger backup battery
3. External battery
4. Charger external battery

5. CHARGING THE BATTERIES

The ZKL 3000 RC uses two types of batteries and chargers, which are displayed below

a. Instructions prior to use

- The chargers only have an IP20 protection level, so always charge the batteries in a dry, indoor environment
- ALWAYS place the chargers at least 50mm apart for adequate cooling
- Always check the charger and cables for visible damage before use. DO NOT USE the charger if any damage is detected
- Do not charge the batteries in an environment which is below 6°C
- The charger of both the backup battery and the external battery may only be repaired and maintained by Dual Inventive
- Always transport and store the chargers in a dry environment
- Only use the charger that was supplied for that particular model

b. Charging a backup battery

- Plug the charger into a power socket. The green LED will illuminate to indicate mains power
- Connect the battery to the charger. The red LED on the charger will illuminate to indicate the backup battery is being charged
- When the red LED switches off, the battery is fully charged
- The backup battery can stay connected to the charger without causing damage, although after a period of time the red LED may illuminate again

c. Charging an external battery

- Connect the power cable to the battery and then connect the charger to the mains. The two red LEDs on the charger will illuminate
- The fan in the charger should start at this point
- Both LEDs on the charger will remain red when the external battery is being charged
- When charged, one LED will turn green indicating this
- The external battery can stay connected to the charger, however it will not trickle charge

ATTENTION:
If you are to re-use the charger on another battery, please remove the charger from the power before connecting the new battery.

a. Preparations

Before you start, check whether the ZKL 3000 RC system's calibration is still in date.
You can find the "Next calibration date" sticker on the measuring unit.

Before installation, the user should check the ZKL 3000 RC for defects and perform a function test. Testing the ZKL 3000 RC should always be done in a position of safety.

- Before testing, clean the contact points with a wire brush to ensure the best possible connection
- Before use, place two fully charged batteries into the ZKL 3000 RC
- Open the battery cover with the compartment key
- **ALWAYS** place the power cable on the notched side of the battery compartment
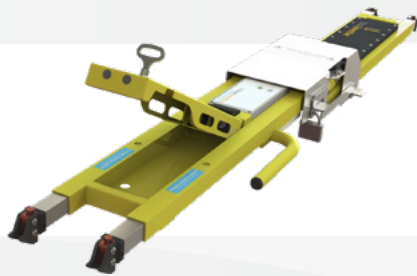
- Insert the batteries and pull the rubber fastener over the battery ends to lock them in position
- Close the battery cover and lock it with the compartment key
- Wait at least 10 seconds after installing the batteries to allow the ZKL 3000 RC to switch on
- Using the override key switch, switch the ZKL 3000 RC on

b. The override key switch

The override key switch has three positions:

Key up (fully clockwise) ↻ **= ON**
The ZKL 3000 RC is now set in an overruled manner and will not produce a short circuit. The unit cannot be operated remotely.

Key horizontal ← **= OPERATIONAL**
The ZKL 3000 RC is now operational and can be operated remotely by either the MTinfo 3000 app or MTinfo 3000.

Key down (fully counter-clockwise) ↺ **= OFF**
The ZKL 3000 RC is now set in an overruled manner and will not produce a short circuit. The unit cannot be operated remotely.

The override key switches the ZKL 3000 RC **ON** or **OFF** without using either the MTinfo 3000 app or MTinfo 3000. Use of the override key will overrule commands sent by both the MTinfo 3000 app and MTinfo 3000 as the key switch always takes priority. Usually, the key switch would only be used as a last resort.

**Attention! The OPERATIONAL position has two settings.**
OPERATIONAL - **ON**: When switched from the **ON** to **OPERATIONAL** (one turn to the left), the ZKL 3000 RC remains activated creating a short circuit. However, it will now be possible to remotely operate the ZKL 3000 RC using either the MTinfo 3000 app or MTinfo 3000.

OPERATIONAL - **OFF**: When switched from **OFF** to **OPERATIONAL** (one turn to the right), the ZKL 3000 RC remains deactivated. Again, it will now be possible to remotely operate the ZKL 3000 RC using either the MTinfo 3000 app or MTinfo 3000.

Attention! Please wait a few seconds after operating the override key. If the override key is switched through multiple positions too rapidly (such as from ON immediately to OFF), the ZKL 3000 RC might not properly register this switch action.

c. Function test for installation
- Ensure that the contact points and the Test-Tool are clean
- With the Test-Tool present (as shown below), press the contact points together and switch the ZKL 3000 RC 'ON' using the override key
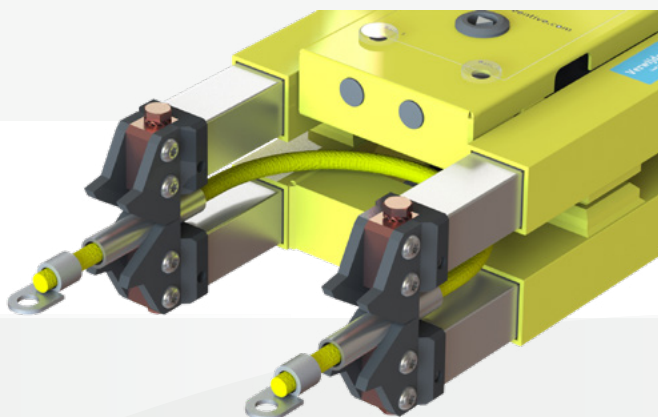
- The green LED should start flashing (twice per second), indicating that a short circuit has been detected. Check this status for at least five seconds
- If all is OK and the green LED continues to flash, switch the ZKL 3000 RC 'OFF' using the override key. The LED should stop flashing. Again, check this for at least five seconds
- If the LED remains off, remove the Test-Tool. The ZKL 3000 RC is ready to be deployed

ATTENTION: If the ZKL 3000 RC does not pass the functional test before installation, do NOT use the unit. Apply a label to the ZKL 3000 RC, quarantine it and return to your depot/warehouse to be returned to Dual Inventive for repair.

a. Installing the ZKL 3000 RC in the track

CAUTION, Please check whether local restrictions, regulations or certification apply to the use of the ZKL 3000 RC.

After successfully testing the ZKL 3000 RC in a position of safety, the ZKL 3000 RC is then ready to be installed in the track. Before doing so, ensure the rails are cleaned as thoroughly as possible (to remove rust build up). This helps to create a good connection between the ZKL 3000 RC and the track. A wire brush, connected to a power tool, is one such solution to clean the rails, as seen in the images below:"

- Ensure that the distance between the bottom of the ZKL 3000 RC and any ballast is at least 3cm
- Set the override key switch of the ZKL 3000 RC to 'ON'
- Unfold the ZKL 3000 RC and place the contact points on the web of the rail
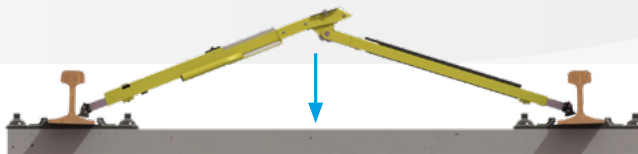
- Partially insert and remove the ZKL 3000 RC during installation several times (being careful to keep it in the same location) before the final placement of the ZKL 3000 RC. The contact points will scrape the rust away from the rail web ensuring a better contact
- Using your hand or foot (and being careful to avoid trapping in the hinge), push the ZKL 3000 RC down until it locks
- The green LED should start flashing (twice per second), indicating that a short circuit has been detected. Check this status for at least five seconds
- Place the locking clamp over the hinge of the ZKL 3000 RC
- Insert the two metal locking plates in the base of the locking clamp
- Next, place the clamp around the two pins and lock with a padlock (as shown below)
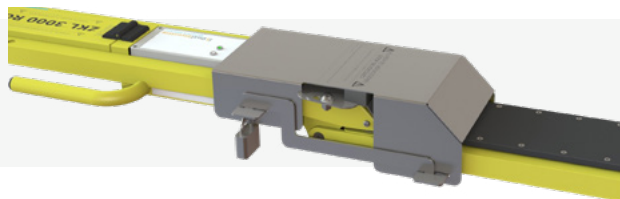
- Place the external battery outside of the track in a safe location and secure it. No padlocks or chains have been supplied for this purpose
- Pass the cable under the rail (on the side of the battery cover where possible) to the ZKL 3000 RC
- Open the battery cover and connect the plug of the external battery with the ZKL 3000 RC using the connection cable to battery slot 2. Otherwise, the ZKL 3000 RC will not function properly

ATTENTION! You should always place the power cable to the side of the notch in the battery compartment.

- Carefully close the battery compartment, ensuring the cable stays within the specially cut hole and lock it using the compartment key
- If you are not using an external battery, you must instead insert a secondary backup battery. Please ensure you always use two batteries. If you use a second backup battery in place of an external battery the power will only last around 24 hours and is therefore not suited for long term deployment

- Apply the bypass clamps to the foot of the rails. The bypass clamps are linked to each contact point of the ZKL 3000 RC. You connect these clamps to the rail by tapping them with a hammer until they are fully placed on the base. This ensures below result.

- Next, test the ZKL 3000 RC for functionality to ensure the ZKL 3000 RC can be switched on and off and is visible in MTinfo 3000. See chapter "Functional test in the track"
- In case of any problems, DO NOT use the ZKL 3000 RC

b. Functional test in the track

Ensure your own safety at all times during the functional test.

The ZKL 3000 RC is now installed in the track and should next be function tested. It is important that you **first read the other chapters before continuing.**
ATTENTION! If you are applying a short circuit with the ZKL 3000 RC in the same section, the **distance to the ZKL 3000 RC should be at least 5 metres.**

- Login on either MTinfo 3000 (https://MTinfo3000.com), or the MTinfo 3000 app
- Find the ZKL 3000 RC using its ID in the real-time status
- Click on the ZKL 3000 RC to verify the status
- For more information, see the manual: Using MTinfo 3000, chapter "Real-time status"

If any of the steps below show a different result than expected, please consult <u>chapter 9, Troubleshooting</u>.

The status is shown as:

Switch status	Switched ON	
Detection OK	OK	
Detection quality	88.21%	
Key position	On	⚠

- Ensure detection quality is at least 80% (if the detection quality hits 0% the detection is NOT OK (NOK) meaning the device will not show a green blinking led). If this is not possible, see the chapter "<u>Placing ZKL 3000 RC in the track</u>".
- From the 'ON' position, rotate the override key back to 'OPERATIONAL' (see <u>chapter 6b, The key switch</u> for additional explanation) and check the real-time status again.

The status is shown as:

Switch status	Switched On	
Detection OK	OK	
Detection quality	88.21%	
Key position	Operational	

- From the 'OPERATIONAL' position, switch the override key to 'OFF' and once again check the real-time status.

The status is shown as:

Switch status	Switched OFF	
Detection quality	88.21% (2019-04-01 10:50:54)	
Key position	Off	⚠

The 'detection quality date/time' field reports the last time the ZKL 3000 RC was switched on and detection was OK (this is only applicable when the switch status is 'OFF').
- From the position OFF, reset the key switch to OPERATIONAL and check the real-time status again.

The status is shown as:

Switch status	Switched OFF	
Detection quality	88.21% (2019-04-01 10:50:54)	
Key position	Operational	

- The function test is now complete.
- Finally, set the ZKL 3000 RC to OFF-OPERATIONAL by using the override key. This will ensure the ZKL 3000 RC is ready for use remotely
- The OPERATIONAL position remembers the device's last switch status and allows you to operate the device remotely through MTinfo 3000 and the MTinfo 3000 app.
It is possible to use the ZKL 3000 RC as a regular ZKL 3000 by leaving it in the ON position.

Do not use the ZKL 3000 RC if you are not sure that the system is functioning properly.

c. LED Indications

You may find the following situations on the ZKL 3000 RC:

- Green led is flashing ➔ status safe
- Cause: ZKL 3000 RC has been switched on and is measuring a short circuit

- Green and red LED are off ➔ no detection
- Possible causes:
    - ZKL 3000 RC has not been switched on
    - ZKL 3000 RC does not have any power
    - ZKL 3000 RC is defective. Remove the ZKL 3000 RC from the track, label, quarantine and send it to Dual Inventive for repairs
    - ZKL 3000 RC does not have a good connection with the rails

Use MTinfo 3000 (https://mtinfo3000.com), or the MTinfo 3000 app
to see the status. More information can be found in the chapter "Troubleshooting"

- If the red LED is permanently illuminated
- Cause: power supply is below desired level
- Solution: Replace the battery as soon as possible

d. Replacing external battery

When the ZKL 3000 RC indicates that the power supply is low, it must be replaced.
- Disconnect the power cable from the external battery
- Insert a fully charged, external battery and connect it to the power supply cable
- The backup battery will start charging automatically
- Report to the relevant person within your organisation that the external battery has been replaced. This is because MTinfo 3000 will report that the battery was disconnected next time a project is released

e. Removing the ZKL 3000 RC from the track

- Remove the external battery and connection cable
- Disconnect the bypass clamps
- Remove the locking clamp from the ZKL 3000 RC
- Open the locking mechanism cover
- Place your fingers in the open area behind the cover and press the palm of your hand on top of the ZKL 3000 RC
- Put your other hand on the cover of the ZKL 3000 RC
- Using your fingers, squeeze open the locking mechanism
- In a controlled manner, pull the ZKL 3000 RC up
- Lift the ZKL 3000 RC out of the track and fold until it locks

Put your other hand on the cover of the ZKL 3000 RC

Place your fingers in the open area behind the cover and the palm of your hand on top of the ZKL 3000 RC
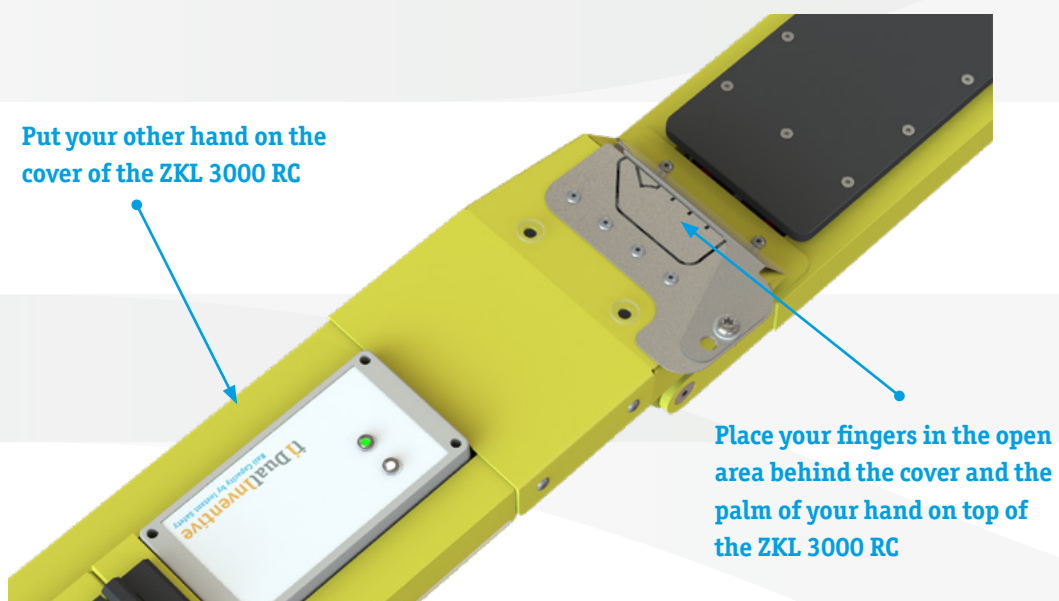
8. ALERTS

a. Status screen alerts

When you click the 'plus' symbol next to a ZKL 3000 RC on the realtime screen, you will see an expanded status view for the ZKL 3000 RC.

Status	Explanation
Device status: Online	The ZKL 3000 RC is connected to MTinfo 3000.
Device status: Offline	The ZKL 3000 RC is not connected to MTinfo 3000.
Last update	The last time the device signaled to the MTinfo 3000 app and MTinfo 3000.
Switch status: Switched ON	The ZKL 3000 RC is switched "ON".
Switch status: Switched OFF	The ZKL 3000 RC is switched "OFF".
Detection: OK	A short circuit has been detected.
Detection: NOK	A short circuit has not been detected.
Key position: Operational	The key switch is in the operational position.
Key position: On	The ZKL 3000 RC is overruled by the key switch and is switched "ON".
Key position: Off	The ZKL 3000 RC is overruled by the key switch and is switched "OFF".
Battery	The battery is connected to the ZKL 3000 RC and is full.
Battery	The battery is connected to the ZKL 3000 RC an has sufficient power.
Battery	The battery is connected to the ZKL 3000 RC but is almost empty.
Battery	The battery is empty.
Battery	The battery is critical.
Battery	The battery has been removed from the ZKL 3000 RC or is completely empty.
Battery volt	Shows the voltage of the ZKL 3000 RC batteries.

b. Error and Alerts

Users with switching rights on a released project will automatically receive alerts via text messages (SMS). Users' mobile phone number is entered as alarm number within the user profile to enable this. The notification service starts as soon as the ZKL 3000 RC has been assigned to a project and the project is released. It is the responsibility of the recipient to act upon these alerts.

NOTE
A notification is a message or a reminder of a message send by MTinfo 3000 to a users' mobile device (tablet, phone). A reminder for a critical notification is an extra service to help the user but it is explicitly not a mitigation of an identified risk.

WARNING
SMS messages will not be delivered to the user if a wrong telephone number is registered or when the user blocks the sender's phone number MTinfo 3000. Verify if you have entered your correct telephone number and do not block the sender.

NOTE
When replacing batteries make sure you install the main battery and backup battery in the correct slot indicated by the label on the ZKL.

The text message alerts that require action are:

Alert	Explanation	Action
ZKL 3000 RC "Serial Number" * Detection NOT ok. Please check manual for more information	ZKL 3000 RC with ID "Serial Number" is no longer creating a proper short circuit in the track. The detection is not OK.	Remove contaminants and reinstall the device to improve the detection. If this doesn't solve the issue replace the device with another device and return for service. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * is offline. Please check manual for more information	ZKL 3000 RC with ID "Serial Number" is offline. The ZKL 3000 RC cannot make a connection to MTinfo 3000.	Restart the device by reconnecting the batteries of the device, move the device 10 meters or check the Status page for network outage. If this doesn't solve the issue contact Dual inventive. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is CRITICAL, the main battery is CRITICAL. Please check manual for more information	Both batteries of ZKL 3000 RC with ID "Serial Number" are critical. The system will send a new alert as soon as one of the batteries is getting depleted.	Replace the Main battery with a full main battery as soon as possible. See 7. INSTALLING THE ZKL 3000 RC.

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8. CONTINUATION ALERTS

Alert	Explanation	Action
ZKL 3000 RC "Serial Number" * The backup battery has sufficient power, the main battery is CRITICAL. Please check manual for more information	The main battery of the ZKL 3000 RC with ID "Serial Number" is critical and the backup battery is ok (either full or half full). The system will send a new message as soon as one of the batteries will reach the next depletion level.	Replace the Main battery with a full main battery as soon as possible. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is CRITICAL, the main battery has sufficient power. Please check manual for more information	The backup battery of the ZKL 3000 RC with ID "Serial Number" is critical and the main battery is ok (either full or half full). The system will send a new message as soon as one of the batteries will reach the next depletion level.	Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery has sufficient power, the main battery is DEPLETED. Please check manual for more information	The main battery of the ZKL 3000 RC with ID "Serial Number" is depleted and the backup battery is ok (either full or half full). The system will send a new message as soon as the ok battery reaches the next depletion level.	Replace the Main battery with a full main battery as soon as possible. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is DEPLETED, the main battery has sufficient power. Please check manual for more information	The backup battery of the ZKL 3000 RC with ID "Serial Number" is depleted and the main battery is ok (either full or half full). The system will send a new message as soon as the ok battery reaches the next depletion level.	Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is DEPLETED, the main battery is CRITICAL. Please check manual for more information	The backup battery of the ZKL 3000 RC with ID "Serial Number" is depleted and the main battery is critical. The system will send a new alert as soon as the main battery is depleted.	Replace the Main battery with a full main battery as soon as possible. Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is CRITICAL, the main battery is DEPLETED. Please check manual for more information	The main battery of the ZKL 3000 RC with ID "Serial Number" is depleted and the backup battery is critical. The system will send a new alert as soon as the backup battery is depleted.	Replace the Main battery with a full main battery as soon as possible. Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is DEPLETED, the main battery is DEPLETED. Please check manual for more information	Both batteries of ZKL 3000 RC with ID "Serial Number" are depleted.	Replace the Main battery with a full main battery as soon as possible. Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.

Alert	Explanation	Action
ZKL 3000 RC "Serial Number" * The backup battery is CRITICAL, the main battery has been REMOVED. Please check manual for more information.	The backup battery of the ZKL 3000 RC with ID "Serial Number" is critical and the main battery has been removed, The system will send a new alert as soon as the backup battery is depleted.	Install a full main battery as soon as possible. Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery is DEPLETED, the main battery has been REMOVED. Please check manual for more information.	The backup battery of the ZKL 3000 RC with ID "Serial Number" is depleted and the main battery has been removed, The system will send a new alert as soon as the backup battery is removed.	Install a full main battery as soon as possible. Check the status of the backup battery in a few hours. If after a few hours it is still not charged then replace the battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery has been REMOVED, the external battery is CRITICAL. Please check manual for more information.	The backup battery of the ZKL 3000 RC with ID "Serial Number" has been removed and the main battery is critical, The system will send a new alert as soon as the main battery is depleted.	Replace the Main battery with a full main battery as soon as possible. Place a full backup battery. See 7. INSTALLING THE ZKL 3000 RC.
ZKL 3000 RC "Serial Number" * The backup battery has been REMOVED, the main battery is DEPLETED. Please check manual for more information.	The backup battery of the ZKL 3000 RC with ID "Serial Number" has been removed and the main battery is depleted, The system will send a new alert as soon as the backup battery is depleted.	Replace the Main battery with a full main battery as soon as possible. Place a full backup battery. See 7. INSTALLING THE ZKL 3000 RC.

c. Error and Alerts - reminders

For the offline and the detection critical events a reminder system is introduced. The reminders are helping the user to remind that there is an unresolved issue with a specific ZKL 3000 RC.
Battery notifications already have an implicit reminder system as the user is notified when the main or backup battery reaches critical and depleted levels.

NOTE
Reminders do not relieve the user of his responsibility to go immediately to the device to inspect it when receiving the first alert massage!

Please, always consult the Real Time Status for the up-to-date situation.

A reminder is sent after a 15-minute interval. A maximum of 3 reminders are sent for one continuously 'not ok'-situation. Reminders are only sent when the device is in active state (i.e. in an activated protection zone).

The reminder text messages are:

Alert	Explanation	Action
Reminder: ZKL 3000 RC "Serial Number" * Detection NOT ok. Please check manual for more information	Reminder message when the detection is not ok and the device is in an activated protection zone.	Remove contaminants and reinstall the device to improve the detection. If this doesn't solve the issue replace the device with another device and return for service.
Reminder: ZKL 3000 RC "Serial Number" * is offline. Please check manual for more information	Reminder message when the device is offline and the device is in an activated protection zone.	Restart the device by reconnecting the batteries of the device, move the device 10 meters or check the Status page for network outage. If this doesn't solve the issue contact Dual inventive.

9. TRANSPORT & STORAGE

a. Transport
- Always use the transport case to transport the ZKL 3000 RC when possible. The ZKL 3000 RC transport cases are equipped with wheels for use on solid ground and are horizontally stackable
- If you transport the ZKL 3000 RC without a case, carry it horizontally next to the body and use the handle ensuring the contact points of the ZKL 3000 RC point forward
- Make sure the locking mechanism is latched shut
- During transport, ensure your own safety at all times

b. Storage
Careful maintenance and adequate storage of the ZKL 3000 RC prolongs its life span.

- Clean the ZKL 3000 RC every four months with a cloth and/or brush
- When frequently used, you should regularly clean the sprung contact legs and the contact points. Debris can cause parts to wear faster
- Clean the contact points with a wire brush
- Use the transport case to store the ZKL 3000 RC and store it in a dry, well ventilated area.
- Do not store a wet ZKL 3000 RC in a closed case for a long period of time. This will cause mould

10. MAINTENANCE & SERVICE

a. Maintenance
It is possible that due to wear and tear, the ZKL 3000 RC's ability to create and detect a short circuit is decreased. This will be noticeable if you have to resend the 'ON' command multiple times, even though the green LED is flashing. In this case, the contact points are probably worn, and they should be replaced. These can be supplied by Dual Inventive. The ZKL 3000 RC does not need to be recalibrated during this maintenance.

To replace the contact points, use a torx wrench T25 to loosen the bolts. After you have completely removed the bolts, you can install the new contact points by reusing these. When installing contact points, please tighten to a torque of 6.1 Nm.
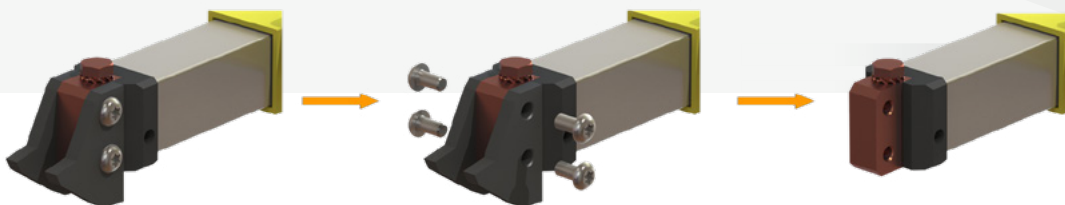
10. CONTINUATION MAINTENANCE & SERVICE

b. Service

Once every four years, the ZKL 3000 RC needs to be recalibrated by Dual Inventive. At the same time they will undertake any remedial maintenance that is required. The "next certification date" stickers indicate when this is due. For more information, please contact us quoting the ID number.

For service and repair please contact your local Dual Inventive representative.

11. ENVIRONMENT & RECYCLING

Equipment Disposal
The ZKL 3000 RC, the LI-ion batteries and peripherals, such as chargers, are not domestic waste. For more detailed information about recycling the equipment, please contact the local authorities or Dual Inventive.

IN CONCLUSION

If you encounter any problems when using our products or are unsure of anything in this manual, please report this to us via info@dualinventive.com, or by phone. Ultimately, customer satisfaction and your safety are our top priority and therefore we take all feedback very seriously. We use this to improve the safety and design of our products. On behalf of the Dual Inventive team, we wish you all the best.

For marketing materials, please visit our website where they have been made available by Dual Inventive. Please visit www.dualinventive.com.

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Ubiquitous Rail