

ELECTRICAL CERTIFICATION

INTRO TO COMPONENTS

CATALOG: E1

OBJECTIVE

Members will learn electrical components used in robot construction and connection.

COMPLETION REQUIREMENTS

All Electrical subteam members are required to complete this certification.

INTRO TO COMPONENTS INTRODUCTION

Trainer Qualifications

Electrical Lead and Mentors with relevant experience are able to administer this certification.

Major Assignment

- I. Members will be introduced to the electrical components below
- II. Members will be shown an example electrical board on previous competition or outreach robots

Location

Robotics Center

Materials

Example electrical board with components

INTRO TO COMPONENTS INSTRUCTIONS

Battery

Provides power to the robot - 12.6 volts

- Positive connection to kill switch

Kill Switch

Turns robot on and off, automatically powers off if more than 120 amps

- Connected to Battery and PDH

Power Distribution Hub (PDH)

Distribution of power to different systems and components

- PDH requires access to USB-c port in order to configure
 - Programming needs access to this port
- Connected to Kill Switch, to other components through the ports
- **Fuse** - piece of metal designed to break when a certain amp is reached
- **Disposable Fuse** - if fuse is blown, unable to reuse
 - RoboRIO has to use disposable fuse
- **Port** - other components are physically connected to the PDP

Motor Controller

- Takes instructions from the PDH and RoboRIO to send voltage to motors
- Not used on motors with built-in encoders (Falcons)

Voltage Regulation Module (VRM)

Smaller voltages and amperages to be used on systems requiring smaller power

- "Mini PDH"
- Connected to the PDH, to other components through the ports
- Requires 20 amps from the PDH
- Can function on its own as long as it has power, doesn't need instructions

Pneumatics Control Module (PCM)

Smaller voltages and amperages to be used for pneumatic systems

- Connected to the PDH, to other pneumatic systems through the ports

Radio

Establishes wireless connection with the robot to allow driving

- Requires 12 volts
- Have to plug into 1st ethernet port - allows power and signal
 - 2nd port only allows signal

roboRIO

Receives commands from radio, uses already downloaded programming, translates those inputs into commands for the components

- Won't run unless Radio Signal Light (RSL) is plugged into
- Has ports for LimeLight, webcams, limit switches - sensors

Radio Signal Light

Tells if robot is on/connected

- La and N go to RoboRIO
- La and Lb connect to each other

Canbus (CAN)

Connects to anything that requires input from the RoboRIO

- Must connect to all components
- Has to terminate somewhere with a resistor
- Twisting wires - help get better signal
- Have to be careful about voltage "jumping" to Canbus wires

FRC Team 4085 Certification

2025 - 2026 Season

Falcon

Type of motor with built in encoder

- RoboRIO tells commands - does the calculations to perform the task
- Gives feedback to say it is working - gives the output - somewhat troubleshoots itself
- Can make adjustments - can see what it is doing
- Programming has some more knowledge on this