Manual for switching the

ZKL 3000 RC

DualInventive

Ubiquitous Rail

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CONTENTS

1. INTRODUCTION

This manual describes the process of remotely operating the ZKL 3000 Remote Control (RC) Line Blockage System via the Remote Switch (RS) 3000 handheld device or the Dual Inventive Smartphone App.

The RS 3000 handheld device, and the Dual Inventive App both provide remote access to the ZKL 3000 RC system, which safeguards a section of track by producing and monitoring a short circuit which in turn, simulates a train in the track section. This causes the track circuit to be 'OCCUPIED' placing the protecting signals at danger. The section will be immediately closed for rail traffic, enabling rail workers to perform work on the track both safely and efficiently.

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 hand held Remote Switch (RS 3000) and the Dual Inventive App.

2. APPLICATION

The RS 3000 hand held device and the Dual Inventive Smartphone App allow the user to remotely operate one, or a group of, ZKL 3000 RC's in a safe, effective, and efficient manner. These both use Dual Inventive's secured network to connect to the ZKL 3000 RC. You can remotely switch one or a group ZKL 3000 RC's in a period.

3. CONDITIONS & SAFETY INSTRUCTIONS

WARNING!

Please read all safety instructions carefully before using the ZKL 3000 RC. Please ensure you fully understand the system and its functions. When the correct safety measures are not followed, there is a risk of electric shock, fire or even death

a. Conditions for use

Users must only use the RS 3000 when the following criteria are satisfied:

- The user holds an in date ZKL 3000 RC competency
- The user has been assigned the appropriate user rights in MTinfo 3000
- The user has been authorised to use the RS 3000

As a competent user you are responsible for:

- The RS 3000 during use (including installation phase)
- 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 (if applicable) your PIN. You must never share this information with others

3. CONDITIONS & SAFETY INSTRUCTIONS CONTINUED

b. Instructions

— Other important instructions

- Ensure that the RS 3000 battery is charged after use before storing
- Remove the RS 3000 battery after it has been charged and store it in the supplied transport case

— Instructions for first use

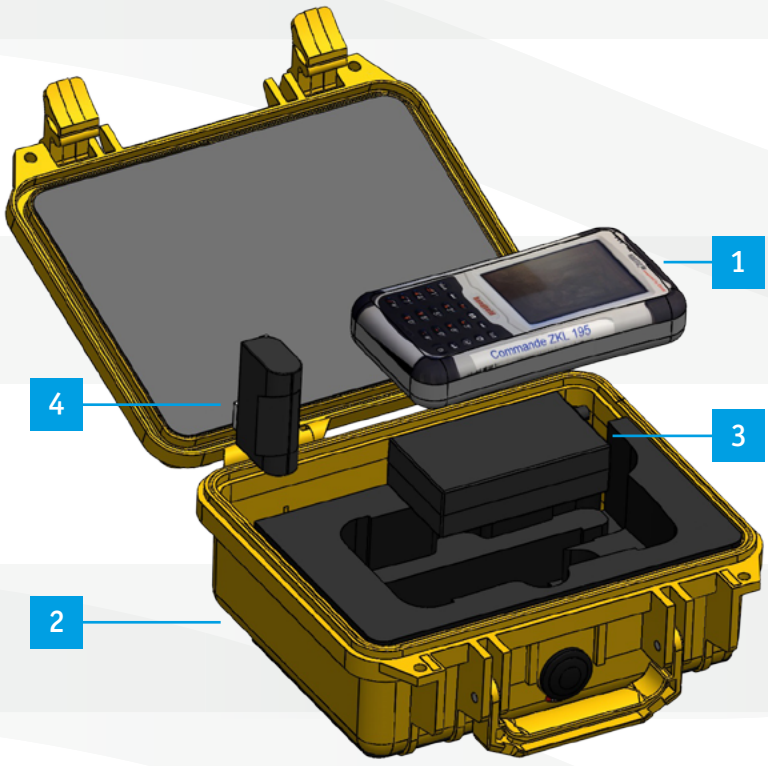
- Check whether the ZKL 3000 RC has the correct certificates. Please consult our website for the list of required certificates: www.dualinventive.eu
- Always take care of your own safety within the railway environment using the most up-to-date, applicable legislation
- Issues may be encountered which mean ZKL 3000 RC's cannot be switched. For more information about these alerts, please see chapter "Errors and Alerts"
- Visually inspect the RS 3000 for damage and perform a function test
- DO NOT USE the RS 3000 if you detect any damage or defects. Please apply a label, quarantine the item and return to your stores to be sent to Dual Inventive
- Only start using an RS 3000 when it has been fully charged. To do so, place the battery in the RS 3000 and attach the charger

4. RS 3000

a. RS 3000 components

A complete RS 3000 set consists of:

1. RS 3000
2. Transport case
3. RS 3000 Charger
4. RS 3000 Battery



4. RS 3000 CONTINUED

5. Keyboard
6. Touch screen
7. Stylus for touch screen
8. ON/OFF button
9. Status display battery
10. Battery
11. Connection for charger

4. RS 3000 CONTINUED

b. Important icons

Log off
This closes the application on the RS 3000 and logs you out

Padlock
This project has not been released and is therefore not accessible

Project overview
Overview of the current projects

Refresh
Refresh the data on screen

Backspace
Remove last input character during switching confirmation

Agenda
Displays an overview of the periods available within the project

Activate real-time status
Activate real-time updates (every 10 seconds) for a 30 minute period

Switching Menu
Back to switching menu of the ZKL 3000 RC

Close
Close application. Back to the main menu

5. CHARGING THE RS 3000

a. Before starting

- The chargers have a protection level of IP20. Always charge the batteries indoors and in a dry environment
- Always check the charger for visible damage before use. Do NOT use the charger if damage is detected
- Always store and transport the chargers in a dry environment

Please note: The chargers of both the backup battery and the external battery may only be repaired and maintained by Dual Inventive

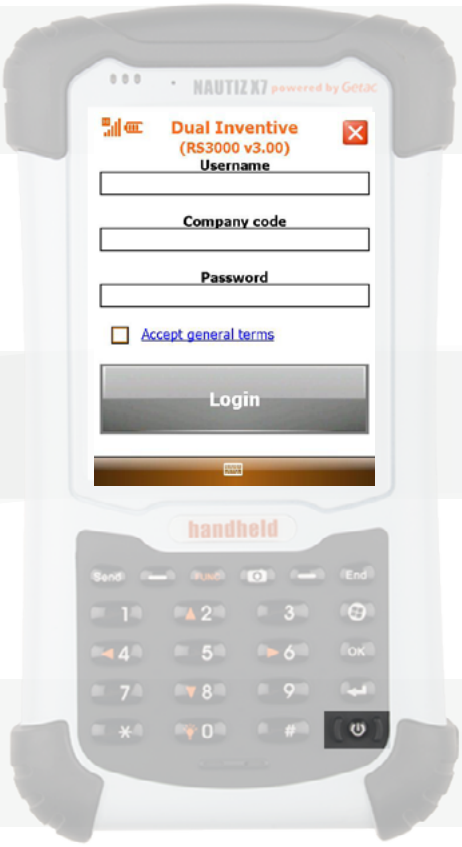
b. Charging the battery

- Please insert the battery in the RS 3000 before connecting the charger. This is done by turning the clip on the back of the RS 3000 anticlockwise and then removing the cover. The battery can then be placed into the slot (it will only fit in one way), the cover replaced and then locked back into position by turning the clip clockwise
- Connect the charger via the charging port on the underside of the RS 3000
- Connect the plug of the charger to a power socket. The light on top of the RS 3000 will turn red, indicating that the battery is being charged
- When the light turns green, the battery has been fully charged

6. USING THE RS 3000

a. Login

- Press the ON/OFF button ⏻ (located in the bottom right hand corner of the keyboard) for approximately 3 seconds to turn on the RS 3000. The unit will take a few minutes to power on
- Enter your login information (User name, Company code and Password), accept the general terms & conditions and press the 'Login' button
- Once logged in, the RS 3000 will show the projects assigned to the current user



6. USING THE RS 3000 CONTINUED

b. Screensaver

When you have not used the RS 3000 for approximately 20 seconds, the display will automatically lock for safety reasons. To unlock, simply swipe your finger over the screen in an L-movement.

If the unit is not used for a longer period, it will go into sleep mode and swiping the screen will not wake the device. To continue use, please press and hold the power button for a couple of seconds until the screen switches back on. A swipe will then be required to unlock the device.

c. Logout

- Click the Logout symbol

- You will be taken back to the login screen
- To completely shut down the RS 3000, press the ON/OFF button ⏻ on the keyboard for approximately 5 seconds
- Always recharge the battery after use
- Remove the battery after it has been fully charged

7. OPERATING THE RS 3000

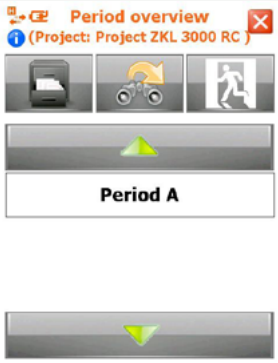
a. Select project

- Once logged in, the RS 3000 will display the projects the logged in user is assigned to
- Select the required project from the list
- Non-released projects are indicated by a padlock. Selecting these projects will display the name and phone number of the project leader

7. OPERATING THE RS 3000 CONTINUED

b. Select period

- After selecting a project, the screen will then display the periods contained within it
- Select the required period



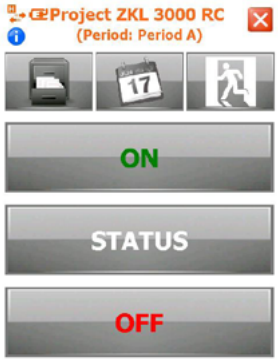
c. Equipment status

Once a period has been selected, the following screen will be displayed. The meaning of the bars on the screen is:

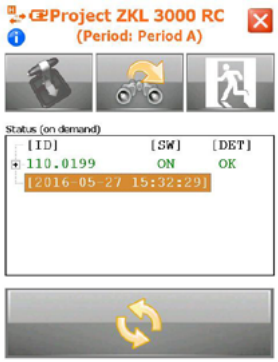
ZKL 3000 RC(s) on.

Check status of ZKL 3000 RC(s).

ZKL 3000 RC(s) off.



- Press the STATUS button to check the status of the selected ZKL 3000 RC(s) during the selected period
- The status of the selected ZKL 3000 RC [ID] will be displayed on the screen under [SW] and [DET]



[SW]	[DET]	Explanation
ON	OK	ZKL 3000 RC is switched on and is producing a good short circuit
ON	NOK	ZKL 3000 RC has been switched on, but is not producing a good short circuit
OFF	NOK	ZKL 3000 RC has been switched off and is no longer creating a short circuit
-	-	ZKL 3000 RC cannot be contacted

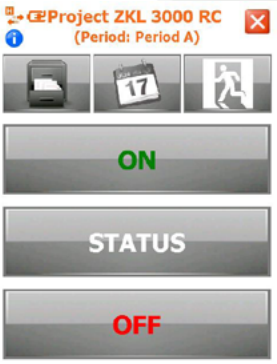
Please note, for more information, please see chapter 8. "Alerts".

7. OPERATING THE RS 3000 CONTINUED

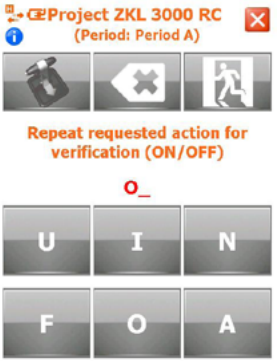
- When the 'plus' icon next to a ZKL 3000 RC is pressed, the status box will expand to give more details on the ZKL 3000 RC (as shown to the right)
- When you press Activate status, the status of the selected ZKL 3000 RC will be updated every 10 seconds for the next 30 minutes. An alarm will sound if the status changes without being commanded by the RS 3000

d. Switching using the RS 3000

To switch the ZKL 3000 RC(s) in the period, select one of the 'ON' or 'OFF' buttons.



A verification screen will then appear.



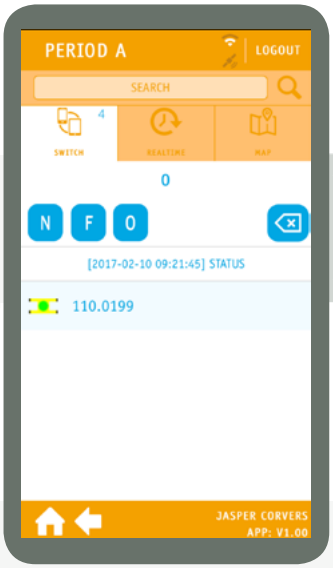
- Confirm your choice by typing either "ON" or "OFF" using the on screen keyboard **(ATTENTION! the letters are not always in the same place)**
- Once 'ON' has been entered, the green LED on the ZKL 3000 RC will start to blink and then the unit will report that it has been switched on
- Once 'OFF' has been entered, the green LED on the ZKL 3000 RC will switch off and then the unit will report that is has been switched off

Please note, for more information, please see chapter 8 "Alerts".

Alternatively, periods can also be switched using the web interface MTinfo 3000 (where product approval allows). Please read the manual MTinfo 3000 for this, chapter "Switching".

7. OPERATING THE RS 3000 CONTINUED

e. Switching using the Dual Inventive APP

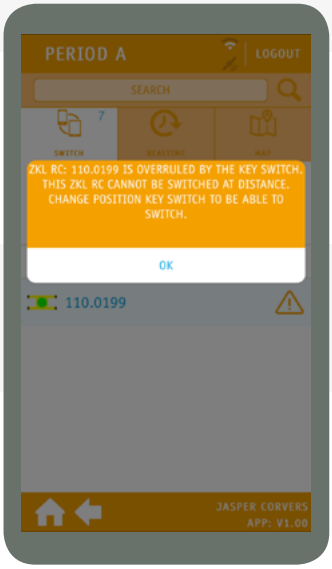


You can switch ZKL 3000 RCs via the RS 3000 module within the Dual Inventive smartphone App, providing that the project has been released and the user is assigned to the project.

Attention: you must have a PIN setup for this in MTinfo 3000, as it is not possible to use SMS verification for this action. The project lead / internal contact person can set this up via MTinfo 3000 during user maintenance.

Switching ZKL 3000 RCs on a project:

- Go to the RS3000 function on the RS3000 hand held device or within the Dual Inventive app
- Select the project to be switched
- Select the period
- Go to the tab “Switch”
- Switch the relevant ZKL 3000 RCs on the period by selecting “On” or “Off”
- Now enter the correct letters (ON or OFF) to switch the device **(ATTENTION! the letters are not always in the same place)**
- Confirm your switching action with your PIN code



After sending the switch command, the screen will refresh to display the updated status of the ZKL 3000 RC(s), indicating whether they have been successfully switched or not. Any errors will be shown on this screen with a red cross symbol or orange triangle symbol. Clicking on this will reveal further information about the problems. In the event that the switching action was not successful, repeating the command again is recommended.

Next to the switching action, you can also view the real-time status of the ZKL 3000 RC(s) via the “Real time” tab. It is also possible to see the location of the ZKL 3000 RC(s) via the “Map” tab.

You may encounter situations that prevent you from switching the ZKL 3000 system. For more information about these notifications, please seethe ZKL 3000 RC Installation manual, chapter 8 “Troubleshooting”.

8. ALERTS

a. Status screen alerts

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

Status	Explanation
Measurement: ON	The ZKL 3000 RC is now switched "ON"
Measurement: OFF	The ZKL 3000 RC is now switched "OFF"
Detection: OK	A short circuit has been detected
Detection: NOK	A short circuit has not been detected
Switch: ON	The ZKL 3000 RC is in the "ON" position
Switch: OFF	The ZKL 3000 RC is in the "OFF" position
Key: OPERATIONAL	The override key is in the operational position
Key: OVERRULED	The override key is in an overruled position
Batt 1: OK	The backup battery is connected to the ZKL 3000 RC and has sufficient power
Batt 1: ALMOST EMPTY	The backup battery is connected to the ZKL 3000 RC, but is almost empty
Batt 1: EMPTY	The backup battery is empty
Batt 1: REMOVED	The backup battery has been removed from the ZKL 3000 RC or is completely empty
Batt 2: OK	The external battery is connected to the ZKL 3000 RC and has sufficient power
Batt 2: ALMOST EMPTY	The external battery is connected to the ZKL 3000 RC and is almost empty
Batt 2: EMPTY	The external battery is empty
Batt 2: REMOVED	The external battery has been removed from the ZKL 3000 RC or is completely empty
Status: -	The ZKL 3000 RC cannot be reached

8. ALERTS CONTINUED

b. SMS alerts

Users with switching rights on a released project will automatically receive alerts via SMS. Those not on a project can also receive these, however this will need to be arranged with the company contact person as they will need to register the mobile phone number as an additional alarm number using MTinfo 3000. Monitoring starts as soon as the ZKL 3000 RC has been powered on. It is the responsibility of the recipient to act upon these alerts (more information is available in the ZKL 3000 RC Installation Manual).
The text message alerts that require action are:

SMS alert	Explanation
Project: 'Manual ZKL 3000 RC', Period 'A' released.	Project "Manual ZKL 3000 RC" containing Period "A" has been released
Project: 'Manual ZKL 3000 RC', Period: 'A' has been returned	Project "Manual ZKL 3000 RC" containing Period "A" has been returned
ZKL 3000 X * DET. ALARM	The ZKL 3000 RC X is no longer detecting a short
ZKL 3000 X * BATT1. ALARM * BATT2. OK	The backup battery of ZKL 3000 RC X is (almost) empty. The external battery is ok
ZKL 3000 X * BATT1. OK * BATT2. ALARM	The external battery of ZKL 3000 RC X is (almost) empty. The backup battery is ok

c. Error and alerts

Error	Explanation and solutions	Further reading
ZKL 3000 RC offline in real-time status	Try again, check the batteries and if needed use the override key switch	Check batteries: ZKL 3000 RC Installation manual, chapter "Preparation" Use key switch: ZKL 3000 RC Installation manual, chapter "Key switch"
Override key is not in setting OPERATIONAL	ZKL 3000 RC has been overruled with the override key. It is not possible to remotely operate this ZKL 3000 RC. Rotate override key to 'OPERATIONAL' to allow remote switching	Use key switch: ZKL 3000 RC Installation manual, chapter "Key switch"
Short circuit already present	When switching, a short circuit was already detected in the vicinity (section is not empty). The ZKL 3000 RC cannot guarantee it is creating the short circuit. Check the section and try again before proceeding. Always be certain of a proper short circuit (in an empty space)	Execute functional test: ZKL 3000 RC Installation manual, chapter "Functional test in the track"
Short circuit still present after ZKL 3000 RC has been switched off	ZKL 3000 RC has been switched off, but a short circuit is still being measured in this section. Try removing the ZKL 3000 RC from the track	Execute functional test: ZKL 3000 RC Installation manual, chapter "Functional test in the track"

8. ALERTS CONTINUED

Error	Explanation and solution	Further reading
ZKL 3000 RC has been switched on, but there is no (proper) short (DET NOK)	Connection with the ZKL 3000 RC has been lost (partly or decreased quality). Try switching again. If this doesn't work, attempt to use the override key. If still encountering problems, please contact Dual Inventive	Placing ZKL 3000 RC: ZKL 3000 RC Installation manual, chapter "Placing the ZKL 3000 RC"
After switching ZKL 3000 RC on, there is no immediate (proper) short circuit (DET NOK)	ZKL 3000 RC short has not been detected (DET NOK). Please attempt to reseat the ZKL 3000 RC in the track and check again	Placing ZKL 3000 RC: ZKL 3000 RC Installation manual, chapter "Placing the ZKL 3000 RC"
After switching ZKL 3000 RC, SWITCH remains ON	ZKL 3000 RC has not been successfully switched OFF. Try again or use the override key switch.	Use key switch: Installation manual ZKL 3000 RC, chapter "Key switch"
After switching ZKL 3000 RC ON, SWITCH remains OFF.	ZKL 3000 RC has not been successfully switched ON. Try again or use the override key switch	Check batteries: Installation manual ZKL 3000 RC chapter "Preparation" Use key switch: Installation manual ZKL 3000 RC, chapter "Key switch"
ZKL 3000 RC SWITCH status unknown whilst being switched ON	The ZKL 3000 RC is experiencing issues communicating with the switch. Please repeat command, and if the problem persists, take it out of service	Execute functional test: Installation manual ZKL 3000 RC, chapter "Functional test in the track"
ZKL 3000 RC SWITCH status unknown whilst being switched OFF	There is no guarantee about the status of the ZKL 3000 RC. Be certain of a switched off short circuit (in an empty section) by contacting the signaller	Execute functional test: Installation manual ZKL 3000 RC, chapter "Functional test in the track"
No projects available in RS 3000 after login	No 'released' projects are available. Consult the project lead	Consult the project lead
RS 3000 has poor or no connection to the internet	Move to another location, restart the RS 3000 and try again, switch via the computer or use the override key switch.	Use key switch: Installation manual ZKL 3000 RC, chapter "Key switch" Switch via MTinfo 3000: Preparation manual MTinfo 3000, chapter "Switching" Switch via RS 3000: Manual using RS 3000, chapter "Switching"
ZKL 3000 RC battery 2 is almost empty	External battery of ZKL 3000 RC is almost empty. Replace battery as soon as possible	Check batteries: Installation manual ZKL 3000 RC, chapter "Preparation"
ZKL 3000 RC battery 2 is empty	External battery of ZKL 3000 RC is empty. Replace battery	Check batteries: Installation manual ZKL 3000 RC, chapter "Preparation"
No ZKL 3000 RC in period	Consult the project lead	Consult the project lead

9. MAINTENANCE & SERVICE

Please contact Dual Inventive for service, repairs and maintenance.

10. ENVIRONMENT & RECYCLING

The RS 3000 and its peripherals, such as chargers, should not be considered domestic waste. For more detailed information about recycling of the equipment, please contact your local authorities or Dual Inventive.

11. CONCLUSION

If you encounter any problems whilst 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 users safety are our top priorites 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.

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