LANTRONIX®

FOX3 Series
Promotion Kit User Guide

FOX3-2G Series
FOX3-3G Series
FOX3-4G Series

Intellectual Property

Warranty

For details on the Lantronix warranty policy, please go to our web site at https://www.lantronix.com/support/warranty/.

Contacts

Lantronix, Inc.
48 Discovery, Suite 250
Irvine, CA 92618, USA

Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support
Online: https://www.lantronix.com/technical-support/

Sales Offices
For a current list of our domestic and international sales offices, go to the Lantronix web site at https://www.lantronix.com/about-us/contact/

Disclaimer

Open Source Software

Some applications are Open Source software licensed under the Berkeley Software Distribution (BSD) license, the GNU General Public License (GPL) as published by the Free Software Foundation (FSF), or the Python Software Foundation (PSF) License Agreement for Python 2.7.3 (Python License). Lantronix grants you no right to receive source code to the Open Source software; however, in some cases, rights and access to source code for certain Open Source software may be available directly from Lantronix' licensors. Your use of each Open Source component or software is subject to the terms of the applicable license. The BSD license is available at http://opensource.org/licenses. The GNU General Public License is available at http://www.gnu.org/licenses/. The Python License is available at http://cmpt165.csil.sfu.ca/Python-Docs/license.html/. Your use of each Open Source component or software is subject to the terms of the applicable license.

OPEN SOURCE SOFTWARE IS DISTRIBUTED WITHOUT ANY WARRANTY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SEE THE APPLICABLE LICENSE AGREEMENT FOR ADDITIONAL INFORMATION.

You may request a list of the open source components and the licenses that apply to them. Contact your regional Lantronix sales associate at https://www.lantronix.com/about-us/contact/.

Revision History

Date	Rev.	Comments
02/12/2015	1.0.0	- Initial version.
06/02/2015	1.0.1	- Updated: chapters 2.2 Related documents and 6.1 How does the FOX3-2G/3G/4G firmware operate?
06/03/2015	1.0.2	- Changed: STARTER-KIT to PROMOTION-KIT
06/04/2015	1.0.3	- Added figure 14 in chapter 6.3 Installing your own SIM card and replacing the internal battery
06/05/2015	1.0.4	- Added basic configuration settings when using your SIM card and TCP server - see chapter 6.3 Installing your own SIM card and replacing the internal battery

06/23/2015	1.0.5	- Added new items in the PROMOTION-KIT:
		    1) USB to serial converter with extension cable
		    2) External antenna (ANT-11 for FOX3 only and ANT-12 for FOX3-3G and ANT-14 for FOX3-4G device)
		    3) 8 hours free technical support

12/21/2017	1.0.6	- Added explanation of the sample configuration – see chapter 5 - Extended the contents of promotion kit – added CA27, CA76 and CA123
05/09/2018	1.0.7	- Extended the contents of promotion kit – added CA27, CA76 and CA123
July 2019	A	Initial Lantronix document. Added Lantronix document part number, Lantronix logo, branding, contact information, and links.
May 2021	B	- Removed ANT-11 (EOL). -Made minor document enhancements.
August 2023	C	- Replaced D2Sphere with ConsoleFlow.
June 2024	D	- Replaced ConsoleFlow with Percepxion. - Updated Workbech Installation and Configuration. - Updated FOX3 series preloaded Sample Configuration. - Updated part numbers for accessories. - Replaced FOX3 series with FOX series as reference to product page and in URLs for product page.

For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

Table of Contents

1   About this Document

This document provides customers information about the FOX3-2G/3G/4G PROMOTION-KIT, to easily and quickly evaluate the product and all its functionality.

This document is written assuming the user has basic computer knowledge, and is familiar with the Windows operating environment.

1.1   Audience

This document is intended for system integrator and application developers.

1.2   How this document is organized

This guide consists of following chapters:

- Chapter **2**, "Overview" gives an overview of the PROMOTION-KIT and describes its contents.

- Chapter **3**, "Getting started" provides installation instructions of the PROMOTION-KIT and testing its functionality.

- Chapter **4**, "Telematic Eval Kit – Hardware Description" provides an overview of the Telematic Eval Kit and describes how to use it.

- Chapter **5**, "Explanation of the sample configuration" provides information about the configuration preloaded at the factory. It shows the functionality of each alarm configuration and the description of each configuration parameter settings.

- Chapter **6**, "Appendix" provides information how the firmware operates and information about the included installation cables. Here is also explained how to operate with your own SIM card and how to login the FOX3-2G/3G/4G device to your own remote server.

2   Overview

This PROMOTION-KIT provides all the necessary hardware, software, and documentation to easily and quickly evaluate the performance of your FOX3-2G/3G/4G device. The FOX3-2G/3G/4G device is shipped pre-configured allowing system integrators and developers to test the factory-preloaded configuration and see how the FOX3-2G/3G/4G device works. You can register the device on Percepxion, the centralized device management server. Once the device is powered up, you can configure it to establish connectivity with and then add it Percepxion for monitoring. Percepxion supports two-way communication interface between server and device and lets you track all activities of the device, pull and change the factory-preloaded device configuration. You need an internet enabled computer (PC client) with a pre-installed standard web browser to get started with the PROMOTIO-KIT.

2.1   Scope of delivery

PROMOTION-KIT consists of 1 outer box with 3 small boxes inside. Before you start up the PROMOTION-KIT, make sure that your package includes the items listed in **Table 1** below. If any item is missing or damaged, please contact your vendor immediately..

In addition to the D8 interface, the IOBOX-CAN device offers several flexible features such as CAN-Bus interface and programmable inputs and outputs for almost every application within the automobile industry. For more details, please refer to the chapter 3.1, and download the document *"FOX3_3G_4G_HardwareManual.pdf"* from our website.

Figure 1: PROMOTION-KIT delivery package.

Article name	QTY	Description
FOX3-2G/3G/4G (BOX)		
FOX3 unit	1	FOX3 series unit with factory-preloaded configuration. The device is placed in the IGN-Sleep mode prior to being shipped from the factory and can be woken up via IGN-Switch or a high signal on IGN-pin.
ACC-510-0013-00 (Battery)	1	1000 mAh rechargeable battery (already inserted and connected to the FOX3-2G/3G/4G device)
PREMIUM-FEATURES	-	All PREMIUM-FEATURES are activated by the factory. For details how to use them refer to the corresponding Application Notes listed in chapter 2.2.
SIM-Card	1	Prepaid Lantronix Connectivity Services SIM card with 250MB of data and 2 months access to Percepxion for evaluation purposes.
60140 60168	1	Depending on which Promotion Kit you ordered, one of the following external antennas will be part of your kit: 60140 : Penta Band GSM/WCDMA combination antenna for FOX3-3G. 60168 : GSM/UMTS/WCDMA/LTE and GNSS combined antennas for FOX3-4G. More details: https://www.lantronix.com/products/fox-series/.
Instruction sheet	1	Necessary information how to get started with Lantronix AVL devices.
FOX3-2G/3G/4G – Telematic Eval Kit		
Telematic Eval Kit	1	To test the functions of the FOX3-2G/3G/4G device and allows connection to your PC for evaluation purposes.

USB to SERIAL converter and cable	1	This cable allows a serial connection through the USB port of the PC to the serial port of the Telematic Eval Kit
60044	1	Main port service and power connection cable
60353	1	Installation cable for FOX3-2G/3G/4G with interface to the RFID-Reader or JAZZ2. This cable allows to install your FOX3-2G/3G/4G to the vehicle.
60048	1	This cable allows testing of the available pins on the accessory port of the FOX3-2G/3G/4G (e.g. 1-Wire bus). It has a 4pin connector for connecting to a RFID-Reader or JAZZ2 device.
-	1	Accessory port service cable with 2x3pin connector to DB9 female socket with a length of 1.0 m
60286	1	2x4pin connector to OBDII cable with separated IGN-wire. Cable length of 1.5 m
POWER-SUPPLY-BOX		
Power Suppy	1	15 V incl. UK/US/AU/EU adaptor

Table 1: The list of items included in the PROMOTION-KIT.

2.2   Related documents

The following tables list all the user documents and application notes related to FOX3 series devices. The latest user documents are available at www.lantronix.com/resources/documentation/ and application notes are available at www.lantronix.com/resources/application-notes/.

User Documents:

NR	Document	Description
[1]	**PFAL Command Reference**	Contains the description of the internal firmware and the complete list of supported PFAL commands used to manage/administer different parts of an application built on the FOX4 series devices.
[2]	**FOX3 Series Hardware Manual**	Contains information about the hardware of FOX3 series devices.

Table 2: User Documents

Application Notes:

NR	Document	Description
[3]	**Application Note: Transform History Binary Data in NMEA format for AVL devices and STEPII, MAMBO/2**	Contains instructions to decode history data that is transmitted from an AVL device via TCP connection.
[4]	**Application Note: Remote Firmware Update with Workbench Software**	Contains instructions to upgrade AVL devices to a new firmware version remotely via TCP (server-based application).
[5]	**Application Note: In-Vehicle Installation Guidelines for FOX3-2G/3G/4G and Bolero40 Series**	Provides all the necessary instructions to install your product properly and safely in a vehicle.
[6]	**Application Note: Eco-Drive-GPS Premium-Features in AVL Firmware 2.11.0 and above Part Number**	Contains information about the features of the GPS-ECO-DRIVE supported as PREMIUM-FEATURE in the firmware version avl_2.11.0 and above.
[7]	**Application Note: ADAVNCED ENCRYPTION STANDARD (AES_TCP) PREMIUM FEATURE in AVL Firmware 2.10.0 and above**	Contains information about the features of the AES_TCP (ADVANCED ENCRYPTION STANDARD) supported as PREMIUM-FEATURE in the firmware version avl_2.10.0 and above.
[8]	**Application Note: Activation of Premium-Features for FOX3-2G/3G/4G and Bolero40 Series**	Contains instructions to activate a PREMIUM-FEATURE on an AVL device.
[9]	**Application Note: Communication of Passive RFID Reader and FOX3 Series via Serial Link**	Contains instructions to connect and use an RFID-Reader to/with AVL devices.
[10]	**Application Note: CAN Applications with AVL Devices**	Contains instructions to connect AVL devices to a vehicle, and to configure and use the CAN-Bus features.
[11]	**Application Note: How to collect FMS/J1939/OBD-II data with FOX3-2G/3G/4G Series**	Contains instructions to connect AVL devices to a vehicle, and to configure and use the CAN-Bus/FMS/OBDII features.
[12]	**Application Note: Firmware WebUpdate for FALCOM AVL devices**	Contains instructions to upgrade an AVL device firmware remotely over the air.

NR	Document	Description
[13]	**Application Note: Connecting a bar code scanner to STEPPII, STEPIII, Bolero-LT or FOX device**	Contains instructions to connect a bar code scanner to an AVL device and transmit the scanned data.
[14]	**Application Note: AVL_Software_Update.pdf**	Contains instructions to upgrade an AVL device firmware to a new version locally via serial port.
[15]	**Application Note: Getting started with 1-Wire Devices**	Contains instructions to use the 1-Wire interface on the FOX4-4G Series.
[16]	**Application Note: Reading real-time data from digital tacograph with IOBOX-CAN and FOX3 series**	Provides information to configure your FOX4 series devices in combination with the accessory box IOBOX-CAN/WLAN, to connect the IOBOX-CAN/WLAN to the D8 connector of the digital tachograph, to read real time data from this interface, and to transfer them to your platform server.
[17]	**Application Note: How to use IOBOX-WLAN with a FOX3-3G/4G series device**	Provides information to configure your FOX4-4G series devices in combination with the accessory box IOBOX-WLAN, to connect the IOBOX-WLAN to your AP (access point) and send data over WLAN to your platform server.

Table 3: Application Notes

These PDF files are viewable and printable from Adobe Reader. If you do not have the Adobe Reader installed, you can download it from http://www.adobe.com.

3   Getting Started

3.1   PROMOTION-KIT hardware set up

This chapter explains how to connect and set-up the PROMOTION-KIT.

To install the PROMOTION-KIT:

1. Unpack the PROMOTION-KIT.
2. Connect the FOX3 unit to the Telematic Eval Kit, PC and apply power.
3. Charge the internal battery of the FOX3-2G/3G/4G and power up the device.
4. Install the Lantronix Workbench software and start the evaluation of the FOX3-2G/3G/4G device
5. Access the online documentation from the Lantronix website FOX series product page.

3.1.1   Unpacking the PROMOTION-KIT

Unpack the contents as shown in the figure below.

Figure 2: Boxes inside the PROMOTION-KIT.

PROMOTION-KIT Contents:

1) FOX3 or FOX3-3G (pre-configured, incl. SIM-Card and battery)
2) Telematic Eval Kit
3) USB-to-serial converter (incl. cable)
4) Power supply
5) US/UK/AU/EU adaptor
6) ANT-12 OR ANT-14 (external antenna)
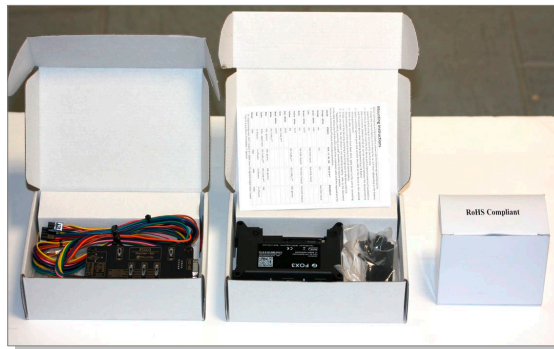7) CA31 - Main port installation cable
8) CA69 - Accessory port cable
9) Mounting instructions

Figure 3: PROMOTION-KIT contents.

3.1.2 Connecting FOX3-2G/3G/4G to the Telematic Eval Kit

1. Before starting initial operation, switch all switches on the Telematic Eval Kit to "OFF" (factory default setting).

2. Plug in the 8pin double row connector (1a) of cable (1) to the 8pin main port on the FOX3-2G/3G/4G device. To unplug, press the "lever" on the back of this connector (1a) and pull it out.

3. Plug in the 6pin double row connector (1b) of cable (1) to the 6pin accessory port on FOX3-2G/3G/4G. To unplug this connector press the "lever" on the back of this connector (1b) and pull it out.
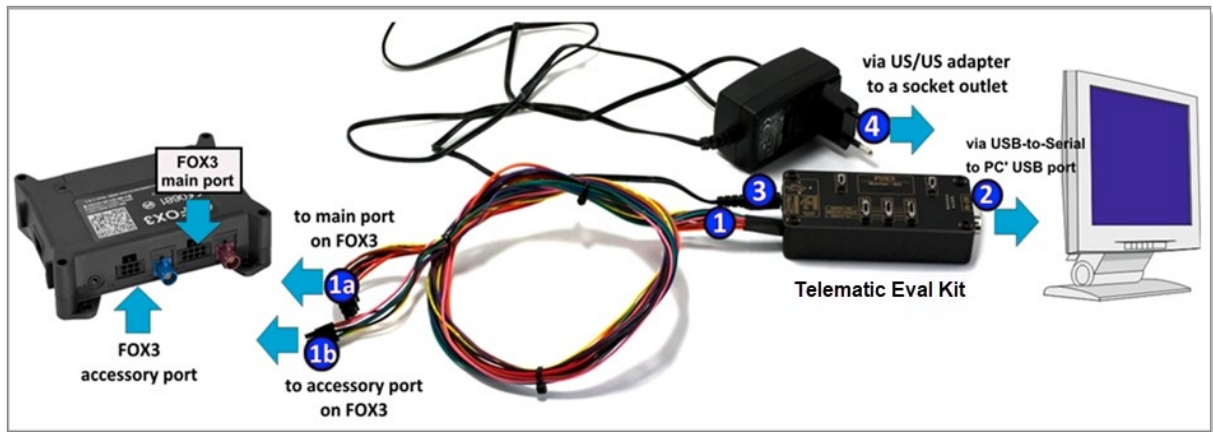

Figure 4: Connecting PROMOTION-KIT to FOX3-2G/3G/4G and PC

4. Now, unpack the power supply from the box and plug it into the left input socket on the Telematic Eval Kit marked "INPUT 12.0V … 32.0V". Then plug the AC adapter into the wall socket of your 220V electric mains (to access British/American wall socket use the included UK/US adaptor accordingly).

5. *Important: Even the FOX3-2G/3G/4G series devices provide two serial ports the Telematic Eval Kit offers only one serial port for the communication with them. That means if you would like to connect and test a third-party-product to a FOX3-2G/3G/4G series device you have to use the second serial port (the serial port [RX,TX,GND] on the 6pin connector) instead of the first serial port which is available on the Telematic Eval Kit. That means, please do not reconfigure the first serial port, except when you have already a self-made serial cable for the second port (accessory port).*

3.1.3 Charge the internal battery and power up the device

The internal battery in the device may be shipped with a minimal charge and will need to be fully charged before use.

To charge the internal battery, follow the steps below:

1. After connecting the AC adapter to the Telematic Eval Kit and into the wall socket, apply power to the Telematic Eval Kit and FOX3-2G/3G/4G device by turning just the "**+IN**" switch to "**ON**" position.
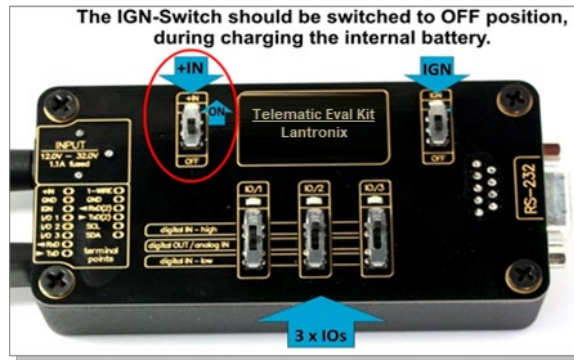
Figure 5: Overview of the Telematic Eval Kit top panel (+IN = ON)

1. Depending on the battery charge state, the charging time may by different but usually it takes 3-4 hours to fully charge the internal battery.

2. After the battery is fully charged, unpack the USB to serial converter and the USB extension cable. Remove the USB cover on the converter and connect the USB cable to the converter (1), see figure below. Plug the serial port of the converter to the COM port of the Telematic Eval Kit (2). Finally, plug the other end of the cable into a free USB port on your PC (3). This cable is used for communication between the FOX3-2G/3G/4G and Workbench software for sending and receiving data as well as to change the configuration stored in the FOX3/3G device.
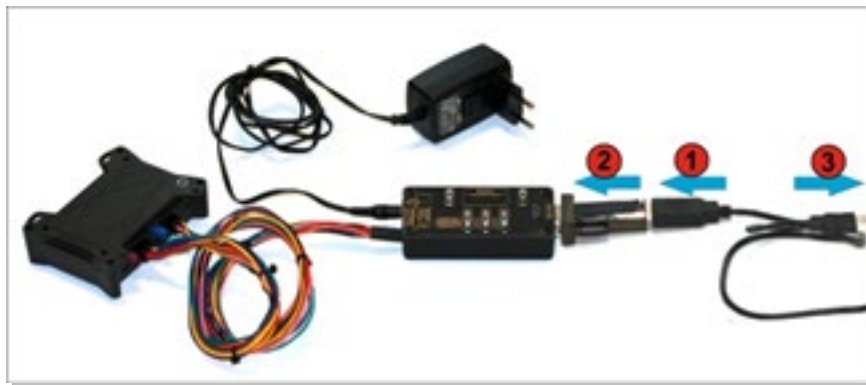

Figure 6: Connecting the converter with the USB cable

3. Finally, power up the FOX3-2G/3G/4G device by turning the "**IGN**"-switch to "**ON**" position.
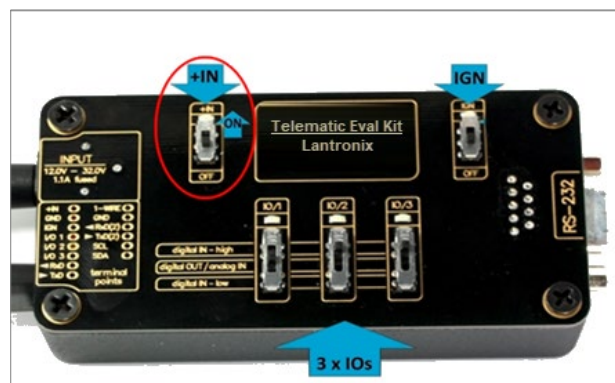

Figure 7: Overview of the Telematic Eval Kit top panel (IGN = ON)

"+IN" It supplies power to the Telematic Eval Kit and FOX3-2G/3G/4G.

"IGN"   It turns on the FOX3-2G/3G/4G (wakes it up from the IGN sleep mode).

---

4. If you want to use the FOX3-2G/3G/4G with external antenna, remove first power from the device, unpack the supplied antenna and connect both ends of the antenna to the same colours of FAKRA connectors on the FOX3/3G and power up the device again.
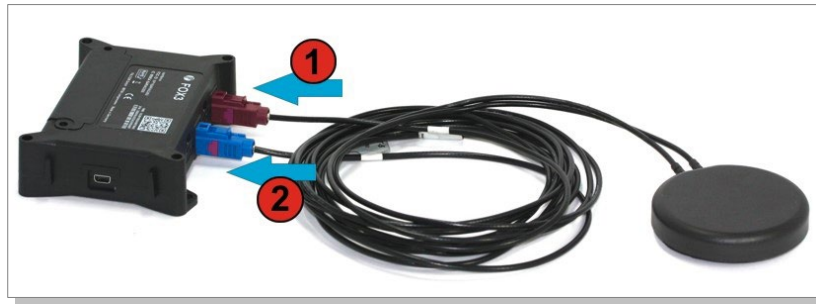

Figure 8: Connecting the external antenna

3.1.4   Installing and configuring Lantronix Workbench software

To test your device with factory preloaded configuration or to change this configuration, you need to install the Workbench application.

System requirements to install Workbench application:

- PC with Intel Core i3 or advanced processor and Windows 10/11, MacOSX, or Linux operating system installed.
- 512 MB of RAM or higher (512MB minimum supported; may limit performance and some features).
- 300 MB of available hard disk space (recommended 8 GB).
- Keyboard and Mouse.

To install and configure Workbench application on a system with Windows 10/11 operating system, do the following:

1. Go to https://www.lantronix.com/products/workbench/ and download **lantronix-workbench-win-x64** zip file.
2. Extract the contents of the zip file to display **lantronix-workbench-win-x64** folder. Go to **lantronix-workbench-win-x64 > bin** folder.
3. In the **bin** folder, double-click the **workbench_win_x64** file to start Workbench. The **Load profile** dialog box displays with **Default profile** selected. Click **OK.**
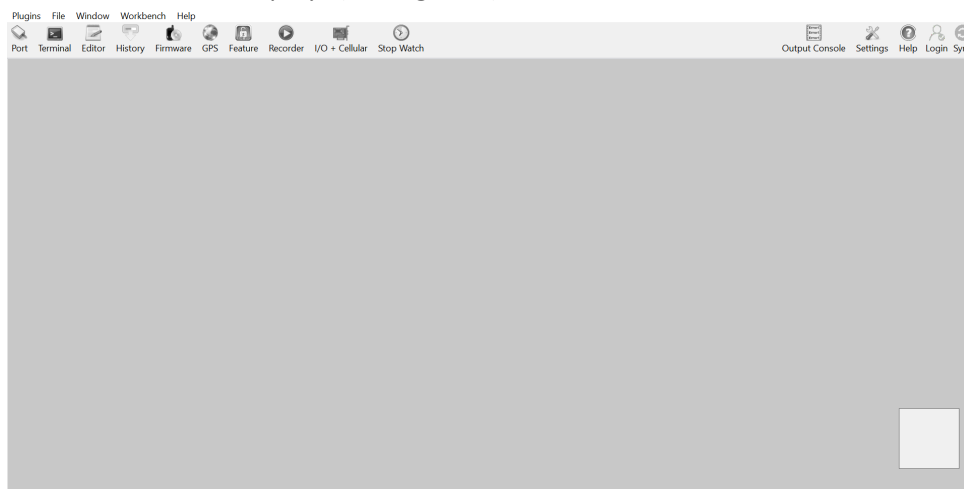4. The Workbench UI displays (see **Figure 9**)

Figure 9: Workbench Interface

5. Click **Port (1)**, to open a new Com Port, **Portview 1 (2)** displays (see **Figure 10**). In **Portview 1**, select the port to which the the FOX3-2G/3G/4G is connected (go to Device Manager > Ports > USB Serial Port (COMxx), where **xx** is the COM port to use). Set the port settings as follows:

- **Port type** – SERIAL
- **Port** - select the port to which the the FOX3-2G/3G/4G is connected (go to Device Manager > Ports > USB Serial Port (COMxx), where xx is the COM port to use)
- **Baud** – 115200 bps
- **Data bits** – 8
- **Parity** – None
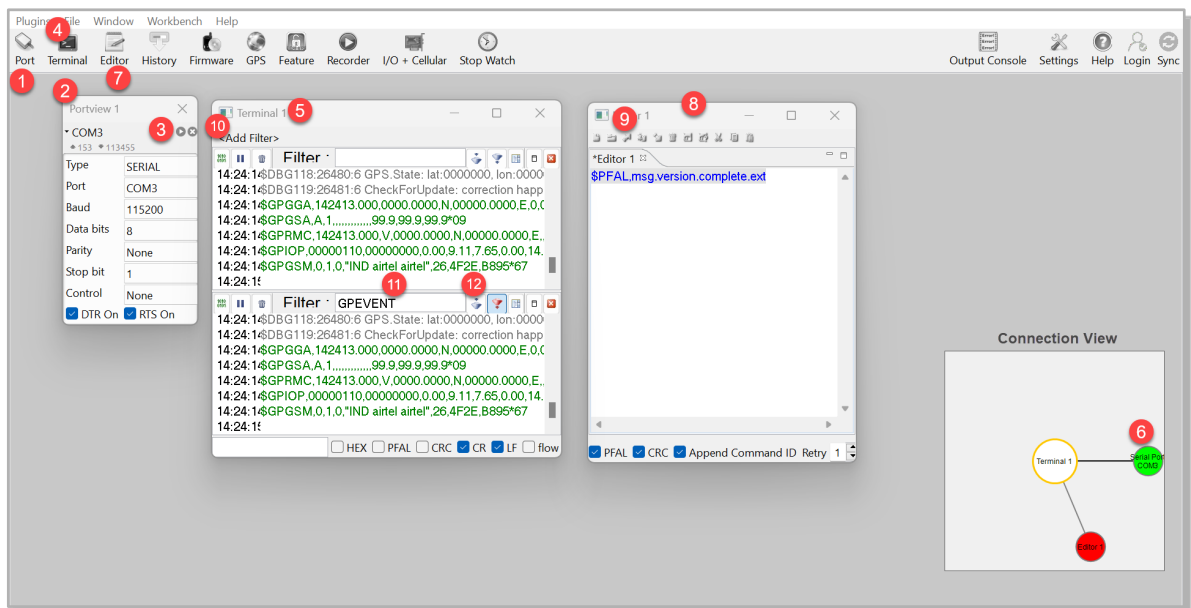- **Stop bit** – 1
- **Flow Control** – None

Figure 10: Workbench Interface Components

Finally, click ⏵ icon **(3)** to open that COM Port. Click "**Help**" button on the upper-right corner to get online help in HTML format.

6. Click **Terminal (4)** to open a new Terminal, **Terminal 1 (5)** displays. Click **Terminal 1** and go to **Connection View.** Right-click the **Connection View** window to enlarge it and click **COM Port (6)** to establish connection between the Com Port and Terminal. The COMPort icon turns green.

7. Click **Editor (7)** to open a new Editor, **Editor 1** displays. Click **Editor 1**, go to Connection view and Click **COM Port (6)** to establish connection between Editor and COMPort. The COMPort icon turns green.

8. To send commands to the FOX3-2G/3G/4G device, type them in the **Editor (8)** and then click **Start sending configuration (9)** or double click with left mouse on each configuration line in **Editor (8)** individually.

9. To see all events generated by the FOX3-2G/3G/4G device, either open a new terminal, or in **Terminal 1 (5),** click "**Add Filter**" **(10)**, type the text GPEVENT in input field **(11)**. Finally click the button **(12)** (Filter incoming).

3.1.5   Accessing online documentation

References to the online documentation are listed in chapter 2.2

3.2   Technical Support

To view the support options, go to https://www.lantronix.com/technical-support/.

3.3   Percepxion

Percepxion is a cloud or on-premise portal for the centralized management of Lantronix devices. A browser based interface (including mobile phone app support) that allows an administrator to view status, logs and charts, update firmware and configuration, view and edit telemetry, execute PFAL commands, and monitor Lantronix devices. Each Lantronix device can communicate with the Percepxion server, sending status updates and responding to commands sent by the server. You can create custom dashboards to provide an overview of device, device ports, and metrics that are most significant to you.

4 Telematic Eval Kit - Hardware Description

This chapter gives you information about the operation of the Telematic Eval Kit. It allows you to exercise the function of all inputs and outputs on the FOX3-2G/3G/4G device without the need to add any other external component to them.

The components on the Telematic Eval Kit can be identified from the figures below showing the front, top, and the rear panels.
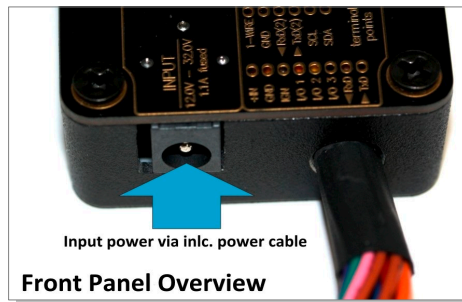
4.1 Front panel overview

Figure 10: Front panel of the Telematic Eval Kit

A description of each of the items on the front panel is provided in Table 4.

Item	Description
INPUT (12V – 32V)	Input power supply for Telematic Eval Kit and FOX3-2G/3G/4G device with **1.1 A** fuse protected.

Table 4: Front panel overview
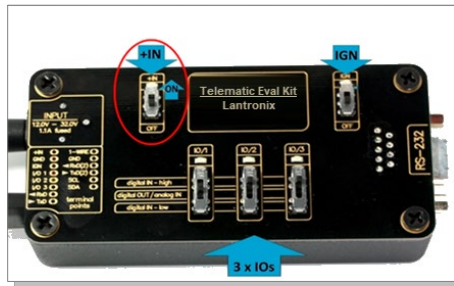
4.2 Top panel overview

Figure 11: Top panel of the Telematic Eval KIt.

A description of each of the items on the top panel is provided in Table 5.

Item	Description
LED (+IN)	Lights when the +IN-switch is turned to ON.
LED (IGN)	Lights when the IGN-switch is turned to ON.
+IN - switch	This two-way-switch enables or disables power to the connected FOX3-2G/3G/4G unit. (To enable power to the device, the Current- switch must be set to "ON")
IGN - switch	This two-way-switch wakes up the FOX3-2G/3G/4G device from IGN-sleep mode and sets the IGN-pin of the FOX3-2G/3G/4G to High or Low signal level for using the rising edge and falling edge events.
IO - switches	These pins have dual functions. All are controlled by the internal firmware of FOX3-2G/3G/4G. Therefore, the user must define whether to use them as analog or digital pins. The configured digital pins can be inputs or outputs while the analog pins can only be inputs. Their function is controlled with commands with *$PFAL,IO0[1,2].Config=DI,1,10 or $PFAL,IO0[1,2].Config=AI,1,10* by changing the electrical behaviour of the reference pin to digital or analogue input (DI = Digital input; AI = Analogue input). These three-way switches (from IO/1 to IO/3) allow operation of the IOs either as digital/analogue inputs or digital outputs. More details how to test these IOs, are given below.

Item	Description
	As the PROMOTION-KIT comes with all PREMIUM-FEATURES activated, the IO2 and IO3 are activated for using the "CAN-INTERFACE". Only IO/1 remains free and can be used as general purpose input/output pin. For more details please refer to the Related Documents [2].
Testing IOs as digital inputs:	When the reference IO (e.g: IO/1) is configured as digital input with "$PFAL,IO0.Config=DI,2,10", the FOX3-2G/3G/4G device will generate a rising edge event "IO.e0=redge" and set the state of the IO/1 to high "IO.s0=high", if: • the position of the IO/1-Switch changes from "**Digital IN - Low**" to "**Digital IN - High**". and will generate a falling edge event "IO.e0=fedge" and sets its state to low "IO.s0=low", if: • the position of the IO/1-Switch changes from "**Digital IN - High**" to "**Digital IN -Low**".
Testing IOs as analogue inputs:	When the reference IO (e.g: IO/1) is configured as analogue input with "$PFAL,IO0.Config=AI,2,10, you have to calibrate first this IO the low and high voltages. To do it, perform the following steps (e.g. IO/1): 1. Switch the IO/1-Switch (IO/1) to "**Digital IN - Low**" position**.** 2. Send the command "**$PFAL,IO0.Calibrate,offset=0**" from the Workbench **Editor** ❽ (see Fig. 10) to FOX3-2G/3G/4G. 3. Switch the IO/1-Switch (IO/1) to "**Digital IN - High**" position**.** 4. Send the command "**$PFAL,IO0.Calibrate,gain=15**" from the Workbench **Editor** ❽ (see Fig. 10) to FOX3-2G/3G/4G. 5. Switch the IO/1-Switch (IO/1) to "**Digital OUT / analogue IN**" position. This position has a fixed voltage of approx. 6V. Now, you can configure an alarm (e.g. $PFAL,CNF.Set,AL31=Sys.Timer.e0&IO.s0>6.0:IO6.Set=high) to switch on an LED (e.g. IO/3) when the voltage on the IO/3 is higher than e.g. 5.0 V. To test it, perform the steps below: 6. Send the configuration "**$PFAL,CNF.Set,AL31=Sys.Timer.e0&IO.s2>5.0:IO13.Set=hpulse,5000**" from the Workbench **Editor** ❽ (see Fig. 10) to FOX3-2G/3G/4G. 7. Switch the IO/1-Switch (IO/1) to "**Digital OUT / analogue IN**" position**.** 8. Send the command "**$PFAL,Sys.Timer0.Start=single,1000**" from the Workbench **Editor** ❽ (see Fig. 10) to FOX3-2G/3G/4G After the timer expires (1 second has passed), the red LED on the FOX3-2G/3G/4G (front side, next to the 6pin accessory port) goes ON for 5 seconds and then turns OFF. For more details about the LED on the FOX3-2G/3G/4G, refer to the Related Documents [2].
Testing IOs as digital outputs:	When the reference IO (e.g: IO/1) is supposed to be used as digital output, there is no configuration to be done in the firmware. To test it, perform the steps below: 1. Remove the available configuration for the IO/1 with "**$PFAL,IO0.Config=**" 2. Switch the IO/1-Switch to the *"Digital OUT / analogue IN"* position 3. Send the command "**$PFAL,IO4.Set=high**" to set it to High 4. Send the command "**$PFAL,IO5.Set=low**" to set it to Low

Table 5: Components on the top panel of the Telematic Eval Kit and their functionality
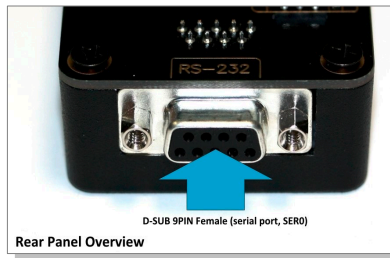
4.3   Rear panel overview

Figure 12: Rear panel of the Telematic Eval Kit

A description of each of the items on the rear panel is provided in **Table 6**.

Item	Description
Serial port 0	Via your own RS-232 cable you can connect the PROMOTION-KIT to a PC and evaluate the connected FOX3-2G/3G/4G device.

Table 6: Rear panel components

5   Explanation of Sample Configuration

Once the FOX3-2G/3G/4G device is powered up, it tries automatically to register to the GSM network and attach to the GPRS network. The connection state of the GPRS and TCP services will be shown by the generated events **GSM.GPRS.eConnected** and **TCP.Client.eConnected** telling you whether the device is connected to the GPRS/TCP server. These events are displayed on the Terminal in the Workbench. In the table below you find a detailed description of the configuration preloaded in the device shipped with promotion kit. To call this configuration use either the command *$PFAL,Cnf.Show* or use the button "*Read current device configuration*" from the **Editor** of the Workbench software. See chapter 3.1.4, **Figure 10**.

Function	Description and Configuration
Device Name	**Set a good Device name.**
	`$PFAL,CNF.Set,DEVICE.NAME=GVO_FOX3-4G-M1-BEL-R412_CAR`
Protocol Settings	**Define which Protocol you wan to see on the Terminal.**

	`$PFAL,CNF.Set,PROT.START.BIN=$!`
	`$PFAL,CNF.Set,PROT.RMC=1`
	`$PFAL,CNF.Set,PROT.IOP=1`
	`$PFAL,CNF.Set,PROT.GSM=1`
	`$PFAL,CNF.Set,PROT.GSA=1`
	`$PFAL,CNF.Set,PROT.GSV=1`

Alias	**Define all needed aliases to make the configuration better readable.**
Common Alias	`$PFAL,CNF.Set,ALIAS.SYS=System` `$PFAL,CNF.Set,ALIAS.CNF=Config`

Alias for Timers	`$PFAL,CNF.Set,ALIAS.SYS.TIMER0=_20SEC`
	`$PFAL,CNF.Set,ALIAS.SYS.TIMER1=_TRIP_START_STOP`
	`$PFAL,CNF.Set,ALIAS.SYS.TIMER2=_GO_SLEEP`
	`$PFAL,CNF.Set,ALIAS.SYS.TIMER3=_GO_DOZE`

Alias for Tiggers	`$PFAL,Cnf.set,ALIAS.SYS.TRIGGER0=_POWERSAVE`
	`$PFAL,Cnf.set,ALIAS.SYS.TRIGGER1=_ARM`
	`$PFAL,Cnf.set,ALIAS.SYS.TRIGGER2=_TRIP`
	`$PFAL,Cnf.set,ALIAS.SYS.TRIGGER3=_TRIPTYPE`

Alias for IOs	`$PFAL,CNF.Set,ALIAS.IO0=_ANA0`
	`$PFAL,CNF.Set,ALIAS.IO1=_ANA1`
	`$PFAL,CNF.Set,ALIAS.IO2=_ANA2`
	`$PFAL,CNF.Set,ALIAS.IO4=_OUT0`
	`$PFAL,CNF.Set,ALIAS.IO5=_OUT1`
	`$PFAL,CNF.Set,ALIAS.IO6=_OUT2`
	`$PFAL,CNF.Set,ALIAS.IO7=_RESET_BIOS`
	`$PFAL,CNF.Set,ALIAS.IO8=_IGN`

Alias for LED	**Green LED – To indicate TCP/MQTT/REST/Percepxion Connection Status**
	`$PFAL,CNF.Set,ALIAS.IO11=_LEDG`
	
	Yellow LED - To indicate GNSS Fix Status
	`$PFAL,CNF.Set,ALIAS.IO12=_LEDY`
	
	Red LED - To indicate Power Supply Status
	`$PFAL,CNF.Set,ALIAS.IO13=_LEDR`

Power Modes	**Setup all needed Device Power Modes.**
	`$PFAL,CNF.Set,DEVICE.IGNTIMEOUT=60000`

Function	Description and Configuration
Battery Modes	Setup all needed Device Battery Modes.

	`$PFAL,CNF.Set,DEVICE.BAT.MODE=auto,3.50`
	`$PFAL,Sys.Bat.chargemode=eco`
	`$PFAL,Sys.Bat.mode=auto`

GNSS	Setup GNSS
	`$PFAL,GPS.NAV.GNSS=GPS,GALILEO,GLONASS,BEIDOU`
Lantronix SIM Card	Setup the Cellular connection for LANTRONIX SIM card.

	`$PFAL,CNF.Set,GPRS.APN=data641003`
	`$PFAL,CNF.Set,PPP.USERNAME`
	`$PFAL,CNF.Set,PPP.PASSWORD`
	`$PFAL,Cnf.Set,GSM.OPERATOR.SELECTION=auto`
	`$PFAL,CNF.Set,GSM.OPERATOR.BLACKLIST`
	`$PFAL,CNF.Set,GPRS.AUTOSTART=1`

Buffer Data	Nonvolatile buffered data.
	`$PFAL,CNF.Set,TCP.CLIENT.SENDMODE=2`
Percepxion	Setup Percepxion Connection.

	`$PFAL,Cnf.Set,PX.CLIENT.CONNECT=1,api.percepxion.com`
	`$PFAL,Cnf.Set,PX.CLIENT.DEVICE_NAME=<your devicename>`
	`$PFAL,Cnf.Set,PX.CLIENT.DEVICE_DESCRIPTION=<your devicename>`
	`$PFAL,Cnf.Set,PX.CLIENT.CONTENT_CHECK_INTERVAL=60`
	`$PFAL,Cnf.Set,PX.CLIENT.STATUS_UPDATE_INTERVAL=1`
	`$PFAL,Cnf.Set,PX.CLIENT.GROUPS_CAP_EXCHANGE_DATA=<description>`
	
	`$PFAL,Cnf.Set,PX.CLIENT.GROUPS_TELEMETRY_DATA={"name":"sample_group","detail":`
	`[{"name": "sample_param1","value": "value123"},{"name":"sample_param2","value":`
	`"88"}]}`
	
	`$PFAL,Cnf.Set,PX.CLIENT.GROUPS_CAP_EXCHANGE_DATA={"name":"sample_group","record_name": "Sample Group","record_description": "Description of samplegroup","record_category": "Sample Group","record_subcategory": "Sample Group"}`
	
	`$PFAL,Cnf.Set,PX.CLIENT.GROUPS_CAP_SELECTION_DATA={"name":"sample_group","record_name": "Sample Group","record_description": "Description of samplegroup","detail": [{"name": "sample_param1","record_name": "Sampleparam1", \`
	`"record_description": "Description of Sample param1","record_type":"string","record_length": 50},{"name": "sample_param2","record_name": "Sampleparam2","record_description": "Description of Sample param2","record_type": \`
	`"string","record_length": 50}]}`

Starting With PFAL SCRIPT	Startup the device and setup main Timer.
	`$PFAL,CNF.Set,AL0=SYS.Device.eStart:GPS.Nav.Position0=load0&SYS.TIMER_20SEC.start=cyclic,20000`
Shutdown Handling	Setup Shutdowm Handling.
	Start 30s timer after loss of external power, go to Doze Mode to reduce power consumption.
	`$PFAL,CNF.Set,AL1=SYS.Power.eDropped:Sys.Timer_GO_DOZE.Start=single,180000`
	Start 30s timer after IGN line is down, go to Doze Mode to reduce power consumption.

Function	Description and Configuration
	`$PFAL,CNF.Set,AL2=IO.e_IGN=fedge:Sys.Timer_GO_DOZE.Start=single,180000`
	Stop the Timer to go to Dozemode when IGN is go High again.
	`$PFAL,CNF.Set,AL3=IO.e_IGN=redge:Sys.Timer_GO_SLEEP.Stop&Sys.Power.mode=disable`
	Stop the Timer to go to Dozemode when ext Power is go High again.
	`PFAL,CNF.Set,AL4=Sys.Power.eDetected:Sys.Timer_GO_SLEEP.Stop&Sys.Power.mode=disable`
	Go to Doze mode Mode after the 30sec Timer execute and start new timer for 24h to go to (Deep) Sleep mode.
	`$PFAL,CNF.Set,AL5=SYS.Timer.e_GO_DOZE:Sys.Power.mode=doze,60,480&Sys.Timer_GO_SLEEP.Start=single,86400000`
	Finally go to Sleep mode.
	`$PFAL,CNF.Set,AL6=SYS.Timer.e_GO_SLEEP:GPS.Nav.Position0=save0&Sys.device.sleep=Ign+ExtPwrDrop+GPS+Motion=200`
LED Handling	**Setup LED Handling**
	Let Yellow LED blink when no fix but searching.
	`PFAL,CNF.Set,AL7=GPS.Nav.sFix=invalid:IO_LEDY.set=cyclic,200,200`
	Let Yellow LED on when have valid GPS Fix.
	`$PFAL,CNF.Set,AL8=GPS.Nav.sFix=valid:IO_LEDY.set=High`
	Blink Red LED when device running on Battery or on insuffcent ext. Power
	`$PFAL,CNF.Set,AL9=Sys.Power.sVoltage<9:IO_LEDR.set=cyclic,200,200`
	Set Red LED to on when good ext. Power.
	`$PFAL,CNF.Set,AL10=Sys.Power.sVoltage>9:IO_LEDR.set=High`
	Set Green LED off when no Cellular Network.
	`$PFAL,CNF.Set,AL11=GSM.eOplost:IO_LEDG.set=low`
	Set Green LED fast blinking when Cellular network attached.
	`$PFAL,CNF.Set,AL12=GSM.eOpfound:IO_LEDG.set=cyclic,200,200`
	Set Green LED slower blinking when GPRS attached.
	`$PFAL,CNF.Set,AL13=GSM.GPRS.eConnected:IO_LEDG.Set=cyclic,400,400`
	Set Green LED to high when Connected to backend, use when new Percepxion CMD Integrated
	`$PFAL,CNF.Set,AL14=GSM.sOpValid&TCP.Client.sConnected:IO_LEDG.set=High`
	Go back to slow blinking when backend connection lost but Cellular Network attached.
	`$PFAL,CNF.Set,AL15=TCP.Client.eDisconnected&GSM.sOpValid:IO_LEDG.Set=cyclic,400,400`

Function	Description and Configuration
	Go back to fast blinking when backend connection lost but GPRS lost.
	`$PFAL,CNF.Set,AL16=GSM.GPRS.eDisconnected&GSM.sOpValid:IO_LEDG` `.Set=cyclic,200,200`
Tracking	**Setup Basic Tracking**
	Enable GPS AUTOCORRECT with base values.
	`$PFAL,CNF.Set,DEVICE.GPS.AUTOCORRECT=on,8.0,127,30,10`
	Check position every 20 seconds if the distance is > 200m, set Data Point to CF.
	`$PFAL,CNF.Set,AL17=SYS.TIMER.e_20SEC&GPS.Nav.Position.s0>200&G` `PS.Nav.sSpeed>2:GPS.Nav.Position0=current`
	Check position Heading changes more than 15° after last position sent and speed higher than 2m/s to prevent non moving data.

	`$PFAL,CNF.Set,DEVICE.GPS.HEADING=15`
	`$PFAL,CNF.Set,AL18=GPS.Nav.eChangeHeading&GPS.Nav.sSpeed>2:GPS`
	`.Nav.Position0=current`

6 Appendix

6.1 How does the FOX3-2G/3G/4G firmware operate?

FOX3-2G/3G/4G device can be easily integrated into a variety of new applications. It contains independent-customized software that provides even greater performance and flexibility for its users and system integrators to develop high-performance applications. The concept of the device is based on a simple implementation for a wide range of applications with low costs and high flexibility. The software enables you to configure, track, control, and monitor the FOX3-2G/3G/4G device via SMS and allows you set and poll the configuration remotely over Internet from the remote server. The software comprises a set of word-like commands termed "PFAL". Each of these causes the FOX3-2G/3G/4G system to take a particular action or to read, set a particular configuration. The software provides the basic configuration settings needed when the system starts up and is used as starting points for the creation of user applications. The development of user applications is based on the advanced event-handling features provided by the operating software. The exact point at which you configure the FOX3-2G/3G/4G unit depends on the application you want to develop. Events are triggered automatically at system run-time and manually when the inputs change.

A part of events triggered at system run-time can be:

- Geo-fence violations (in/out)

- Changes to analog inputs (signal exceeds the range)

- Over speed detection (exceeding the speed limits)

- Specific distance reached (distance reached event)

- Towing detection (park events)

- Moving/acceleration detection and many many other features.

A part of events triggered manually can be:

- Changes on digital or analog inputs (car' door open/close events, ignition on/off events)

FOX3-2G/3G/4G executes actions in response to an event or state(s) or in any combination. FOX3-2G/3G/4G can also execute direct actions immediately after the user sends a command (via SMS, TCP, RS-232) to the device. When an event is triggered, the alarms related to that event are automatically sent either over GSM (SMS, Data call) and/or via TCP, or internally used to switch On/Off something in remote e.g. activating a Buzzer.

A part of alarms that can be executed can be:

- Message generation (route verification arrival/departure notification via SMS/TCP)

- Activation of outputs in a number of ways (activate a buzzer)

- Data logging activation (stores the data inside the device)

- Handling of incoming messages of any type (Activation on SMS text type

- Vehicle doors Lock & Unlock

- Vehicle engine starter Disable and Enable

- Handling of Timers, Triggers and Counters, and many others

Above are listed just a few software features and for a full view of the set of events, states, alarms, configurations and their functionalities refer to the Related documents [1].

6.2   Installation and Service cables

There are two installation cables (60353 and 60048) included in the PROMOTION-KIT. Cable 60353 is used to install your FOX3-2G/3G/4G device in a vehicle and additionally to interface Lantronix RFID reader or 3rd party products with RS-232 interface via the 4-pin UCOM connector. This cable has an 8pin double row connector that connects to the FOX3-2G/3G/4G and a 4pin double row connector that connects to one of the LANTRONIX accessories or 3rd party products.

Cable 60048 is used to test 1-wire interface using your own 1-wire temperature sensors and 3rd party products with RS-232 interface via the 4-pin UCOM connector. Table 7 and Table 8 provide a reference to the colour codes of these cables. More details about the in-vehicle installation refer to the Related Documents [11].

Note: When connecting the cable 60353 to the vehicle wiring, for safety reason firstly connect the ground pin to the negative pole of the vehicle battery and then the +IN pin to the positive pole. When using a switch between FOX3-2G/3G/4G and external power source, first turn OFF the switch during the installation and then turn ON after completing the installation.

The cable 60044 is used as service cable, which connects to the 8pin main port of one of the FOX3-2G/3G/4G series device, your PC/Laptop COM port and to the cigarette lighter socket of a vehicle to apply power to the device. To (re)configure the device install the Workbench software.

An accessory port cable with 2x3pin connector to DB9 serial female socket, 1m long is used as a service cable if the 8pin main port or 1st serial port of one of the FOX3-2G/3G/4G series device can't be accessed. It connects to the 6pin accessory port and your PC/Laptop COM port. To (re)configure the device install the Workbench software.

The cable 60286 is used to connect the device to the CAN OBDII connector of your vehicle and apply power to the device from this OBDII connector.This cable has also a separate wire which needs to be connected to the ignition sense of your vehicle for using the Ignition-Sleep mode and trip starts and stops.

Figure 13: Supplied cables (for colors and pinout see Table 7 and Table 8)

The pin function and the colour codes of the cable 60353 is listed in **Table 7** below:

COLOUR	NAME	DIRECTION	DESCRIPTION	LEVEL
Open-end wires				
RED	+IN	Input	Power supply input.	V$_{+IN}$ = + 10.8 ... + 32.0 V Imax ≤ 1.5 A
BROWN	GND	-	Ground.	0 V
BLUE	IGN	Input	It can be connected to the vehicle ignition and used for trip START and STOP reports and IGN-Sleep mode	HIGH ≥+10.8 .. +32.0 V DC; LOW = 0V
ORANGE	I/O1	Input/Output	Software configurable pins. They can operate either as input or output. They have dual functions as analog or digital inputs.	OUT: 100 mA max. @ +0 .. +32.0V DC
YELLOW	I/O2	Input/Output		IN: 0 V..+32.0V DC (High & Low free-programmable)
GREEN	I/O3	Input/Output		Analog : < 32.0 V / 10 bits resolution
PURPLE	RxA_0	Input	Serial Port 0 - Receive data	V24, ±12 V
BLACK	TxA_0	Output	Serial Port 0 - Transmit data	V24, ±12 V
4pin UCOM Connector				
PURPLE	RxA_0	Input	Serial Port 0 - Receive data	V24, ±12 V
BLACK	TxA_0	Output	Serial Port 0 - Transmit data	V24, ±12 V
RED	+IN	Input	Power supply input.	=+IN
BROWN	GND	-	Ground.	0V

Table 7: PIN function of the cable 60353

The pin function and the colour codes of the cable 60048 is listed in table below:

COLOUR	NAME	DIRECTION	DESCRIPTION	LEVEL
Open end wires				
PINK	1-Wire	Input /Output	1-Wire master interface for Driver ID, temperature and humidity sensors.	V$_{OUT}$ = + 2.8 .. +5.0 V
BROWN	GND	-	Ground Reference.	0 V
PURPLE	RxA_1	Input	Serial Port 1 - Receive data.	V24, ±12 V
BLACK	TxA_1	Output	Serial Port 1- Transmit data	V24, ±12 V
YELLOW	SCL	Output	I2C bus interface - Serial Clock line	-
GREEN	SDA	Input /Output	I2C bus interface - Serial Data line	-
4pin UCOM Connector				
PURPLE	RxA_1	Input	Serial Port 1 - Receive data	V24, ±12 V
BLACK	TxA_1	Output	Serial Port 1- Transmit data	V24, ±12 V
RED	+IN	Input	Power supply input.	V$_{+IN}$ = + 10.8 ... + 32.0 V Imax ≤ 1.5 A
BROWN	GND	-	Ground.	0V

Table 8: Pinout of the cable 60048

The pinout of accessory port cable with 2x3pin connector to DB9 serial female socket is listed in table below:

2x3 MICROFIT	DB9 female	Description
RX	RX	Receive data
TX	TX	Transmit data
GND	GND	Ground

Table 9: Pinout of accessory port cable with 2x3pin connector to DB9 serial female socket

The pinout of this cable 60286 (OBDII 4Pin Cable) is listed in table below:

2x4 MICROFIT	OBDII connector	Description
2	5	GND
6	6	CAN_High
5	14	CAN_Low
1	16	V+
3	NC	IGN as separate wire

Table 10: Pinout of the cable 60286

6.3 Installing your own SIM card and replacing the internal battery

To insert your own SIM card into the FOX3-2G/3G/4G' SIM holder and replace the internal battery by a new one, follow the steps represented in figure below:
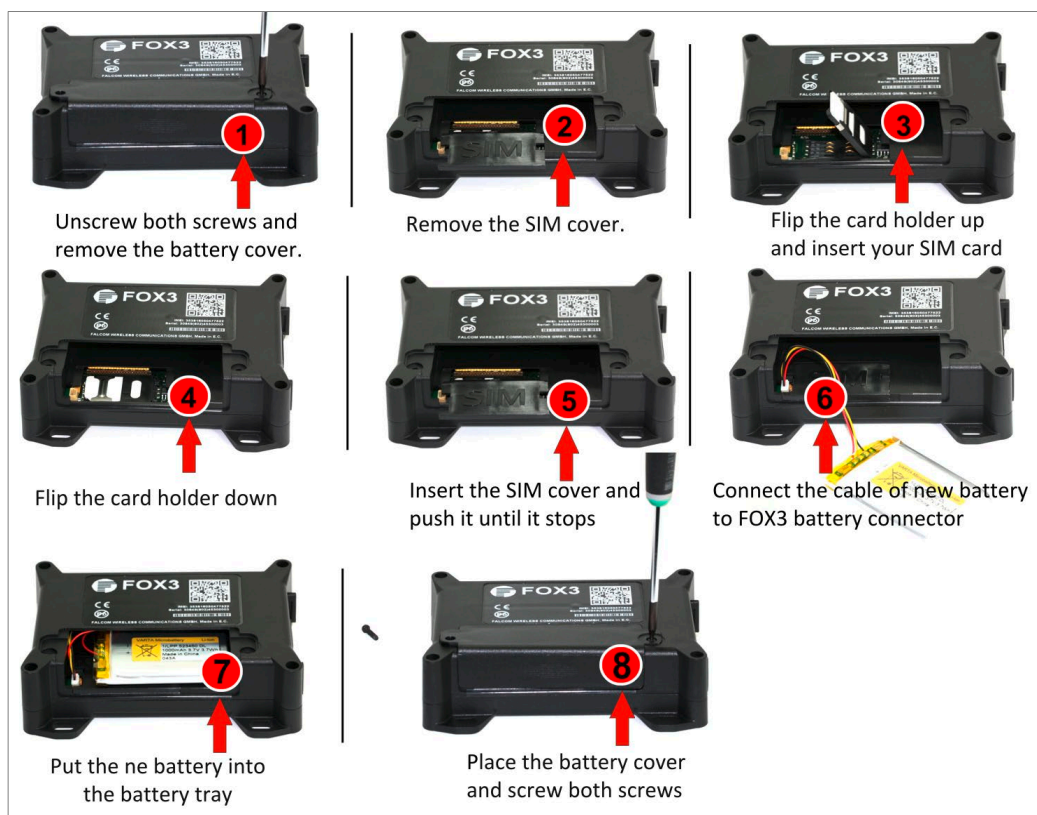

Figure 14: Inserting you SIM card and replacing the battery by a new one

For more details refer to the Related Documents [2]

When using your own SIM card and another TCP server, the following table shows the basic configuration settings that should be done in the FOX3 device to register the device in the GSM network and enable internet connection to your TCP-Server. These configuration settings should be done locally via serial port connection. After inserting your SIM card and powering up the device, send the following commands (marked in red) from Workbench Editor ❽ (see Fig. 10) to the FOX3-2G/3G/4G.

SETUP	$PFAL,Cnf.Set,GPRS.APN=data641003 (The APN used here belongs to Lantronix Connectivity Services. Your network operator provides the APN)
	$PFAL,Cnf.Set,GPRS.QOS=3,4,3,0,0
	$PFAL,Cnf.Set,GPRS.QOSMIN=0,0,0,0,0
	$PFAL,Cnf.Set,PPP.USERNAME=gprs (If your provider requires, Lantronix Connectivity Services does not require a username.)
	$PFAL,Cnf.Set,PPP.PASSWORD=gprs (If your provider requires, Lantronix Connectivity Services does not require a password.)
	Settings required for a GPRS attachment
SETUP	$PFAL,Cnf.Set,TCP.CLIENT.CONNECT=1,222.222.222.222,1111 (enter your IP and Port)
	Settings required for a TCP connection.
	Where: 222.222.222.222 - is the IP-address of the TCP server to be connected;
	1111 - is the TCP port number of the TCP server to be connected;
	$PFAL,CNF.Set,TCP.CLIENT.LOGIN=1
	Sends the login data automatically to the remote server after requesting the TCP server for establishing a connection.
SETUP	$PFAL,Cnf.Set,GPRS.AUTOSTART=1 (default = 0)
	Activate GPRS autostart to reconnect automatically when GPRS network connection gets lost.
SETUP	$PFAL,Cnf.Set,DEVICE.PIN=1111 (enter the PIN of the used SIM card)
	Enter the SIM PIN to register the FOX3 device into the GSM network:
	Where: 1111 - is the PIN of the inserted SIM card.

Table 11: Adapt device configuration settings to your application conditions (mandatory settings).

FOX3-2G/3G/4G/-4G LOGIN DATA TO YOUR SERVER	After establishing TCP connection with your remote server, the following ServerLogin data is automatically sent to your remote server. For more details refer to the Related Documents [1].
	$<MSG.Info.ServerLogin>
	$DeviceName=FOX3
	$Security=0
	$Software=avl_2.13.0 (BxBGT1gzIHJldjowMy1OVUNIAgEA)
	$Hardware=FOX3 rev:03-NUCH
	$LastValidPosition=$GPRMC,143445.000,A,5040.4096,N,01058.8542,E,0.01,0.00,040315,,
	$IMEI=353816054739497
	$PhoneNumber=+491734567124564
	$LocalIP=10.208.151.168
	$CmdVersion=2
	$SUCCESS
	$<end>

Table 12: Login data sent automatically from the FOX3-2G/3G/4G to your remote server after establishing TCP connection