Communication

CAN Bus Wiring
Minimum 28 AWG
Typical 22 AWG

Robot Signal Light
855PB-B12ME522
shown

RSL Wire 18 AWG Typical
22 AWG Minimum

Robot Radio
VH-109

Downstream Power over Ethernet (PoE)

Disabled by default, **Please check DIP Switches 1 and 2 to verify unless you want to have them on.**

Downstream PoE Devices must support PoE at the supply voltage provided to the radio.

Otherwise Damage will occur to them.

Radio Power
Minimum 22 AWG

Ethernet Cable

Connection to the RoboRIO connected to the port labeled "RIO"

Please refer to the latest Game Manual for specific rules on how to power this radio.

CAN wires should be a twisted pair with a twist per 1 inch or denser.

18 AWG Typical, must be 22 AWG or larger on a 10A Fuse

The main robot CAN loop must start with the RoboRIO.

The use of the discrete I2C/PC port may induce system lockups. Please refer to WPILib docs for possible workarounds.

DIO Wiring
Minimum 28 AWG
Typical 22 AWG

CAN
L
H
INPUT
SPI
PC
RS-232
POWER
STATUS
RADIO
COMM
MODE
RSL
DIO
PWM
roboRIO 2.0
RELAY
ANALOG IN
RESET
USER
RSL

RoboRIO

Check pinout documentation of the specific device you are connecting to the RoboRIO to ensure correct polarity.

USB Camera
C270 Shown

PWM Wiring
Minimum 26 AWG
Typical 22 AWG

Servo
Generic shown

To a 5V Power Supply (i.e Buck Converter)
RIO and Power Supply common grounded.
Power Supply must be properly rated for load.

LED Strip
Generic WS2812B shown

PWM Control

Spark MAX
Brushless/Brushed, CAN/PWM

A B C
MODE
V-
V+
STATUS

Talon SRX
Brushed Only, CAN/PWM

Motor and Motor Controller Wires on 31-40A Breakers must be 12 AWG or larger

Koors 40
Brushed Only, PWM Only

Motor and Motor Controller Wires on 21-30A Breakers must be 14 AWG or larger

Discrete Motor Controllers
(CAN/PWM Controlled)

The CTRE System was the original complement to the new, RoboRIO-based control system debuted in 2015. It was superseded by the newer REV System in 2022.

The original CTRE complement however are still legal and available for use in FRC, and how it is wired against other FRC components is shown in this diagram.

Power Distribution Panel

This CAN Bus is configured to end on the PDP (TERM RES: set to "ON").

CAN
COMM
STAT
40 AMP AUTO RESET
30 AMP AUTO RESET
20 AMP AUTO RESET
20
10

120A Breaker
CB285-120 shown

42 VOLTS DC MAXIMUM
RATED FOR WET AND WATERPROOF
120 AMPERE THERMAL CIRCUIT BREAKER

Battery lugs must be crimped and properly insulated.

Battery wires must be 6 AWG or larger

12V Battery
Refer to latest Game Manual for specific rules and examples

Main Power

Neo Vortex (Spark FLEX)
Modular Brushless, CAN/PWM

Kraken X44 (Talon FX)
Integrated Brushless, CAN/PWM

Kraken X60 (Talon FX)
Integrated Brushless, CAN/PWM

Integrated/Modular Motor Controllers
(CAN/PWM Controlled)

Limit Switch
Generic Switch shown

IR Break
2168 Sensor shown

Reciever
Transmitter

Digital Input/Output

Analog In
Minimum 28 AWG
Typical 22 AWG

Analog Encoder
TTB-0040 shown

Potentiometer
Generic shown

Analog Input

Signal wires must be 28 AWG or larger

Solenoid Valve
SMC SY3240-6LZ shown

Pressure Sensor
am-2006 shown

Compressor wires must be 18 AWG or larger

On-board Compressor
Refer to latest Game Manual for specific rules

PH/PCM power must be 18 AWG or larger if using a 20A breaker

COMPRESSOR OUT
PRESSURE SW
VIN
12V
SOLENOID
CAN
COMP
STATUS
Pneumatics Control Module

Pneumatics Control Module

Pneumatic Systems

FRC CONTROL SYSTEM - CTRE

V.3.20.CR

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