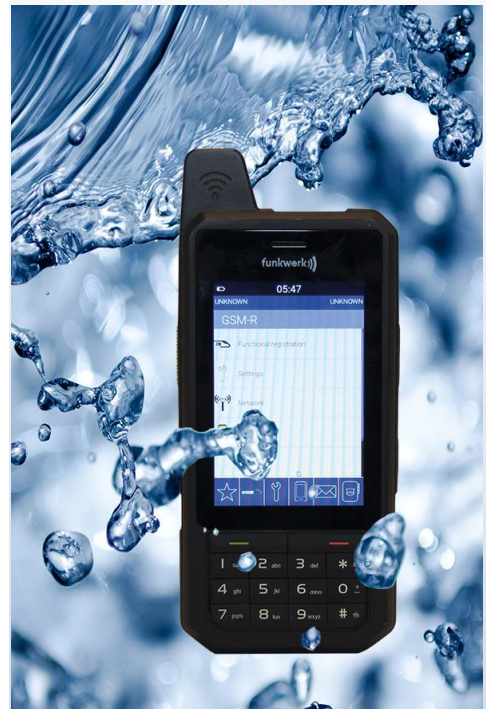


User Manual

Handheld
focX[®]2



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CAREFULLY READ THE ENTIRE DOCUMENT BEFORE USE!

KEEP THE DOCUMENT FOR FUTURE USE!

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1 About the contents

This document describes the use, the technical structure and operation of the handheld radio focX 2.

Read this manual carefully before using the unit. It contains important information to support you in the correct and proper use of the device. Important safety instructions are highlighted separately in the individual chapters.

Target group

All users of the device

Service Technician

Maintenance, commissioning and servicing personnel

Maintenance staff on the railway lines

train driver, conductor, shunting personnel, secondary controller

2 Basic safety messages

The device may be used for its intended use only. Any other use is deemed to be inappropriate.

2.1 Identification of warning messages

Warning messages for personal and property damages

This document contains warning messages for your personal safety as well as for prevention of property damages. The messages are highlighted by a symbol and a signal word that classify the hazard level. The warning messages are either at the beginning of a section or before a concrete action step. Depending on the hazard level, the warning messages are displayed in decreasing order as follows:



CAUTION

indicates a possibly dangerous situation that could result in minor or moderate injury



ATTENTION

indicates a possibly harmful situation, in which the device or an item in its surroundings could be damaged

General notice



IMPORTANT

indicates instructions for use and other particularly useful information

2.2 Note on use

- ▶ Switch the handheld off if it is damaged or is not in perfect working order. Prevent it from being started up again and arrange for it to be checked by authorised skilled personnel.
- ▶ Ensure that the handheld is always securely fastened to your clothing while carrying it.
- ▶ Do not use the handheld in temperatures outside the temperature range information given in the technical data.
- ▶ Protect the handheld from extreme weather conditions.
- ▶ Avoid lengthy direct sun exposure of the handheld.
- ▶ Do not expose the handheld to strong magnetic fields, such as those that can occur, e.g. near induction-heated melting furnaces and induction cookers.

2.3 Dangers of personal damages

The device have been developed and manufactured using state-of-the-art technology and in accordance with approved safety-related norms and regulations. However, unavoidable residual hazards for the user or third parties may result from the device, or impairments to the device or to material assets may occur.

For your own safety, please follow the safety precautions below:

- ▶ Observe all safety and warning messages at all times.
- ▶ Observe the valid regulations for accident prevention and environmental protection applicable to your country.
- ▶ Observe the safety rules and regulations of the country where the device is used.

Radio interference

The radio frequency transmission can interfere with other electronic equipment and cause malfunctions. Interferences with the technical equipment cannot be completely excluded.

- ▶ NEVER operate the device on aeroplanes or near to medical implants or equipment.
- ▶ Switch off the device in areas in which the use of hand-held devices is prohibited. Note and follow all information signs and instructions.

Interference

The device can cause interference with other electronic equipment, especially medical devices, for example, pacemakers.

- ▶ We recommend that the handheld always be carried on the side of the body facing away from the medical device.
- ▶ Do not carry the device immediately above the pacemaker, for example, in a breast pocket.

Please ask the manufacturer of the respective medical device if you are uncertain. Follow all regulations, warnings and instructions.

Risk to your hearing

- ▶ To avoid hearing damage, do not set the volume too high.
- ▶ Do not hold the device near your ear when using hands-free mode.
- ▶ Hearing damage can also occur if a headset with microphone is used. Reduce the volume before connecting and using the headset with microphone.

2.4 Storage information

- ▶ Where possible, store the GSM-R Desk terminal in the original packaging or in non-conductive packaging, which protects it against moisture and dirt.
- ▶ Ensure that the withdrawable battery holder is not soiled during storage.
- ▶ During lengthy storage, the battery should be recharged every 3 to 6 months.

2.5 Accessories information

- ▶ Only use accessories recommended by Funkwerk; this ensures safe and efficient use of the handheld.

2.6 Notes on the rechargeable battery

- ▶ Only use the rechargeable batteries recommended by Funkwerk Systems.
- ▶ Use the rechargeable batteries for their intended purpose only.
- ▶ Only charge the battery at temperatures of between +10 and +45 °C.
- ▶ Completely charge the battery before using the handheld for the first time. Avoid overcharging to extend the life of the battery.
- ▶ Do not charge the battery if it or the device have become wet.
- ▶ Switch off the device before replacing the battery.
- ▶ Ensure that the metal contacts on the battery do not touch other metal objects. This can cause a short-circuit and therefore damage to the battery.
- ▶ Do not throw the battery into a fire, it could explode.
- ▶ Rechargeable batteries are wearing parts. Over time, the lithium ionen rechargeable battery of your handheld loses its original performance / capacity through use, long storage and ageing. These capacity losses are normal and do not justify warranty claims.

2.7 Notes on charger and plug-in power supply units

- ▶ Chargers and plug-in power supply units may only be installed and operated outside hazardous areas (potentially explosive atmospheres). They are designed for use in office-like environments.
- ▶ Protect the charger from heavy dirt, dust, moisture and liquid as well as direct thermal radiation.
- ▶ Disconnect the charger from the mains when it is not in use.
- ▶ The charger and plug-in power supply unit do not contain any parts that can be repaired or serviced by the user. Any interventions may only be carried out by the manufacturer or by authorised skilled personnel.
- ▶ Before you disconnect an outwardly damaged plug-in power supply unit from the plug, disconnect the plug from the power supply.

The following safety messages are intended to help you to identify and avoid hazards in time. In addition, concrete warning messages are before the dangerous actions.

Property Damage

Follow the instructions below to ensure perfect function and operating safety of the device:

- ▶ Only run the system if it is in a technically perfect condition.
- ▶ Correct any faults in the device immediately.
- ▶ Do not modify or alter the devices without authority.
- ▶ Only use original spare parts from the manufacturer.
- ▶ Observe the assembly information.
- ▶ Only install software with a higher version.
- ▶ Perform a functional test after each maintenance work.

3 Product description

3.1 Use

Intended use The handheld is a device for data and voice transmission used for railway internal communication between fixed and mobile subscribers or between mobile subscribers together. The device intended for use in digital train, construction and shunting radio applications as well as, if applicable, for operational and maintenance radio applications. It also contains smartphone-specific functions.

The device must not be used in explosion hazardous areas, on aeroplanes or near to medical equipment.

Radio applications The device offers the following radio applications:

- Train radio and station radio links in accordance with EIRENE FRS 8.1 / SRS 16.1, including optional functions
 - VGCS, VBS, eMLPP
 - Functional numbering
 - Location-dependent addressing
 - Emergency railway calls
- IP-based data and voice communication (point-to-point calls) as well as supplementary services (e.g. SMS) in the digital radio network of public networks
- data radio according to EIRENE SRS:
 - asynchronous 2.4 kbps T
 - asynchronous 2.4 kbps NT
 - asynchronous 4.8 kbps T
 - asynchronous 4.8 kbps NT
 - asynchronous 9.6 kbps T
 - asynchronous 9.6 kbps NT

Smartphone properties The device offers the following smartphone features:

- Android-based system
- Simultaneous operation in GSM-R and public 2G/3G/4G networks (dual mode)¹

Radio interfaces The unit is designed as a dual-mode unit using two radio modules.

The GSM-R module and the 2G/3G/4G module can logged into their network at the same time. It is possible to communicate with the GSM-R module in the GSM-R network and receive data and calls with the 2G/3G/4G module in the background and vice versa.

¹ available with future SW version

3.2 EU conformity and official approval

Funkwerk Systems GmbH confirms that the product meets the following requirements:

- all safety and health requirements of the EU directive applicable
- directive 2014/53/EU (RED)

The detailed declaration of conformity is deposited with the manufacturer.

3.3 Device overview



Figure 1 Device overview

The focX 2 is an OPH (Operational Purpose Handheld) – GSM-R handheld radio including smartphone functions. This type of device is designed for mobile use. The battery and the back cover are replaceable components.

Housing properties

- The housing is made of a stable and abrasion-resistant plastic with a rotating rubber seal.
- The non-slip ribbing on the sides and back allow operation with work gloves.
- Special scratch-resistant and mechanically resilient viewing window on the display.
- Resistance to chem. influences, e.g. engine oil, brake fluid, etc.

Loudspeaker and microphone

The device is equipped with two loudspeakers.

- above the display on the front side,
- on the rear of the housing for the hands-free function.

The device is equipped with one microphone:

- for near and hands-free talking

Enclosed accessories

Each unit is enclosed with a power supply unit, a USB cable, a plug adapter and a headset.

3.4 Designation system and product identification

Due to the structure and diverse optional features, the functional hardware and software modules of the device are individually coded and labelled.

The **hardware** is marked with the following information:

Type

Type number and type designation encode a hardware device type.

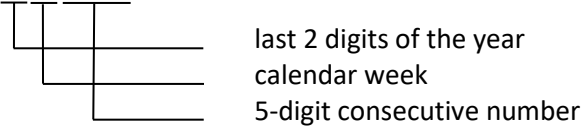
Device state

Hardware changes are registered via the device state (GS). The device state is coupled to the type number and is transferred to the type variant number derived from this.

Serial number

The serial number is used for unique identification of the delivered device and for product tracking and has the following structure:

230200178

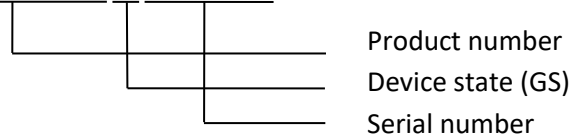


Identification

Every device is provided with a type plate and device-dependent with an additional identification label.

The following product data is coded:

1405.150-0000101230200178



Product number

1405.150-xxxxx focX 2 (OPH)

3.5 Technical data in overview

Environmental characteristics	
Operating temperature	-25 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Protection class	IP65
Waterproof	Permanently waterproof up to 1.00 m Depth
Dust-tight	Dust-impermeable
Shock resistant	Shock-protected
	Dust-impermeable
Relative humidity	annual average 75%, 30 days a year permanently 95%
Chemical resistance	against influence from brake fluid, engine and gearbox oil
Dimensions	
Height	147.5 mm
Width	72.2 mm
Depth	35 mm
Weight	approx. 342 g
Technical Data	
Display	3.5" colour display, 320 x 480 pixels (HVGA)
Display resolution	HVGA 320*480, min 165 PPI
TFT viewing angle stability	120°
brightness	min. 320 cd/m ²
Audio	1 microphones, 2 loudspeakers
Battery	5.500 mAh lithium-ion battery (replaceable)
Radio features	
Frequency bands	
2G/GSM/GSM-R	ER-GSM/GSM 900/E-GSM 900/DCS 1800
3G/WCDM ²	B1/B2/B5/B8
4G/LTE ²	B1/B3/B5/B7/B8/B20/B28/B34/B38/B39/B40/B41/B42
Transmission power	2 W (GSM/GSM-R), 1 W (DCS 1800), 250 mW (3G/WCDM), 200 mW (4G/LTE)
WLAN	IEEE 811 Standards a/b/g/n/ac
Bluetooth	BLUETOOTH 5 BLE
Interfaces	
<ul style="list-style-type: none"> • USB-C (data interface, headset, external operating device/microphone, external plug-in power supply) • GNSS (GPS, Galileo, Glonass, Beidou) • NFC 	

² available in future software versions

-
- Bluetooth for accessories
 - Connection for headset and other accessories with 3.5 mm jack or USB-C
 - Memory expansion with SD memory card up to 128 GB
 - 13 MP camera (with Full HD video)
-

Extras

- automatic band detection
 - GSM ASCII application (Phase 2+)
 - GSM-R application without shunting mode
-

Table 1 Technical data

3.6 SIM card

GSM-R For operation a 1.8 V or a 3 V plug-in SIM card according to GSM 11.11 and GSM 11.12 is required. The SIM card must contain the following entries:

- group number 299 (emergency call in train radio)
- group number 200 (group call “Drivers in the same area”)
- group number 599 (emergency call in shunting radio)³
- group number 500 (general shunting group)³
- own call number (MSISDN)

In order that the EIRENE requirements are fully met, the SIM card must contain all data according to FFFIS for GSM-R SIM Cards – P 38 T 9001 (MORANE).

2G/3G/4G Public SIM card

The SIM card is not included in the scope of delivery.

3.7 Software

The application software of the device has a modular structure and is divided into several parts, each of which implements a specific range of functions. The GSM-R application implements the basic functions of the device including EIRENE functions. The configuration of the devices enables different extensive device functionalities depending on the device software used.

Transferring applications and configuration files to the device is possible by connecting a USB-C connection cable and managing using the installed file system.

The update menu is the configuration tool for the handheld. This allows you to configure and adapt the units to the environment. The update menu is used to:

- Update of the GSM-R application

³ optional

- Import configuration files
- Updating of the GSM-R module
- Import / export phone book

The language of the user interface can be adjusted.

3.8 States and signals

- Status Displays
The displays are used to visually display operating states.

States and signals

- Device ready (Indication Ready for Operation)
- Connection is available
- Incoming status calls
- Incoming SMS
- Incoming single calls
- Incoming group calls
- Ready to talk (during a group call)
- Network connection interrupted
- Battery is running low.

4 Transport and storage

4.1 General environmental conditions

- storage temperature range: -40 to $+70$ °C
- maximal gradient of temperature fluctuation: ± 1 °C/min
- relative humidity: ≤ 75 %
- protected from dirt and dust
- damaged gas-free
- no mechanical stress (shock, vibration)
- non-condensing

4.2 Notice for transport and storage

- ▶ Check the packaging for transport damage immediately. Check the contents of damaged packaging for visible damage. Report transport damage to the manufacturer immediately.
- ▶ Avoid knocks and impacts during the in-house transport.
- ▶ Store the products in their original packaging.
- ▶ Do not store heavy items on the products.
- ▶ Dispose the packaging material according to the locally valid regulations.

5 Installation instructions

5.1 Scope of delivery



IMPORTANT

Check the delivery to ensure it is complete.

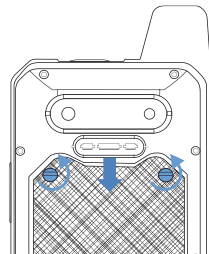
The scope of delivery includes:

- Handheld
- Power supply unit
- USB-C cable
- Multi-country adapter
- Headset
- Screwdriver

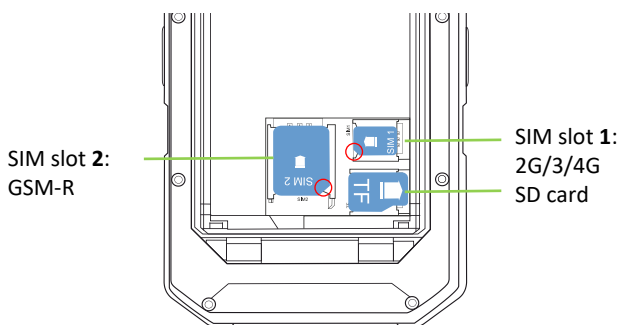
5.2 Insert SIM cards and micro SD card

The SIM card is not included in the scope of delivery.

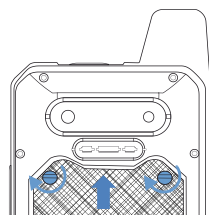
The SIM card slot is located on the rear side of the device.



1. Undo the fixing screws (2x) on the battery cover with the enclosed screwdrivers .
Turn the screws anti-clockwise.
2. Remove the battery cover.
3. Remove the battery.



4. Insert the card(s), with the contacts facing downwards, into the card holder.
SIM slot 1: 2G/3/4G
SIM slot 2: GSM-R
The cut-off edge of the SIM card must fit into the cut edge of the holder.
5. Insert the micro SD card with the contacts facing downwards, into the card holder.



6. Replace the battery.
7. Close the battery cover.
8. Tighten the fixing screws (2x) on the battery cover with the enclosed screwdrivers.
Turn the screws anti-clockwise.

6 Commissioning

6.1 Visual inspection

Check the device for clean workmanship, lack of identifiable mechanical damage and that all the labels are intact. Check the screw connections for flawless quality.

6.2 Charge the battery

When the device heats up while charging the battery

While charging, the device and the charger may become hot. During wireless charging or fast charging, the device may feel hotter to the touch. This does not affect the device's lifespan or performance and is in the device's normal range of operation. If the battery becomes too hot, the charger may stop charging.

Do the following when the device heats up:

- ▶ Disconnect the charger from the device and close any running apps. Wait for the device to cool down and then begin charging the device again.
- ▶ If the lower part of the device overheats, it could be because the connected USB cable is damaged. Replace the damaged USB cable with a new one.
- ▶ When using a wireless charger, do not place foreign materials, such as metal objects, magnets, and magnetic stripe cards, between the device and the wireless charger.



IMPORTANT

Only use included USB type C cable.

6.2.1 Charge battery using plug-in power supply

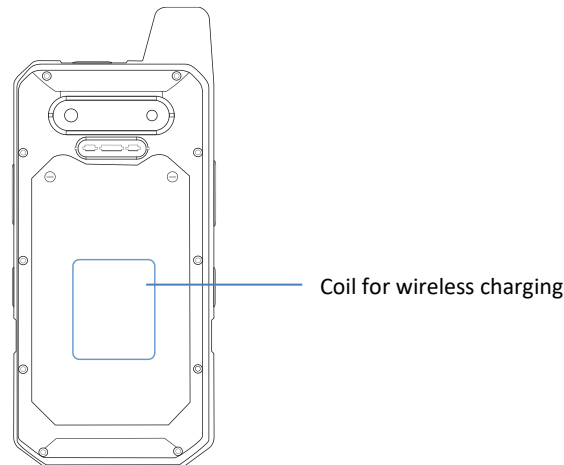
1. Connect the micro USB cable to the micro USB port on the device and the other end to the power supply unit.
2. Plug the mains plug into a properly installed mains socket with 230 V.
The battery symbol is displayed dynamically and indicates that the device is charging.
4. Disconnect the power supply unit from the device if the battery symbol indicates a fully charged battery.
Note: Do not charge the battery for longer than given. Otherwise the life of the battery could be reduced.
5. Unplug the mains plug from the mains socket.

6.2.2 Wireless charging

Prerequisite:

- ✓ Charging station must support inductive charging.
- ✓ Install the charging station according to the instructions and observe the notes.

Placement of the coil



Charge the device:

1. Place the rear of the device in the centre of the inductive charging station. At the same time, the charging indicator lights up to indicate that wireless charging is working properly. The charging status can be read on the screen by the battery symbol.
Note: The position of the charging coil on the charging station may vary depending on the unit model. It may be necessary to move the devices until they connect properly.
When using accessories, the performance of wireless charging may be limited. If charging performance is impaired, remove the accessories.
2. When fully charged, remove the device from the charging station.

Tips for inductive charging

- The rear of the unit and the charger should be clean and free of dust.

7 Operation and use

7.1 Operating elements

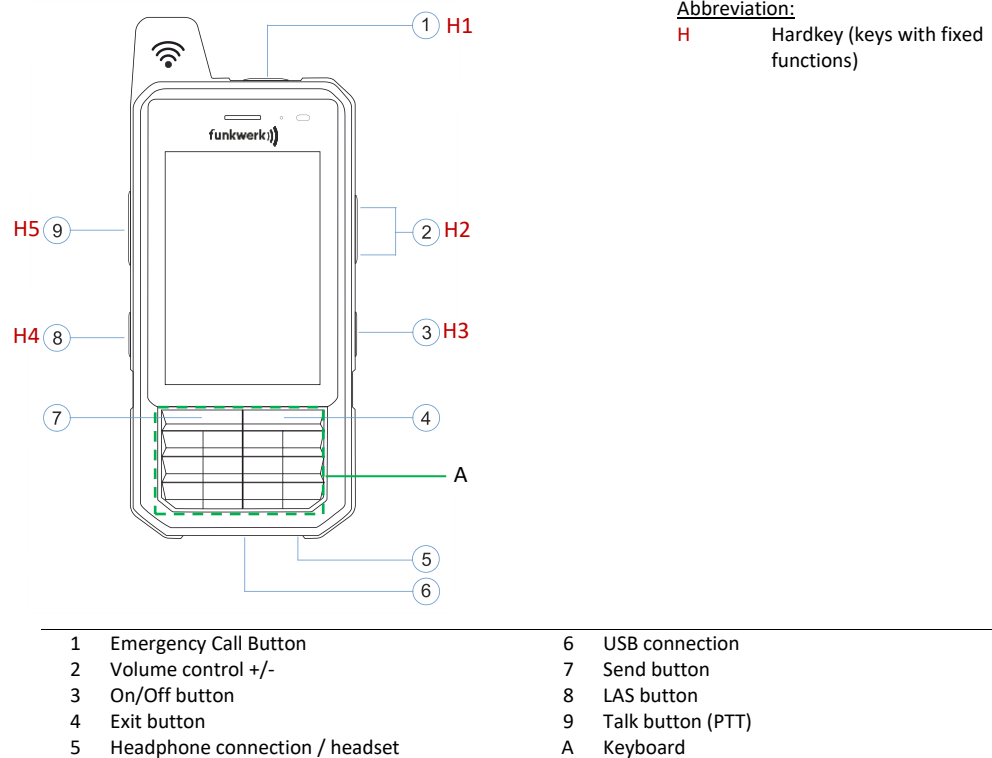


Figure 2 User interface

Abbreviation:
HK Hardkey (keys with fixed functions)

Design

- Display** The main component of the display is a colour display with background illumination. The display is made of a special scratch-resistant and mechanically resilient material. The colour display is suitable for day and night use.
- Keyboard** The keyboard is below the display element. The keyboard consists of a 14-key keypad.
- Emergency Call Button** The emergency button is at the top section of the device. In addition, the PTT button must always be pressed as confirmation. The emergency button is of sufficient size and has a distinct pressure point. This allows one-handed operation with thick winter and work gloves.
- PTT button** The device is equipped with a PTT button. The PTT button is located on the left side of the device.
- Loudspeaker** The loudspeakers serve for voice communication between the subscribers. The handheld is equipped with two loudspeakers. A monitor speaker in the upper

section and a speaker for hands-free operation on the back of the device. The device can also be used in noisy environments.

- Microphone** The microphone is used for voice communication between the participants. The handheld is equipped with one microphone.
- Volume control** The volume control is located on the right side of the device. It is used to adjust the volume separately for handset and handsfree.
- Charging port** The charging connection is located on the underside of the device. An external power supply unit can be connected to this.

7.2 Switching the device on and off

Switching on

1. Press the **H3** button for a longer time to switch on the device.
2. Enter the PIN⁴ (only necessary, if the PIN query is activated on the SIM card). The SIM card data is exported. This can take up to 2 minutes during first-time commissioning.

The device logs into the network. The device is in now in the basic menu.

Initialisation



Basic state



Switching off

Self-discharging of the battery while the device is switched off! Self-discharging of the battery while the handheld is switched off can have a negative effect on the handheld's readiness for service (availability). Regularly recharge the battery if stored for a lengthy time without use.

1. Press the **H3** button for a longer time to switch off the device. A query dialogue appears.
Restart: To be able to reboot the system.
Off: The unit switches off.

⁴ If required.

Emergency: Public emergency call⁵ is initiated.

2. Confirm with Off.

The device disconnects the connection. The display and keypad lighting is switched off. All existing call connections are terminated. The temporary functional numbers are deregistered.

The device switches itself off after a short time.

7.3 Operation touch display

The touch display can be operated by pressing and swiping your fingers.

Select	By pressing on the display, you can select an icon or a specific option.
Extended selection	You can access further menu options by holding down items. For example, if you select a contact and press and hold it, you can select additional functions via the menu in the top right-hand corner.
Scroll	Swipe your finger up or down, right or left across the screen.
Move elements	Press and hold an element with your finger and then drag it in the desired direction.

⁵ If available

8 Maintenance and instructions

This chapter describes the necessary preventive maintenance work. The following table contains the steps necessary to ensure reliable, sustained fault-free operation.

Inspection	Work to do	Remark
Visual inspection	Visual inspection for external damage Replace affected device.	
	Check for external dirt, clean if necessary.	Observe maintenance instructions
Cleaning	External moist cleaning. Polish the surface of the display with a soft dry cloth	Observe maintenance instructions

Table 2 Maintenance

Maintenance instructions

Do not use chemicals, solvents or strong cleaning agents to clean the handheld, charger and all accessories.

If necessary, wipe down the housing using a damp cloth. Never use a dry cloth. This could cause static charging.

Maintenance instructions for the battery

The performance of the battery will be retained for a long time if you take into account the following information and instructions.

- Charge the battery immediately as soon as it is almost discharged.

If the handheld radio is not expected to be used for several days, switch off the device. This prevents the battery from self-discharging.

Strong heating during storage or during operation has a negative effect on the life of the battery. Never expose the battery to direct sunshine or other heat sources for any extended length of time.

8.1 Update

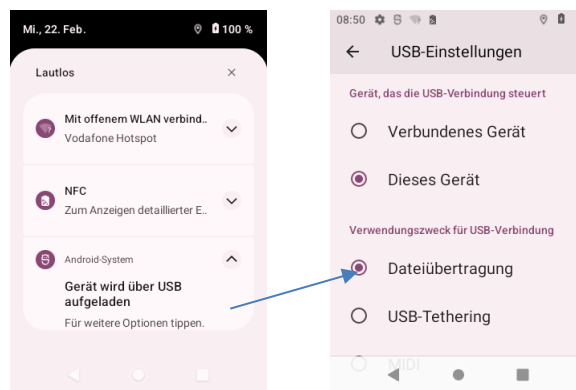
With the update menu, it is possible to upload application software or new configuration files. These files are provided by Funkwerk (for more information, please contact your Funkwerk partner).

Prerequisite:

- ✓ The file must first be copied to the device via USB. This file must be stored on the device in the download directory. The file is provided by Funkwerk.

Connect the device to the PC

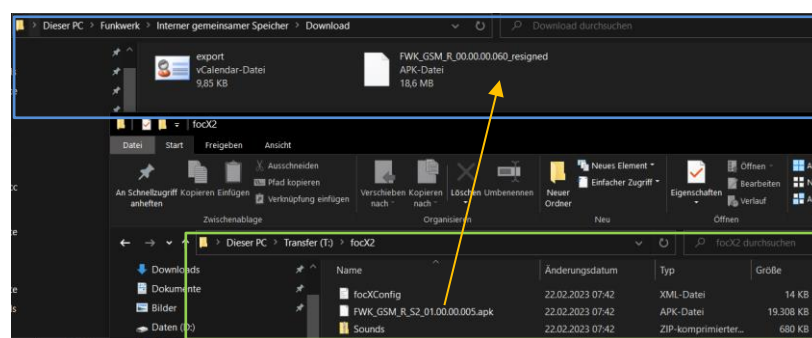
1. Connect the USB-C cable to the corresponding port on the device.
2. Connect the USB end to the corresponding port on the PC.
3. Enable file transfer via USB **Charging this device via USB > File transfer**.



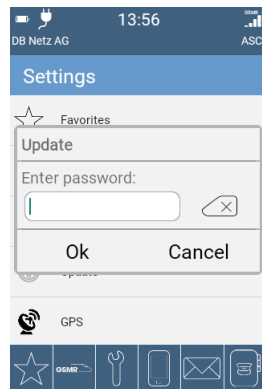
Transfer files


4. Transfer files

Here by example: Update focX2 00.00.00.060 auf 01.00.00.005.



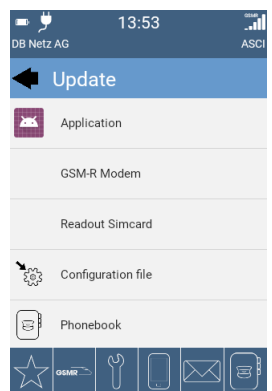
focX 2 App



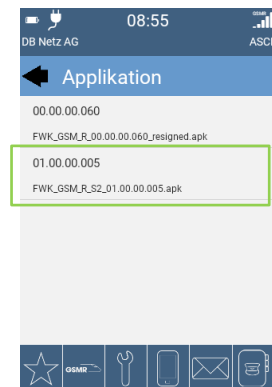
5. Open menu  **Settings > Update**.
The password input dialogue box appears.
6. Enter password **6666**⁶.
7. Confirm entry with **OK**.

Note: If an invalid password is entered, the system returns to the menu.

Menu Update



- Update Applikationssoftware
- Update 2W module > Chapter 8.1.1
- Import configuration file > Chapter 8.1.2



8. Open menu **Applikation** öffnen.
9. Select and tap the new application.
10. Confirm entry with **OK**.
The app now installs the latest version and then restarts automatically.

⁶ Can be changed by configuration.

8.1.1 Update GSM-R module

The GSM-R module software is updated with this function.

Prerequisite:

- ✓ The file must first be copied to the device via USB. This file must be stored on the device in the download directory. The file is provided by Funkwerk.


1. Open Menu  **Settings > Update > GSM-R Modem.**
2. Select file.
3. Confirm with **OK**.

8.1.2 Import configuration file

This function serves to transfer a configuration file to the device. Existing configuration data is overwritten.

Prerequisite:

- ✓ Configuration file must be copied to the device via USB before. This must be stored on the device in the [config]- directory. The configuration file is provided by Funkwerk.

1. Open Menu  **Settings > Update > Configuration file.**
2. Select configuration file.
3. Confirm with **OK**.

9 Decommissioning

Permanent Decommissioning

If the device is to be permanently removed from service or prior to disposal, the following actions are required:

- ▶ Delete data worth protecting.
Data that should be protected from unauthorised access, such as voice recordings, phone book entries, RF field monitoring data and other recordings must be deleted.

10 Returns

Returning defective and to be disposed of devices:

- ▶ Unless agreed otherwise, return the defective devices to the manufacturer, if possible in the original packaging of the replacement device.

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- ▶ If the original packaging is no longer available for return transport, a standard ESD packaging must be used. The standard packaging must be suitable for rail and road transport.
- ▶ Ensure there are no voids and the device is packed in a secured location and protected against impact.

11 Disposal



This symbol reminds you that electrical equipment must never be disposed of in the household waste. Instead, hand in the handheld to a collection point for electrical equipment, which then recycles the product.

Hand in this electrical and electronic equipment and all the device components, e.g. used batteries, to a public collection point for electronic waste. All harmful components of this end-of-life equipment are separately collected there and are disposed of in an environmentally friendly way according to their harmfulness.

All other components that do not contain harmful components are recycled or reused as secondary raw materials.

Always dispose of batteries in a discharged state.

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List of abbreviations

DIN	Norm adopted by the Deutsches Institut für Normung (German Standards Organization)
EG	Europäische Gemeinschaft (European Union)
EIRENE	European Integrated Radio Enhanced Network
EMC	Electromagnetic Compatibility
EN	European Norm
FFFIS	Form Fit Function Interface Specification
FRS	EIRENE Functional Requirement Specification
GPS	Global Positioning System
GS	Gerätstand (device state)
GSM	Global System for Mobile Communications
GSM-R	Global System for Mobile Communications - Railway
IMEI	International Mobile Station Equipment Identity
IP	Ingress Protection (Protection classification to IEC 60529)
ISDN	Integrated Services Digital Number
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MORANE	Mobile Radio for Railway Network in Europe
MSISDN	Mobile Station ISDN
PS	Power Supply
RAL	Colour register of "Deutsches Institut für Gütesicherung und Kennzeichnung e.V."
RGB	Three-color theory (Red-Green-Blue)
RoHS	Restriction of Hazardous Substances
SD	Secure Digital Memory Card
SIM	Subscriber Identity Module
TFT	Thin Film Transistor
VDE	Verband der Elektrotechniker e.V. (German Association for Electrical, Electronic & Information Technologies)
WEEE	Waste from Electric and Electronical Equipment (Europäische Direktive zur Entsorgung von Elektro- und Elektronikschrott)
WVGA	Wide Video Graphics Array