# T-REX Control Panel Product Manual



**Product Name**: T-Rex Pump Controller Kit

**Model No**: 50003

**Manufactured by:**

Petropower LLC

3003 E 37th St N #100

Wichita, KS 67219

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

**WARNING:**

Changes or modifications not expressly approved by PetroPower could void the user's authority to operate the equipment.

*Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

**Contact Information**

Phone: (316) 361-0222

Email: info@petropower.com

Web: https://www.petropower.com/

# How to install T-Rex Box (electric and control) at the Edge (v2)

> ❌ **WARNING:** All electrical work should be conducted by a licensed professional. The high voltage at the well is extremely dangerous.

> ⚠️ **What you need before you go to install site:**
>
> 1. T-Rex V2 Installation Kit (includes T-Rex box ready for wiring up)
> 2. The T-Rex system will need to have 120 voltage - bring necessary materials to step it down if 120 is not already available on site
> 3. An external relay, non-latching, with a coil voltage of 120V; for some VFDs an external relay may not be required
> 4. Standard tools (wire strippers/cutters, small flathead screwdriver, small Phillips screwdriver)
> 5. Mounting hardware (i.e., wood screws) to attach T-Rex box to its permanent location
> 6. Bring an HOA switch if the site does not already have one

> ℹ️ System Needs - 110 to 240 VAC at 0.75 amps

## Preparation:

1. Before going to install site, open T-Rex box, confirm all parts are in place (compare to included manifest in box).
2. Locate an optimal location for the T-Rex Control box to be installed:
   a. The location should be at or close to eye level.
   b. The location should be next to the pump panel - as control wires will need to be run from the pump panel to the T-Rex box.
   c. Attach the box using at least 4 solid anchor points. If adhering to wood use screws at least 2" long.
3. Turn off main power.
4. If not already available, establish 110 power at well site - you will need to run 110V to the T-Rex box.
5. If not already installed, install the HOA switch on the pump panel.
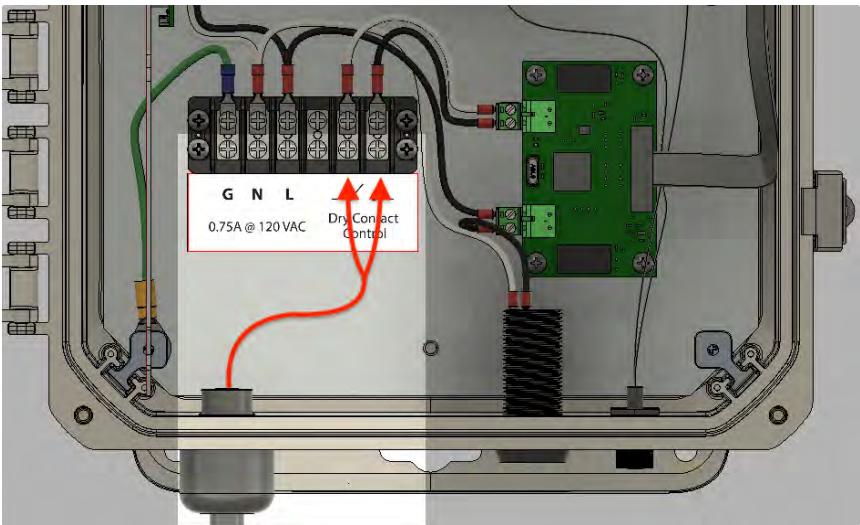
## Connect Power

6. Run the 110V through one of the two openings in the bottom left side of the T-Rex box. Attach the ground, neutral and live wires to their corresponding terminal blocks.
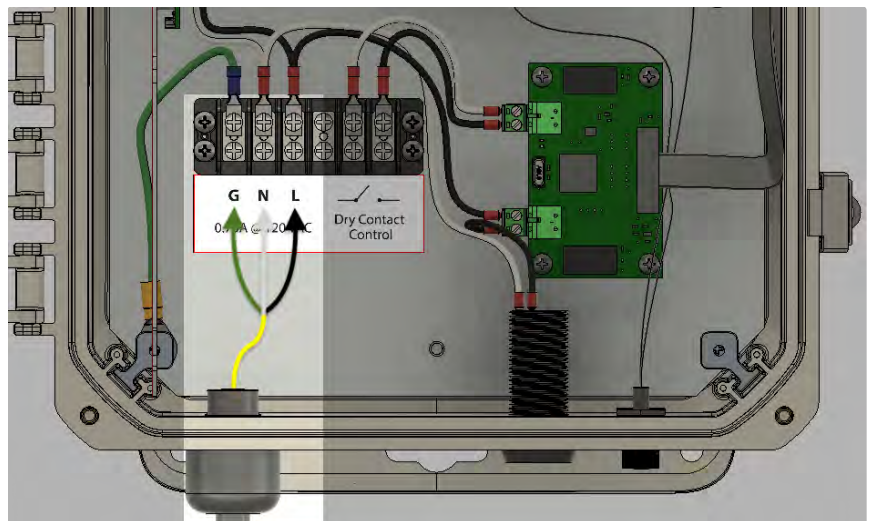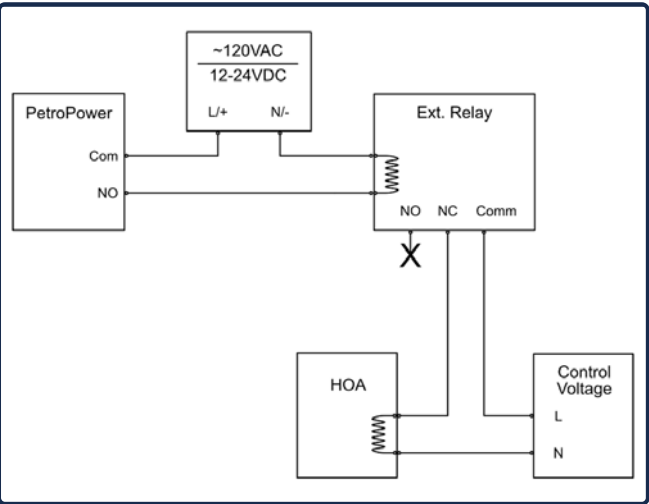
## Connect Control

7. The control output is a dry contact. Run the wires from the pump control relay through one of the two openings in the bottom left side of the T-Rex box. Attach to the screw terminal as shown in the diagram below. Failing on (normally closed) is our preferred method - customer may dictate otherwise.

   The well's default state when 110-120 VAC power is lost will be determined by your external relay wiring.
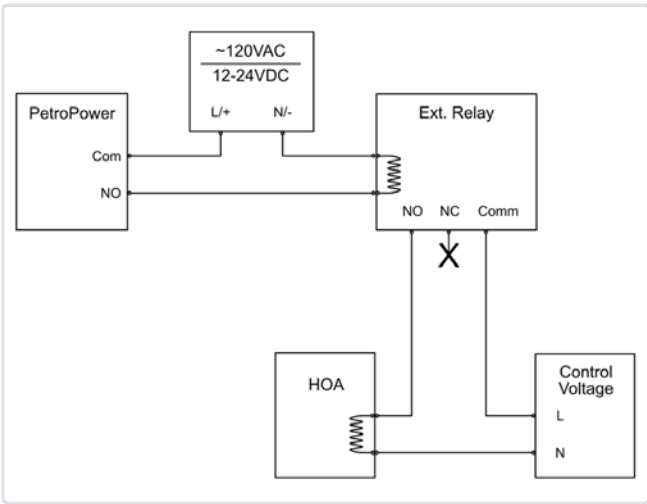


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✅ **Preferred Method**

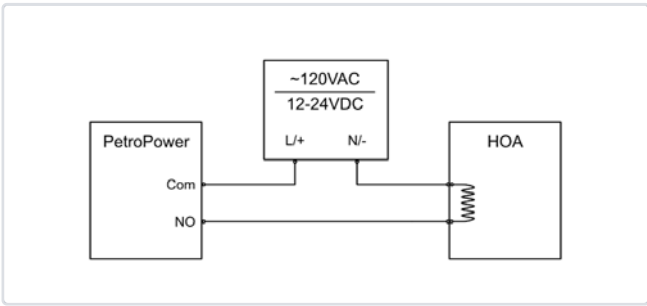**Fail On** Normally Closed (NC) with External Relay



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ℹ️ **Additional Methods**

**Fail Off** Normally Open (NO) with External Relay



**Fail Off** (NO) without Ext. Relay

## Control Testing

8. After the power and control connections are complete, close the cover of the T-Rex box and turn main power back on. The T-Rex display should start reading "Starting...Please Wait".

9. The system takes about 60 seconds to boot up. Once successfully booted the display on the front of the T-Rex box will start cycling through its normal messages for cell connectivity, well name, api number, settings, etc.

10. Call T-Rex Operational Support at (855) 719-2433 - notify them you have completed a new install and need to run through a power control test.

> ℹ️ **A Successful Install Will:**
>
> The pumper is capable of overriding control using the Hand and Off positions of the HOA switch. No other control systems (except safety kills) are present on Auto position of the HOA switch.

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# Type N Professional Antenna Installation Instructions:

1. Attach the u.Fl-to-type-N adapter cable to the module.

2. Affix the type N connection from the adapter out of the bottom of the enclosure - exposing type N connection point.

3. Connect an extension cable to the type-N male connection on the adapter cable.

4. Attach an approved Type N BLE antenna (see list below) to the end of the extension cable.

5. Placement of the BLE antenna should be limited to:
   a. Outdoor installation only
   b. Not higher than 30 feet
   c. Ensure there is at least a 2 foot gap between the BLE antenna and any other nearby antennas
   d. Attached to a 1.5" metal pole
   e. BLE antenna is typically 7'-8' off the ground, but can be adjusted for optimal "line of site" to sensor locations.
   f. Antenna should be attached using its supplied mounting bracket to a permanent location.

**Approved BLE Antennas for Installation:**

| Fanstel Base Model | Antenna | Antenna Type | Antenna Gain | Impedance |
|---|---|---|---|---|
| BT840 | L-PCB ANT | PCB | -3.52dBi | 50ohm |
| BT840F | F-PCB ANT | PCB | 0.34dBi | 50ohm |
| BT840H | MHF4 | Dipole | 6dBi | 50ohm |
| BT840E | u.FL | Dipole | 6dBi | 50ohm |
| BT840E | MD24-12 (Type N) | Mini Directional | 11dBi | 50ohm |
| BT840E | OC24006H (Type N) | Omni Antenna | 6dBi | 50ohm |

**Software Security Declaration:**

The control panel power/bandwidth/transmission is restricted by the associated boards' firmware and software installed by PetroPower staff at the time of assembly. This software is a compiled program that can not be modified by any third-parties; it is solely managed by PetroPower engineering staff in adherence to the operating parameters. There are NO interfaces offered to any third-party to modify the restricted operating parameters. This setup ensures that the device only operates within the parameters of the grant of authorization.

This control panel is controlled via compiled software/firmware that is restricted and can only be updated by PetroPower staff:

1. There are NO interfaces offered to any third-party to modify the operating parameters. Everything is internally managed by PetroPower - via over the air software and firmware updates. This setup ensures that the device only operates within the parameters of the grant of authorization.

2. The source code for the software and firmware is password protected, the method of deploying updated software also requires PetroPower Administrator password credentials.

**Operating Parameter Configurability:**

This product is controlled via compiled software/firmware that is restricted and can only be updated by PetroPower staff:

1. There are NO interfaces offered to modify the operating parameters of the hardware including antennas.

2. All parameters are managed via software/firmware is internally managed by PetroPower via over the air updates. This ensures that the device only operates within the parameters of the grant of authorization.

3. This product supplies no interface for user's to enable ZigBee mode for any configuration. This is disabled via the software/firmware loaded on the device.

# How to install T-Rex Sensors (drive shaft and polish rod) at the Edge

> ⚠️ **What you need before you go to install site:**
>
> 1. T-Rex V2 Installation Kit (includes 2 T-Rex motion sensors, one polish rod mount, and two hose clamps)
>
> 2. Standard tools (flat head screw driver)
>
> 3. A ladder

> ℹ️ Pre-requisite: The T-Rex box must be powered on

1. Open T-Rex box, confirm all parts are in place (compare to included manifest in box)

2. Pair each sensor in turn to the T-Rex box by placing the back of the sensor where it is labeled "Pairing" directly against the front of the T-Rex box where it has a corresponding "Pairing" label.
   a. When placed correctly, the "Pairing" LED light on the front of the T-Rex box should change from blue (ready state) to green (active pairing).
   b. Wait for the display screen to show a pairing confirmation message.

3. Depending on which device you are pairing, the D.S. (Drive Shaft) or the P.R. (Polish Rod) LED light on the front of the T-Rex box will continue to change colors for 3-5 minutes, so wait patiently if the LED indicator is still changing colors.

   

   🔵 = Updating Firmware
   🟢 = Connected, Good signal
   🔴 = Not Connected
   🟠 = Connected, Poor signal
   ⚫ (off) = Sensor not Paired

   Example LED

4. Repeat for each sensor and once both sensor LEDs display solid green, you are ready for install.

5. Turn off main power to the pump and wait for it to completely stop.

6. Gather the polish rod sensor, the metal bracket it will sit in, and the two hose clamps needed to attach the bracket to the polish rod.

7. Assemble the polish rod sensor clamp:
   Loop each of the hose clamps through the openings on the bracket as shown here.

   

8. Attach sensor to bracket:

Place the sensor into the bracket so that it is nested neatly between all of the bracket's side tabs. Ensure the arrow on the back side of the sensor is pointing up.



9. Attach the polish rod sensor:

Use a ladder to reach the top of the polish rod. Securely attach the sensor+bracket just above the bridle using a 5/16 socket or a flathead screwdriver to tighten the hose clamps.

Ensure the arrow on the back side of the sensor is still pointing up and position the front (solar panel) of the sensor so that it is facing the T-Rex control box.



10. Attach the drive shaft sensor:

Take the drive shaft sensor and attach it to the side of the rotating drive shaft by pressing the magnetic side of the sensor to the metal surface (solar side should be facing out). Aim to place the sensor as close to the epicenter of the rotating shaft.

11. Remove the ladder and any other materials from the well pump area and turn the main power back on.

12. Call T-Rex Operational Support at (855) 719-2433 - notify them you have completed the sensor install and need to verify the data is coming through for each (drive shaft and polish rod).

# How to use T-Rex at the Edge

> ℹ️ To use T-Rex on site, the T-Rex box and the two T-Rex motion sensors must first be installed on the well site.

## Overview of the T-Rex Components

There are three separate components used for the T-Rex system on each well:

| 1.) Control Box: | 2.) Polish Rod Sensor | 3.) Drive Shaft Sensor |
|---|---|---|







This is the sensor that tracks the rotational movements of the polish rod. It communicates wirelessly back to the control box and is powered by the solar panel on its outer surface.

This box is the on site computer, cellular connection, sensor data collector, and digital pump off controller. The control box is powered via 110v hard-wired.

This is the sensor that tracks the very subtle up/down movements of the polish rod. It communicates wirelessly back to the control box and is powered by the solar panel on its outer surface.

## Control of the well

1. To ensure that T-Rex is in control of the well, ensure that the HOA switch is set to auto at all times.
   a. If you have a specific need for the well to be off or in hand, you may switch the HOA accordingly, just be sure to set it back to auto after you have completed your task.
   b. Once T-Rex is in control, web users can change the run settings for the well remotely using a web browser.
2. The web-based T-Rex dashboard allows users to set the well's run mode digitally from anywhere. Run mode options include: **On**, **Off**, **Timer** (with configurable run/idle time settings), or **Smart** mode which allows T-Rex to idle the well when it has detected pump off using its sensors thereby saving electricity, but maximizing production run cycles.

## Reading the T-Rex Display

For the most part, the T-Rex box can be left alone to run indefinitely. On occasion, you may want to look at the T-Rex display to determine if anything is out of the ordinary. To see the display, unclasp the latches on the side of the control box and open the door. You should see something like the panel to the right.

Normally, the **display screen** will rotate the following messages:

1. **Cell Status** - *Connection State and Signal Percentage. E.g.*

> Cell: Enabled
> Signal: 25%

2. **Sensor Fault** - *Will only appear when the fault is occurring. E.g.*

> D.S Low Battery

> P.R Low Battery

> D.S Low Signal

> P.R Low Signal

3. **Well Information** - *The well name & API #. E.g.*

> CI: well-name
> 00-000-00000-0000

4. **Last 24hr Runtime** - *In the past 24 hour time period, how long has the well be actively running. E.g.*

> 24 Hour Runtime
> XhXmXs

5. **Run Setting** - Displays the run mode that T-Rex is currently set to.

> Run Setting:
> OFF

> Run Setting:
> ON

> Run Setting:
> TIMER

> Run Setting:
> SMART

> Run Setting:
> UNKNOWN

6. **Run Mode Details** - *Displays additional relevant information for select run modes when in use:*

   a. **Timer Mode** - *When the pump is set to run on the T-Rex controlled timer.*

   > Pump will stop in
   > XhXmXs

   > Pump will start in
   > XhXmXs

   > Timer: XhXmXs On
   > XhXmXs Off

   b. **Smart Mode** - *When T-Rex is automating start/stop based on pumpoff detection.*

   > Pump will start in
   > XhXmXs

   > Pump expected to stop in
   > XhXmXs

# Reading the T-Rex LEDs
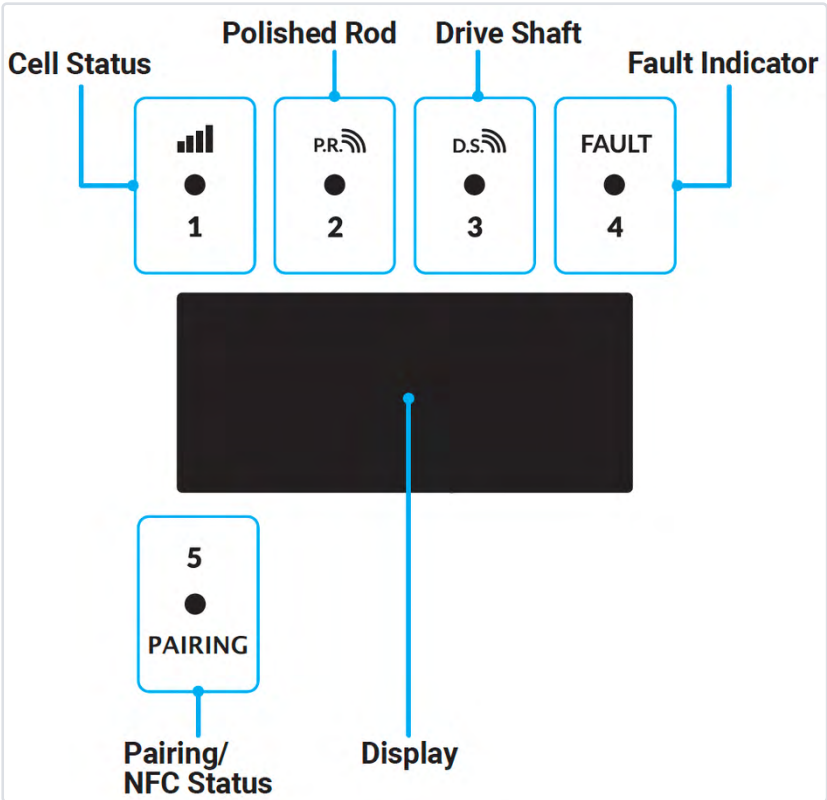


There are also numerous **LED indicator lights** on the screen that communicate based on the colors.

| LED Slot | Color = Status |
|---|---|
| Cell Status | 🔵 = Connecting<br>🟢 = Connected<br>🔴 = Not Connected |
| Polish Rod & Drive Shaft | 🔵 = Updating Firmware<br>🟢 = Connected, Good signal<br>🔴 = Not Connected<br>🟠 = Connected, Poor signal<br>⚫ (off) = Sensor not Paired |
| Pairing/NFC Status | 🔵 = Ready for Sensor<br>🟢 = Pairing Started |

# How to Link a Well (Org Leaders)

> ℹ️ **Note**: Only organization leaders are able to link their own wells using the web dashboard.

## 1.) Get the "Link Code" Token

Record the "Link Code" as shown on the powered up T-Rex Control box on the well site

## 2.) Log In to T-Rex

If not already logged in, go to 🔥 Petropower Trex  and log in using the username and password. Upon successful log in you will be redirected to your organization's dashboard.
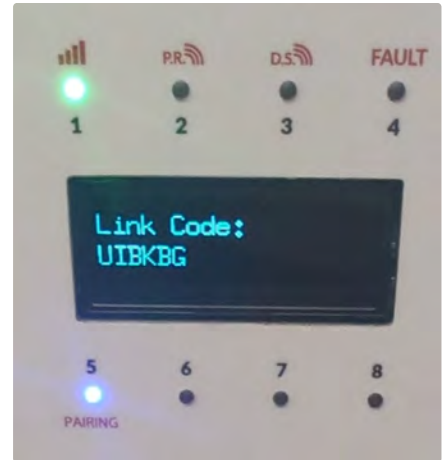


Example Code

## 3.) Access the Well's Link Command

1. Go to the web dashboard, find the associated well in your list to be linked, and click the […] icon on the far right to see the available command options.
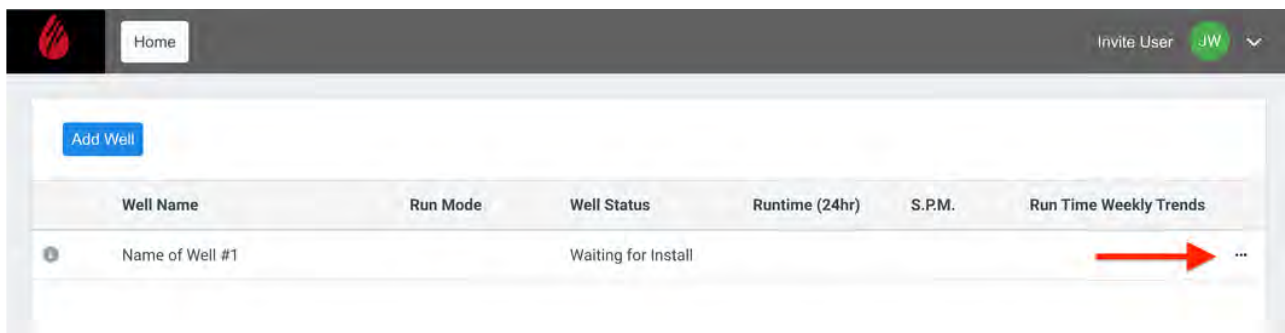


2. Then, click on the "Link" option that appears.

NOTE: if you don't see this option, then your user doesn't have "organization leader" permissions. Contact your organization leader and ask them to adjust your user permissions as needed.
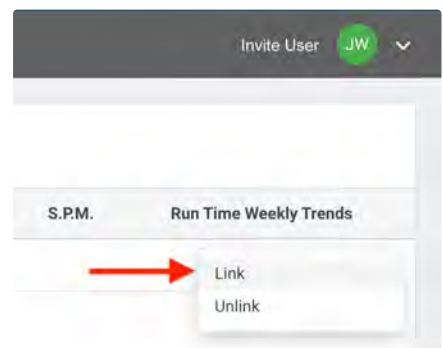
### 4.) Fill out the "Link Device to Well" Pop Up Form

1. Enter the "Link Code" Token that was collected in previous step.

2. Choose to have the well configured for "Normally Open" or "Normally Closed".
   NOTE: PetroPower recommends Normally Closed.

3. Click Submit when complete.



### 5.) Confirm Link was Successful

If the link was unsuccessful, you will be presented with a related error message.

If the link was successful, your newly linked well can not be controlled via the T-Rex Dashboard settings and it's well status will no longer read "Waiting for Install".