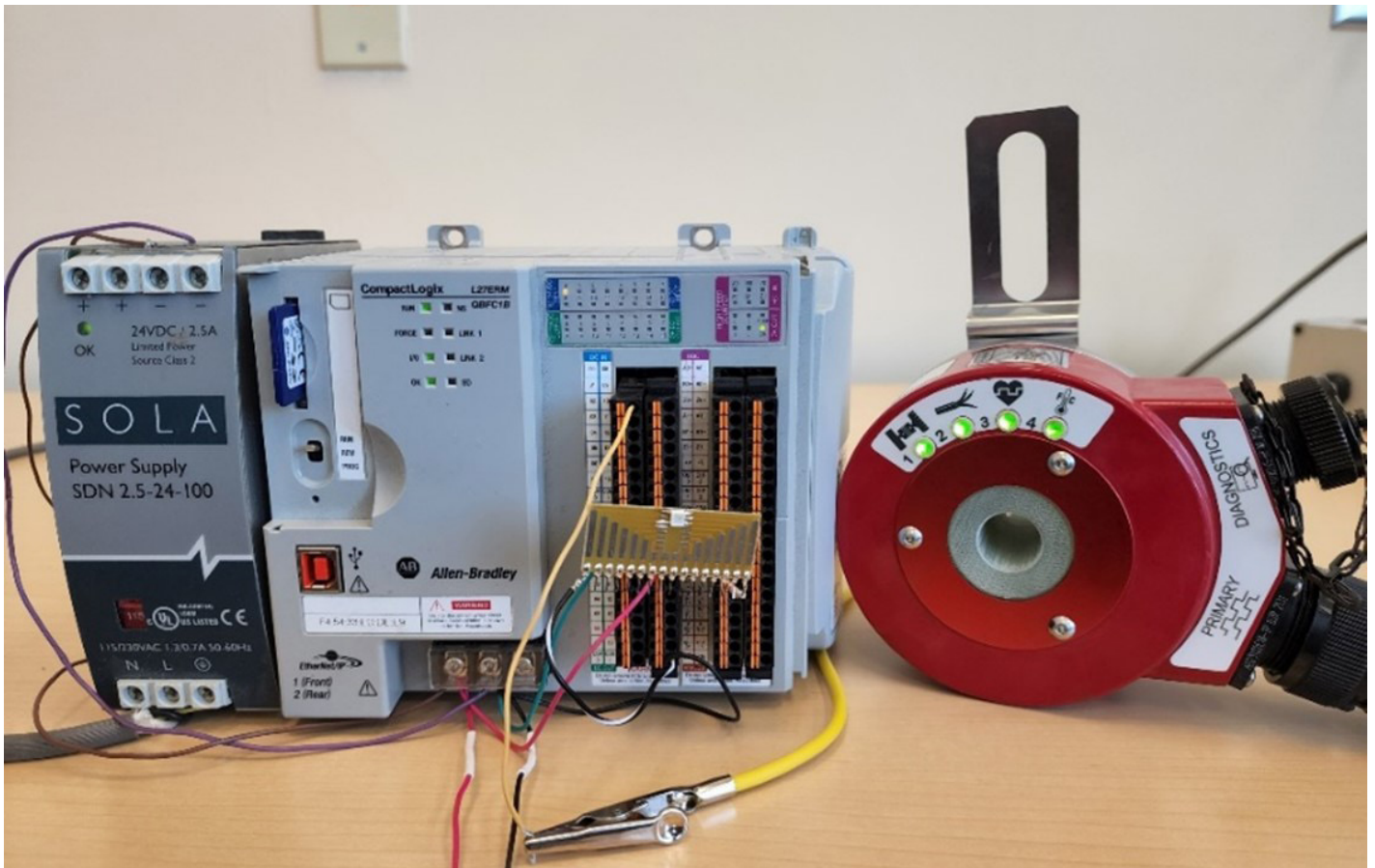


## White Paper

# How to Connect HS35iQ Encoder Fault Output to a PLC

See an example of how to connect the fault output of the HS35iQ encoder to a PLC with example connection diagrams and necessary accessories.



# How to Connect HS35iQ Encoder Fault Output to a PLC

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## Introduction

In this example the fault output from an HS35iQ encoder was connected to a Rockwell PLC. A simple single line of ladder logic was used to read the fault line from the encoder and turn on an LED when a fault is present. The LED is just an easy way to indicate the fault was successfully read from the encoder but other solutions such as alerting maintenance are possible by utilizing the fault output function.

## Hardware Setup

The following components were used to test this example:

- HS35iQPROGR81721R2 encoder with 2.2k load resistors
- L27ERM-QBFC1B PLC
- 24V DC Power supply
- LED with current limiting resistor

The supply terminals for the PLC and the encoder were both connected to the same 24V DC power supply. The 24V power supply was also connected to the **+V** and **COM0** connections on the “DC OUT” port included with the PLC. The anode or positive side of the LED had a resistor connected in series to limit the current supplied from the PLC output. The LED/resistor pair was connected to **DC OUT 08** and **COM**. The fault output from the encoder was connected to **DC IN 00**. **COM0** of “DC IN” was also tied to common (**COM**) of the PLC and encoder. See the wiring diagram in Figure 1.

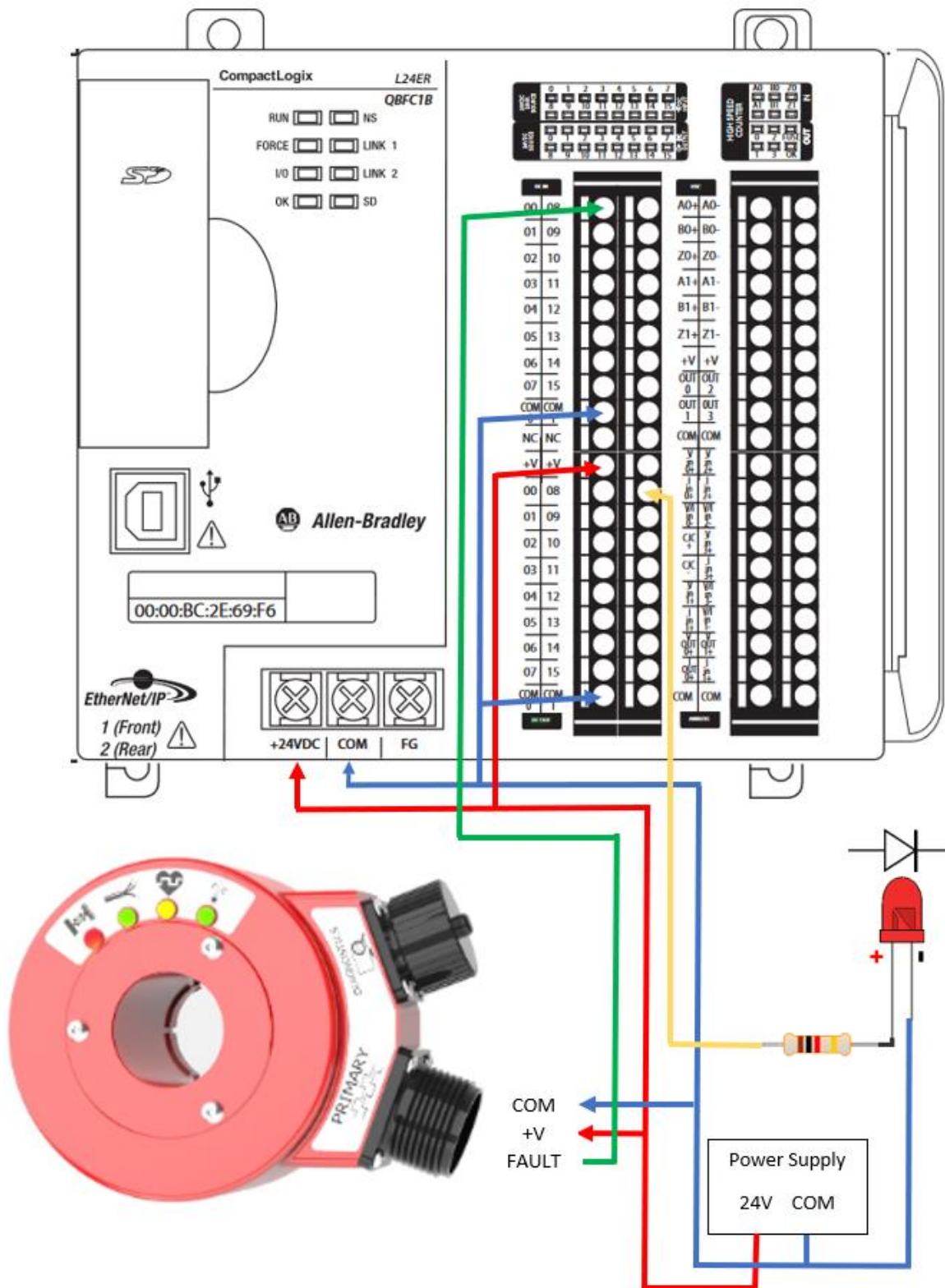


Figure 1. Wiring diagram for example

## Software Setup

The routine written to read the fault output and turn on the LED is shown in Figure 2.

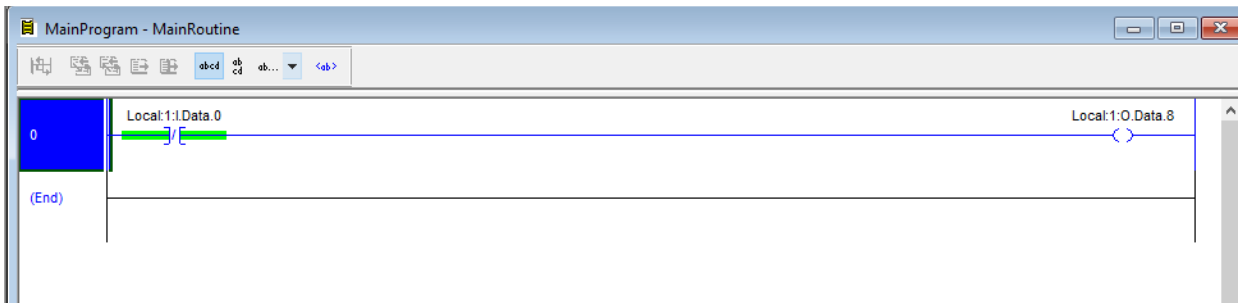


Figure 2. PLC software routine

An Examine Off was used as the fault output is high during non-fault conditions and transitions to low when a fault occurs. The routine simply reads the status of the fault output on **DC IN 0** and will energize **DC OUT 08** connected to the LED if a low condition is read.

## Testing

After everything was connected properly, the program was downloaded to the PLC and it was set to run mode. To test proper functionality a cable fault was triggered by detaching the load resistor from one of the encoder outputs (A/B/Z). The cable fault LED on the encoder transitions to **RED** at the same time the LED connected to the PLC turns on (Figure 3). After the fault is corrected the cable fault LED on the encoder turns **GREEN** and the LED on the PLC turns off (Figure 4).

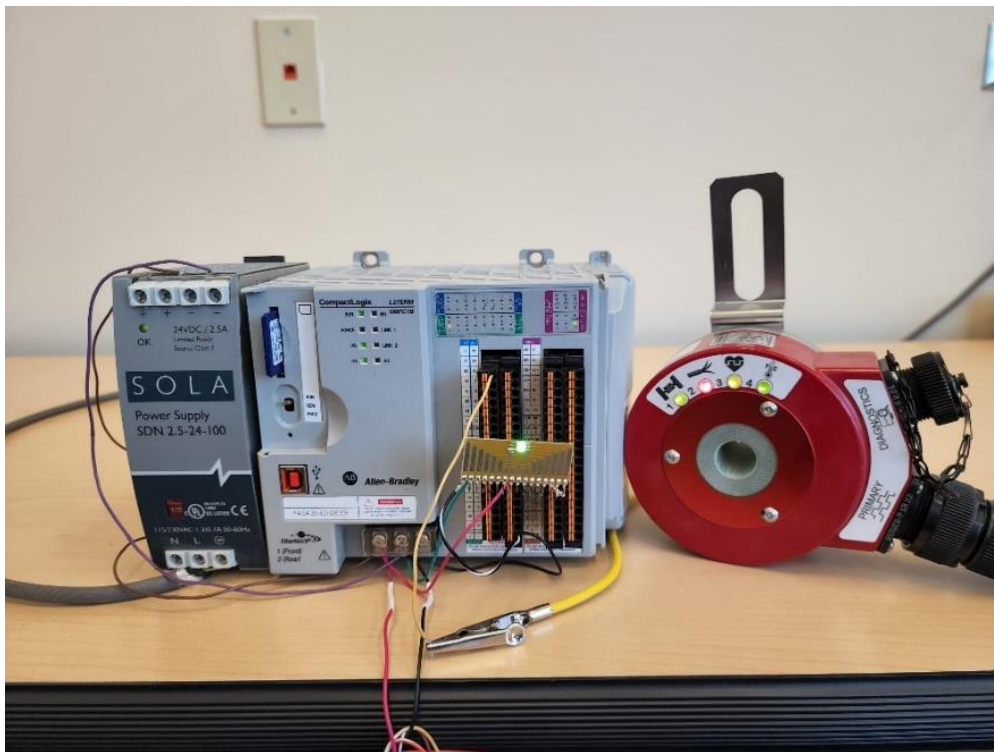


Figure 3. PLC indicating active fault output

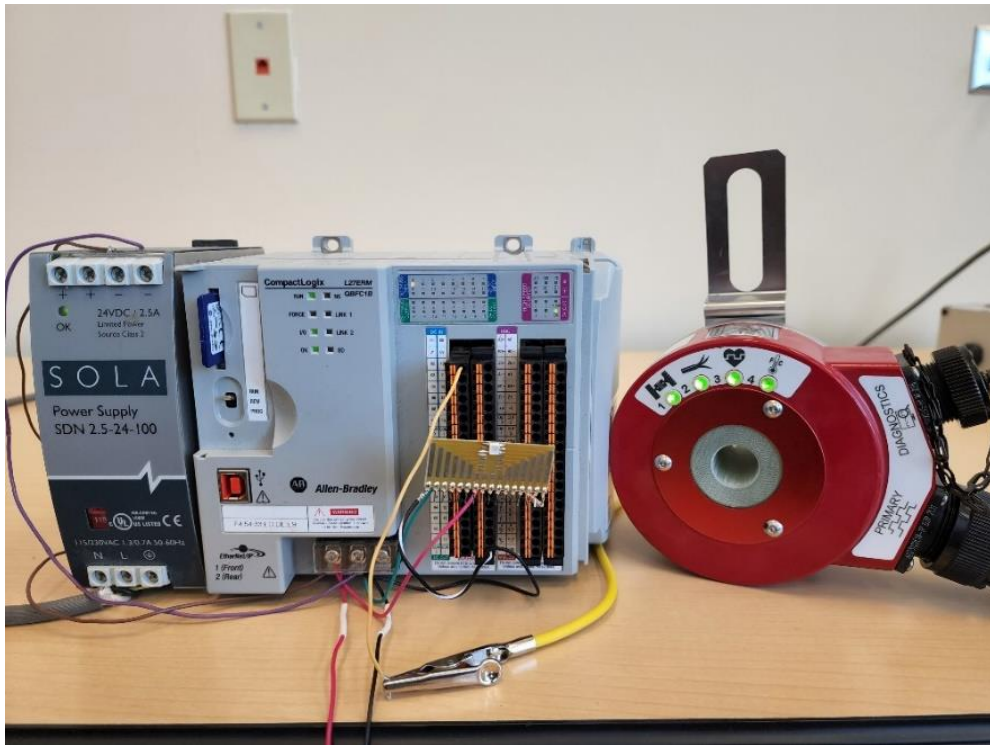


Figure 4. PLC indicates inactive fault output

## Appendix: Fault Output Use Cases

Enhance workflow by wiring the fault output to controls which improves response time and prevents or reduces downtime.

- Current State:  
**Downtime -> Troubleshooting**
- Future State:  
**HS35iQ Fault Forewarning -> Prevented Downtime**

PulseIQ™ Software allows for easy visualization of LED and fault output signal status (Figure 5).

- Fault output available on both primary and diagnostic connectors.

Fault output connection to:

- VFD or Motion card discrete or auxiliary input
- PLC discrete input \*
- Energize a relay, beacon or alarm

\* A solid-state relay is needed when the application requires isolation from the encoder to the receiving device.

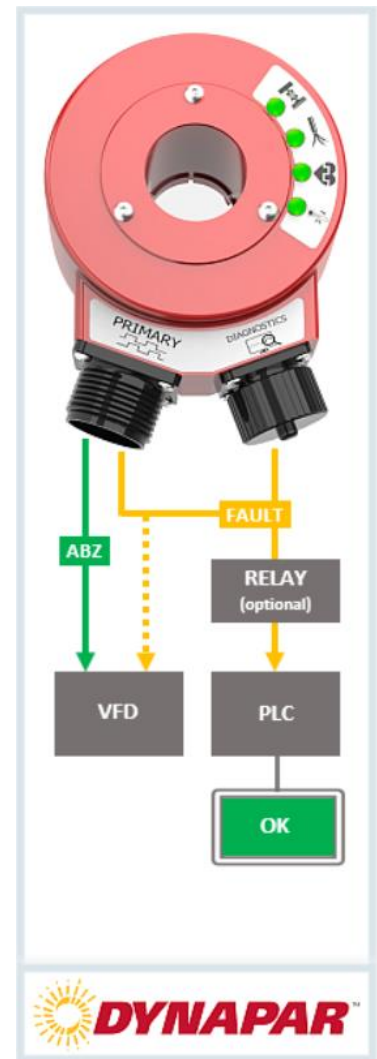


Figure 5. PulseIQ™ Software wiring visualization

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