

# Application Note:

*How to use IOBOX-mini with  
FOX Series Devices*

*FOX3-3G/4G*

*FOX4-4G*

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## Revision History

Date	Rev.	Comments
January 2026	A	Initial Release

For the latest revision of this product document, please check our online documentation at [www.lantronix.com/support/documentation](http://www.lantronix.com/support/documentation).

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# 1. Introduction

The IOBOX-mini is an I/O extension accessory for the FOX Series devices. It extends the connectivity and functionality of the FOX Series devices when your application requires additional input and output ports. This document describes the hardware interfaces of the IOBOX-mini and provides instructions to use it with a FOX Series device.

## Hardware Requirements

- IOBOX-mini (P/N: 60100)
- FOX Series device (with firmware 3.xx for FOX3 Series and firmware 4.xx for FOX4 Series)
- 16-pin (2x8) installation cable with open-end wires, 1.5 m long (P/N: 60347)

The IOBOX-mini and the 16-pin installation cable are not shipped with your FOX Series device and must be purchased separately. To order, contact Lantronix at <https://www.lantronix.com/about-us/contact/>.

## 2. Related Documents

The table below lists the related user documents and application notes.

NR	Document	Description
[1]	<b>FOX3 Series – Hardware Manual</b>	Contains information about the hardware of FOX3-2G/-3G/-4G devices.
[2]	<b>FOX3 Series Promotion Kit – User Guide</b>	Provides customers information about the FOX3-2G/-3G/-4G PROMOTION-KIT, to evaluate the product and all its functionality.
[3]	<b>FOX4 Series – Hardware Manual</b>	Contains information about the hardware of FOX4-4G devices.
[4]	<b>FOX4 Series Promotion Kit – User Guide</b>	Provides customers information about the FOX4-4G PROMOTION-KIT, to evaluate the product and all its functionality.
[5]	<b>PFAL Command Reference</b>	Contains the description of the internal firmware and the complete list of supported PFAL commands used to manage/administer an application built on the FOX3, FOX4 and BOLERO40 series devices.
[6]	<b>Workbench User Guide</b>	Contains information on how to setup and run the Workbench tool.

For the latest user documentation, visit <https://www.lantronix.com/technical-support/documentation/user-guides/>.

For Application Notes, visit <https://www.lantronix.com/resources/app-notes/>.

### 3. Hardware Description



Figure 1 – IOBOX-mini

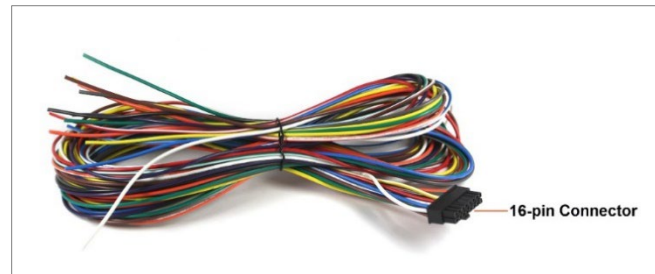


Figure 2 – Installation cable 60437

#### IOBOX-mini Pinout

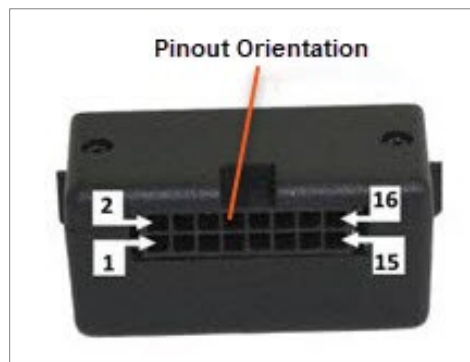


Figure 3 – IOBOX-mini Pinout Orientation

Table 1 – IOBOX-mini Pinout

PIN	NAME	I/O	DESCRIPTION	LEVEL	PFAL INDEX**
1	GND	-	Ground.	0 V	-
2	IN5	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	25
3	-	-	No function	-	-
4	IN6	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	26

PIN	NAME	I/O	DESCRIPTION	LEVEL	PFAL INDEX**
5	-	-	No function	-	-
6	IN7	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	27
7	ANA	I	Analogue input with 10 bits resolution.	0 .. +32.0V DC	14
8	IN0	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	20
9	OUT0	O	Open collector output *	100 mA max. @ 0 .. +32.0V DC	16
10	IN1	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	21
11	OUT1	O	Open collector output *	100 mA max. @ 0 .. +32.0V DC	17
12	IN2	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	22
13	OUT3	O	Open collector output *	100 mA max. @ 0 .. +32.0V DC	19
14	IN3	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	23
15	OUT2	O	Open collector output *	100 mA max. @ 0 .. +32.0V DC	18
16	IN4	I	Digital input.	0 .. +32.0 V DC ( $V_{+IN} = +IN$ )	24

\* It is strongly recommended to connect a separate flyback diode across the high inductive loads (e.g., relay).

\*\* The PFAL Index for a PIN is the reference number used by PFAL commands to execute any command related to that PIN. For example, the command **PFAL,IO16.Set=low** sets the value for PIN 9 (OUT0) where 16 is the PFAL index for that PIN.

## 4. Connecting IOBOX-mini to FOX Series Device

To connect the IOBOX-mini to a FOX Series device, follow the below instructions and refer to [Figure 4-1](#).

1. Remove the power supply and any other connections from the FOX device. Use a T6-TORX screwdriver (1) and unscrew 4 screws (2).
2. Open the casing of the device (3).
3. Identify the mini-USB port on the device PCB and plug in the IOBOX-MINI (4 & 5).
4. Press the IOBOX-MINI to hold it in place (6) and place the lower case on to the upper case of the device. Insert the two tabs of the IOBOX-MINI into the two slots of the lower case of the device (6) and then slide the lower case until it stops (7).
5. Close the device with all 4 screws (8). Make sure that both cases fit each other without any space between them. Tighten the screws with a fixed torque of 0.5 - 0.6 Nm.



**Figure 4 – Connecting IOBOX-mini to FOX Series device**

Once the IOBOX-mini is connected to the FOX Series device, to verify that it is successfully installed and detected by the FOX Series device:

1. Connect the power supply to the FOX Series device and power on the device.
2. Connect the FOX Series device to your PC. For instructions refer to FOX3 Series or FOX4 Series Promotion Kit User Guide (see chapter [2. Related Documents](#)).
3. Start the Workbench tool and open the Terminal window. For instructions to use the Workbench tool refer to Workbench User Guide (see chapter [2. Related Documents](#)).
4. From the Terminal, send the below command to the device.  
**\$PFAL,msg.version.complete.ext**
5. If the IOBOX-mini is successfully installed and detected by the device, the terminal displays the below response.

**\$HardwareOptions: [Highspeed-CAN] [BAT] [MOTION] [AUDIO] [UBLOX] [BLE] [Mini-IOBox]**

Connect the 16-pin installation cable to the IOBOX-mini using the connector and use the open-end wires as required for different applications.

## 5. Configuring the I/O pins on the IOBOX-mini

The IOBOX-mini provides 13 I/O pins (8 digital input, 1 analog input, and 4 digital output). PFAL commands allow you to set the required values for the pins. Firmware indexed IOs are used as reference by the PFAL commands to communicate with each pin. The list of IOBOX-mini I/O pins and their corresponding PFAL indices is provided in [Table 3-1](#).

For practical purposes, you can use the PFAL commands to set conditions which generate values for the pins when met and then use the values to trigger a response for that condition such as generating an alarm, turning an LED on or off, sending a text message etc. For related PFAL commands, their description, and usage refer to PFAL Command Reference (see chapter [2. Related Documents](#))

### Configuring and using Digital Input pins

These pins are high active. The range for digital input is 0 V to +32.0 V DC. When the internal software detects input changes from low to high or vice versa, a Rising or Falling edge event is generated respectively. Therefore, depending on the alarm type, the FOX Series device can react to the input changes and release different alarms such as sending out SMS, TCP packets. The alarm type is configuration dependent.

**Example:** `$PFAL,CNF.Set,AL24=IO.e20=redge:TCP.Client.send,8,"SOS Help me"`

In the above example, an event is generated when a panic button connected to pin 8 is pressed, and in response to the event a TCP message is sent.

### Configuring and using Digital Output pins

The digital output pins are open collectors. They can be connected directly via resistors to LEDs, relays etc. You can use PFAL commands to configure one or more alarms that activate these outputs when specific events occur.

**Example:** `$PFAL,CNF.Set,AL<index>=<COND1>&<CONDITION2>...:IO16.set=high`

`$PFAL,CNF.Set,AL24=GPS.Geofence.ex=outside:IO16.set=high`

In the above example, the digital output becomes high when a vehicle exits a predefined geofence.

### Configuring and using Analog Input pin

Analog voltages of up to 32.0 V with a 10 bits resolution can be processed and remotely evaluated by a server application.

**Example:** `$PFAL,CNF.Set,AL24=sys.device.eStart:Sys.Timer0.Start=cyclic,60000`

`$PFAL,CNF.Set,AL25=sys.timer.e0:TCP.Client.send,8,"Analog &(IO14)"`

In the above example, the first command starts a cyclic timer of 60 seconds when the device turns ON and when the timer elapses a TCP message is sent to the server which contains the value measured by the pin such as voltage.