

PC-4E

EASTERN BEAVER INC.



PC-4E

Manual



TABLE OF CONTENTS:

I. Introduction..... 3

II. Description..... 4

III. Description Continued..... 5

IV. Switching Lead - Trigger In..... 7

V. Installation..... 8

VI. Installation Tips..... 9

VII. PowerLink Cable..... 10

VIII. Specifications..... 12

IX. Cautions..... 13

X. Repair Service & Spares..... 14

XI. Plain English Warranty Summary..... 15

XII. Warranty..... 14

INTRODUCTION:

The PC-4E is the 3rd generation fuse box from Eastern Beaver Inc. It is our first venture into electronic fuses, but subject to the same test reign we used on the PC-8 (over 10,000 units sold and working reliably). The objective for the PC-4E was to develop a reliable, easy to use, fuse box. One that did not require phone or PC apps, remembering settings or sequences. Simply, a fuse box that just works.



Figure 1: PC-4E

The PC-4E has three switched and one battery direct output. The switched outputs are all individually fused, using electronic fuses. The battery direct output has a physical fuse and we normally provide two 20A fuses with the unit. eFuses are reset by power cycling the vehicle. Operation is simple. Installation is simple. Outputs can be split using CS Splitter cables, so if you have a 3A and 5A load, you can use a splitter on a 10A circuit. A delay start up version is available which delays powering up the accessories for around 15 seconds, to allow full power for starting the vehicle (useful in cold climates).

We thank you for purchasing the PC-4E and look forward to supporting all your electrical accessory needs.

DESCRIPTION:

The PC-4E is a 30A, 4 output fuse box/PDM with 1 battery direct connection and 3 switched connections (powered on when ignition is On). The positive switched outputs are White (1), Yellow (2) & Purple (3). The battery direct outputs is Red. The Trigger In is Blue.

All grounds are black. The White output is fused at 10A. The Yellow output is fused at 10A. The Purple output is fused at 15A. Switched outputs (total) must not exceed 25A. Unswitched output must not exceed 15A, unless for short periods of time.

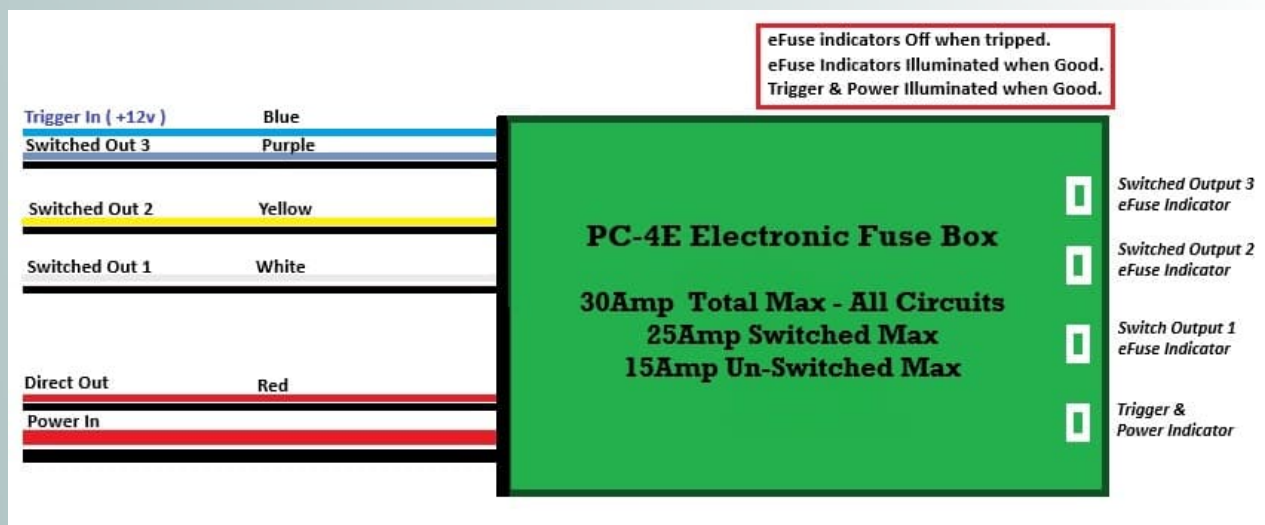


Figure 2: PC-4E Block Diagram

Battery direct outputs can be used for connecting heated gear, chain oilers, or battery/trickle chargers, but be careful of devices that can cause parasitic drain. A typical motorcycle ECU will draw less than 1.0mA when the bike is powered off. We found that currents of around 2mA or higher can cause an average battery to be unable to start a bike, after just 4 weeks of storage.

The PC-4e standby current is typically less than 0.36mA at 12v. We tested some more expensive electronic fuses boxes and most drew 2 to 4 times our standby current.

The switched outputs on the PC-4E, switch off when the bike is turned off. They are typically used for power devices that are needed during riding such as navigation systems, USB ports, radar detectors, camera systems, communications systems and accessory lights, horns etc.

The PC-4E has both fused outputs & GND connection points. This avoids running current though the frame or subframe and having to make external ground busses.

DESCRIPTION Continued:

The PC-4E comes with a PowerLink connection. PowerLink is the Eastern Beaver high power battery connection system. It can be used with our PowerLink jump start cable or other for other high power devices such as horns or lights. You can purchase optional jumper leads & other accessories for high power connections to the battery, on the Eastern Beaver PowerLink page.

NOTE: The PC-4E can be ordered with or without an in-line fuse. If an in-line fuse is ordered, then the PowerLink Jump Start cables cannot be used. The in-line fuse holder is rated around 50A, so it cannot handle jump start loads. When a PC-4E is ordered without an in-line fuse on the input, we the leads are triple insulated. When an in-line fuse is ordered the input is double insulated.

LED Functions:

The PC-4E has 4 LED's on its front panel. When upright (PC-4E in large text on top) the LED's are as follows;

- Power/Trigger - Illuminated when both Power & Trigger IN are Good (ON).
- eFuse 1 - Illuminated when the output is good. When a fault in on the circuit the LED will switch off.
- eFuse 2 - Illuminated when the output is good. When a fault in on the circuit the LED will switch off.
- eFuse 3 - Illuminated when the output is good. When a fault in on the circuit the LED will switch off.

Automatic Operation:

The PC-4E monitors all switched outputs. When a fault occurs (a short circuit or current overload), the eFuse switches off the output. To reset an eFuse, simply turn off the bike, wait 10 seconds and then turn on the bike. The PC-4E will check if the fault is still present. If the fault is cleared the eFuse will turn ON. If the fault is still present, the eFuse will remain OFF. Each time the Trigger In (Ignition) is turned ON, the eFuse will check for a fault condition.

Direct Output:

The battery direct output is fused using a LittleFuse Mini Blade fuse in a Bussmann fuse holder. We supply two 20A fuses for this output (one spare). The circuit can handle up to 25A for short periods (if a 25A fuse is installed).

Generally, the direct output should not be used for electronic devices, that might draw parasitic current (standby current that can cause the battery to flatten over a weeks or months). It is mainly for heated gear (that is disconnected when the rider is off the bike) or for trickle/battery chargers, accessory tire pumps, or devices that are disconnected once their use is finished. The direct output is fused at 20A.

Total Power:

The PC-4E can handle a TOTAL maximum of 30A continuously across the Direct and Switched outputs. The Switched outputs are limited to a TOTAL of 25A with each output individually limited as belwo. The Direct output is limited to 15A.

eFuse Settings:

Standard configuration on the eFuses is as follows;

Direct Output—15A

SW 1 — 10A

SW 2 — 10A

SW 3 — 15A

Example1:

Sw 1 output 8A

Sw 2 output 10A

Sw 3 output 5A

Direct output 7A

Total 30A = OK

Switched total = 23A =OK

Direct total = 10A =OK

Within Specifications

Example 2:

Sw 1 output 5A

Sw 2 output 5A

Sw 3 output 10A

Direct output 15A

Total 35A = NOT OK

Switched total = 20A =OK

Direct total = 15A =OK

Outside Specifications

Example 3:

Sw 1 output 10A

Sw 2 output 10A

Sw 3 output 10A

Direct output 7A

Total 37A = NOT OK

Switched total = 30A = NOT OK

Direct total = 7A =OK

Outside Specifications

Different Between eFuse and Regular Replaceable Fuse:

efuses (Electronic Fuses) switch off at the exact current they are set to. So a 10A eFuse will open at exactly 10A. Regular fuses burn an element and usually it is based on the stated current, for a set period of time (generate enough heat to burn the element). So the accuracy is within a wide tolerance. They actually get very hot when the current is within 20% of the rated current. eFuses on the other hand do not burn an element and their temperature increase is more liners. eFuses offer much quicker circuit protection, than normal fuses.

Circuit Isolation:

Each circuit on the PC-4E is isolated and operates individually. This means the whole unit cannot fail. An individual circuit could fail, but the others would remain operational. This is an import factor re reliability. For electronic fuse boxes that are CPU controlled, a CPU failure could mean all circuits fail or circuits fail in pairs. This is not the case with the PC-4E. Power runs to all circuits in parallel, but they operate individually. This provides a higher level of safety against failure.

SWITCHING LEAD— TRIGGER IN:

The switching input on the PC-4E requires under 0.02A (only required then the bike is switched on) so there are many sources that can be used for the switching input. We recommend using one of the following sources;

1. Aux power port.
2. Number plate light using a splice cable or Posi-tap.
3. Tail/driving light using a splice cable or Posi-tap.
4. Other source of switched power that is 12-15v when ON.

Generally it is best to avoid using diagnostic port connectors or any signal, that carries data or that you are not sure of its function. The switched input to the PC-4E is diode protected and the electronic circuitry is designed for minimal noise so it works on CANBUS motorcycles or with any new motorcycle technology.

Wire diameter from 0.5mm^2 (20 AWG) to 1.25mm^2 (16 AWG) can be used to connect to the Trigger In (smaller wires are fine, but harder to work with). Trigger In uses Bullet or MT-090 connector and a corresponding female connector is provided.

Installation:

Installation of the PC-4E is quite simple. Decide on the location you want the PC-4E mounted. Most installation positions will be under the rider's or passenger's seat, however due to the compact size, mounting inside the front fairing is also possible. In some cases the PC-4E can be mounted under a side cowl or side seat cowl. Points to note concerning the mount positions are:

- Access for connecting cables.
- Access to view LED status (not an absolute necessity).
- Cooling, the PC-4E does not need forced air but it does keep cool via convection so we recommend to avoid stacking items on top that may hinder cooling. Also, avoid storing cloths or such against the case, as this reduces normal cooling.

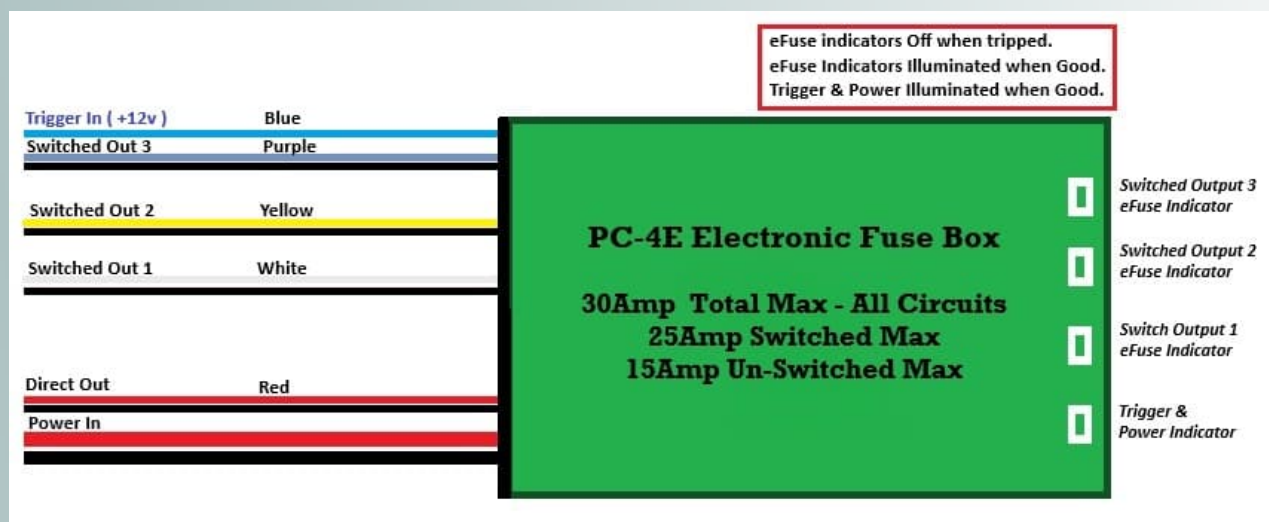
- For reliable operation we recommend mounting the unit out of the direct weather and away from wheel spray/splashing etc.

(The PC-4E is both water proof & weather proof, however some sensibility in choosing a mount position will aid in long product life. Example: mounting against an engine or exposed to the sun, or where it will be damaged by wheel fling off, will shorten product life.)

- It is always best to mount the PC-4E firmly to a panel or tray. Strong Velcro can be used or cable ties. Loose mounting or allowing the unit to move around can lead to premature failure of connected wires.

Connections to the PC-4E are straight forward.

- Power IN— main power in from the battery, via the PowerLink connector (battery side connection included).
- Trigger IN— from a switched power source that turns on when the ignition is turned on.
- 4 Outputs— there are three Switched & one Battery Direct output.



Installation Tips:

1. Install the Battery Direct output fuse last. Make sure all connections that you need to make, are made, before installing the Battery Direct fuse.
2. Connect the battery main power lead, routing it where it will not be damaged by any removable parts (such as seat latches) & where it is away from heat sources such as the exhaust. It is best to cable tie the main power lead into position, however, avoid stressing connections by over tightening cable ties. They should hold the lead in place without stressing the cable or connector.
3. Decide on a mount position for the PC-4E and make it can be mounted securely. Also, that cooling will not be hindered (no loose cloths or stacking on top of other electronic units). Then mount the PC-4E. Velcro is provided with the unit for mounting to a flat surface, however it can be cable tied to a frame/sub frame or a bracket used to hold it in place (optionally available).
4. Connect the Trigger In lead. Bike Specific kits will come with the correct Trigger In adapter cable. Non Bike Specific kits will come with a Posi-Tap or similar connector. We, as mentioned, recommend using a Aux power source or a Number Plate light or Tail light as a source.
5. Finally, connect the PC-4E to the battery by making the PowerLink connection (main battery power lead). Always connect the GND last when connecting, and disconnect the GND first when disconnecting the PC-4E battery leads.
6. Check once more, all connections are cleanly route & that there are no loose wires. Use cable ties where necessary to ensure wires stay in the desired position. With cable ties, do not stress connections by having cable ties too tight. They should hold the cables in place without causing the cable to be pulled too tight. In recent years, many OEM wiring looms had issues because the installers tied looms so tight they stressed connections and broke the loom or the connectors. Avoid this.
7. Turn on the bike ignition and check that the PC-4E PWR/TRIG LED illuminates. This indicates that both Power IN and Trigger In are present. If the LED does not illuminate, check the battery connection (screws are tight) and if they are the the PowerLink connection is made, check that the Trigger In signal is high. If it is not high, check why or select another source for the Trigger In.
8. Turn off the bike. Now connect accessories cables using provided Bullets or male MT-090 connectors. Note polarity. Black wires are grounds.
9. Turn the bike on and check that your accessories all power up. If an eFuse triggers, it may be that you need to use a switched output with a higher current rating ie move from a 10A output to a 15A output, or that you have a short in one of your accessories wiring. Note that some devices may have a higher start current, than running current. So a device that requires 6A might need 10A to start up.
10. Install the Battery Direct output fuse.

PowerLink Cable:

Below is an example image of the battery PowerLink connection. It is a high current connection tested at 50A, with short duration current of up to 150A (limited to 15 seconds for jump starting). The cable is 100% copper multistrand with high temp insulation. The assembly is triple insulated with both sleeving & braided mesh over the top.



All PC-4E battery connections are PowerLink compatible, so you can add any PowerLink accessory such as Jump Start leads.



Jump start leads are designed to aid in starting batteries that have discharged, not batteries that have internal shorts or failed cells, which can result in very high currents. It's always advisable to let some charge build up in the battery being jump started, before actually trying to start the motorcycle. Check the cables are not too hot, after a minute or two, then try to start the bike (no more than 15s). Then you would need to let the cables cool for 3-5 minutes.

A side benefit of the PowerLink system, is it provides a single point, where all accessories can be disconnected, when needed. For example when working on your bike (flashing ECU or such) you can disconnect all accessories so battery drain is minimized.

PC-4E

Intentionally blank (always wanted to do this) ;)

SPECIFICATIONS:

- Maximum Total Current: 30 A
- Maximum Switched Outputs: 25A
- Maximum Direct Outputs: 15 A
- Maximum Current Per Output: 10A, 10A, 15A
- Switched Outputs: Output 2, 3, 4 (White, Yellow, Purple).
- Direct Outputs: Output 1 (Red)
- Grounds: Black
- Switched Input Current: 0.002A (*only used when ignition is ON*)
- Standby Current 0.00036A
- Switch Input Protection: 2 Types (*Inline diode + Diode with Resistor Damping*)
- Power Cable Size: 14 AWG
- Output Cables Size: 16 AWG
- Operating Temperature: -20c to 70c
- Case Size :
65mm Long (2.6")
45mm Wide (1.6")
25mm Height (1 ")
- Fuse Type Switched Outputs: Electronic
- Main Fuse Type: LittleFuse ATO 40A
(note ATO, ATM and LP JCase fuses get very hot near their rated current, so never fuse at the rated current. Select fuse value based on cable capacity and desired current limit. We recommend at least 25% derating for physical fuses then select next biggest size, for a 30A circuit that is a 40A fuse).

CAUTIONS:

- I. When disconnecting battery leads, disconnect the negative (-) first.
- II. When connecting to the battery, attach the Positive (+) first, then the Gnd (-).
- III. When removing the PC-4E battery lead, remove the Gnd (-) first, then the Positive (+) .
- IV. With any connection to the motorcycle battery, please try and make the connection clean. Causing the connections to rattle or make multiple connections, before being secured, can cause voltage spikes and damage electronics.
- V. Install the direct out fuse last, after connecting the PC-4E to the battery.
- VI. Avoid putting rags or visor cleaning cloths on top of the fuse box. The PC-8R requires convection cooling to dissipate heat.
- VII. Always ensure the PC-4E is secured to the bike, to avoid unnecessary problems with connections.
- VIII. Never tie cables in position too tightly. Always allow some slack near connectors or entering looms. Allowing some slack when tying cables in place helps avoid creating stress points and allow a degree of vibration damping to be carried out by the cable slack.

REPAIR SERVICE & SPARES:

The PC-4E is a sealed unit. When a failure occurs, the unit will need to be replaced. If the unit is less than 12 months old, we will replace the faulty unit, provided the failed unit is returned to Eastern Beaver. Shipping costs are not covered by warranty. Where the unit is not under warranty, we will replace the unit for (List price—30%) excluding shipping costs, provided we are certain the unit is faulty.

Where a unit has been damaged in a crash we will offer a 50% discount on a replacement unit, provided proof of the damage is provided. Shipping is not included.

Where damage to wiring on the PC-4E has occurred, we may be able to repair and in such cases we will charge an hourly rate for the time taken to repair. Send pictures of the damage and we can quote on the repair.

PLAIN ENGLISH WARRANTY SUMMARY:

The PC-4E is warranted against defects, per the Standard Eastern Beaver Inc Warranty Policy for a period of 1yr from the date of purchase.

The following exclusions apply:

1. Failure or damage due to improper installation, or proper care during installation.
2. Exceeding specifications on power.
3. Crash or accident damage (*though we will offer a discount on replacement units for PC-4E's damaged in riding accidents*).
4. Use in corrosive environments.
5. Misuse or lack of care during use that leads to physical damage to the PC-4E.
6. Liability is limited to the initial purchase price of the PC-4E, excluding shipping or wiring kit costs.
7. Proof of purchase, from an authorized dealer or Eastern Beaver Inc is required, to make a warranty claim.
8. Shipping costs are not covered by warranty and the customer is responsible for shipping cost to Eastern Beaver Inc and the return to the customer. Eastern Beaver Inc, at its sole discretion may offer to cover some of the shipping costs, depending on the circumstances.
9. The Standard Eastern Beaver Inc Warranty Policy is the determining policy. This section is just a brief summary of that policy.

WARRANTY:

Standard Eastern Beaver Inc. Warranty Policy

This is a return to base warranty. The customer is responsible for all shipping costs.

- I. All implied conditions and warranties which may by law be excluded in relation to the supply of products or provision of services by Eastern Beaver Inc are hereby excluded, the exclusion, of which would render the agreement incorporating these Conditions between Eastern Beaver Inc and the Customer void or voidable or Eastern Beaver Inc liable to a penalty or which may not by the terms of relevant State Legislation be excluded or modified, then such conditions or warranties shall apply.
- II. In connection with the supply by Eastern Beaver Inc to the Customer of any goods or services, where, any legislation provides for redress in the event of Eastern Beaver Inc breach of a condition or warranty, whether statutory or otherwise, then the Customer's sole remedy for any such breach shall at the option of Eastern Beaver Inc be limited to;
 - III. the replacement of Eastern Beaver Inc goods; or
 - IV. the repair of Eastern Beaver Inc goods; or
 - V. refund of the purchase price of Eastern Beaver Inc goods.
- VI. Eastern Beaver Inc shall not be liable for the cost of removal and reinstallation or loss or time due to failure of a component or system of its products other than stated in Clause II.
- VII. Subject to any provision of relevant State legislation which may not be excluded or modified, Eastern Beaver Inc will not be liable for any costs, claims, damages or demands arising from any personal injury, loss or damage to products whatsoever occurring as a result of either the act or omission of Eastern Beaver Inc, its distributors or agents and in no case will Eastern Beaver Inc be liable for consequential loss or damage.
- VIII. Subject to the provisions of this document, if systems or parts fail, supplied as new parts, within a period of 12 months of purchase, due to faults in manufacture, these parts are warranted as per Clause II.
- IX. When returning faulty units, the Customer must provide invoice number, proof of purchase, purchase date, product serial number (where applicable) and a description of the product failure.
- X. Subject to the provisions of this document, if system parts which have been Upgraded or Modified as part of an OEM Upgrade, fail, within a period of 180 days, these parts are warranted as per Clause II.
- XI. This warranty is void if Eastern Beaver Inc determines, in its sole business judgment, the defect to be the result of abuse, neglect, alteration, or attempted repair by unauthorized personnel.
- XII. The several clauses which constitute or evidence this warranty shall be taken as mutually explanatory and anything contained in one but not in another shall be equally binding as if contained in all. Any ambiguity, discrepancy or inconsistency shall be explained by Eastern Beaver Inc upon reference thereof in writing to Eastern Beaver Inc by the Customer or on discovery thereof by Eastern Beaver Inc, who shall thereupon direct the Customer as to the interpretation to be followed. If the Customer finds any such ambiguity, discrepancy or inconsistency he shall immediately refer it in writing to Eastern Beaver Inc.
- XIII. Eastern Beaver Inc shall not be liable for failure to perform its obligations if the failure arises from circumstances beyond its control, including but not limited to fire, explosion, strikes, lock - outs or any other industrial disputes, failure or refusal of its supplier to supply the goods, inclement weather, acts of God, Governmental action, in no such event shall the Customer be entitled to damages of any kind for late performance or failure to perform.
- XIV. Eastern Beaver Inc specifically disclaims any and all implied warranty of merchantability or of fitness for a particular purpose. The buyer acknowledges and agrees that in no event shall the company be liable for any special, indirect, incidental or consequential damages, or for injury, loss or damage sustained by any person or property, that may result from this product failing to operate correctly at any time.