

The FRC Control System - A Primer

Laying out and explaining the Integral control system hardware that is needed to make an FRC Robot run.

Please consult the Regular FRC Control System Diagrams for a more complete implementation of the system.

Robot Signal Light
An industrial-grade light that allows a robot to visually communicate its status either to your drive team, or field staff.

RSL Wiring
Minimum 22 AWG
"La" and "Lb" terminals connected to each other.
CAN wires should be a twisted pair with a twist per 1 inch or denser.

Ethernet Cable
Must be connected to the radio using the port labeled "RIO".
It is Recommended that you use a new ethernet cable to ensure reliability of the connection.

Radio
Enables wireless communication from your robot to the field, and to your team's Driver's Station.

Robot Communication

Main Power and Distribution

High Current Channels
Up to 40A continuous load for these.
Used for motors, pneumatics controllers, and everything else

Low Current Channels
Up to 15A continuous, 20A peak load for these.
Used for the RoboRIO, Radio and other low current devices.

ATO Breakers
12V40A
12V20A
12V30A
12V10A
ATM Fuses
15
10

Circuit Breakers / Fuses
Comes in ATO (High Current) or ATM (Low Current) form factors. These slot in to allow supplying power but also to give current protection to the channel its connected to.

Power Distribution Hub
Distributes battery power, and provides fused low and high current channels towards various components in the robot.

Motor Controllers
Controls the motors that your robot has.
Only 1 motor is allowed per controller in most cases.
Motor Controllers come in different types.

Integrated Controllers
Example Shown is a Kraken X60 Motor + Talon FX
These controllers are integrated into their motor, making it either inseparable, or separable as an installable module
These controllers can either be controlled through CAN or PWM.

Discrete Controllers
Example Shown is a Spark MAX motor controller
These controllers are separate from their motors, meaning you can pair any of these with any compatible motor.
These controllers can either be controlled through CAN or PWM.

Motor Control

The Battery
A Sealed SLA-type battery, it stores and provides the power needed for a robot to run for a Full Match (2:30 Minutes). **Replaced with a recharged one every match.**

120A Main Breaker
Protects the robot from drawing too much current at the battery level.
Also acts as the robot's power switch.

Making your robot aware
Sensors detect movements or certain changes in your robot or its surroundings, so that you can utilize them for your robot's functionality.

Read more on the different types of sensors and how you could utilize them at:
<https://docs.wpilib.org>

Limit Switch Example

Analog Encoder Example

USB Camera Example

Sensors

BASIC FRC CONTROL SYSTEM

V.3.20.PR

TEAM 3161



Power

12V DC Main

LIVE (+)
(-) GND

PWM

26 AWG Minimum

+5V
GND
SIG

CAN

28 AWG Minimum

HI
LO

Wires

American Wire Gauge (AWG)

Minimum Gauge per connection type shown.

6 AWG
12 AWG
14 AWG
18 AWG
22 AWG
26 AWG
28 AWG

Always practice proper safety precautions and practices when working with electrical systems.

More Information about the FRC Control System can be found at
<https://docs.wpilib.org>

KEEP IN MIND