

PLC125 LAB 2.2: WIRING AND TROUBLESHOOTING A PROXIMITY/PHOTOELECTRIC CONTROL CIRCUIT

Student Name: _____

Student ID: _____

LAB OUTCOMES:

Upon completion of this lab procedure, the student should be able to:

1. Interpret the cut-sheet wiring diagram for an AC proximity switch.
2. Wire an AC proximity switch in a control circuit.
3. Measure output voltage of an AC proximity switch in the activated and de-activated state.
4. Interpret the cut-sheet wiring diagram for an AC photo-electric switch
5. Wire an AC photo-electric switch in a control circuit.
6. Measure the output voltage of an AC photo-electric switch in the activated and de-activate state.
7. Make adjustments to the sensitivity of the AC photo-electric switch.

LAB PROCESS:

Set up NSCC 120VAC wiring board. Setup the unit on its base, or lay flat on the work table.

Part 1:

1. Connect the power cord and turn off the power input switch to make sure the unit is not powered

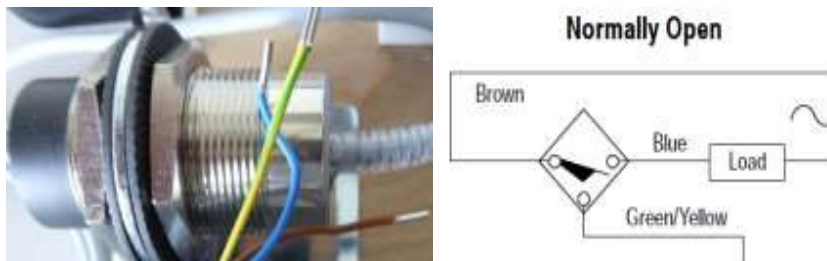


Figure 1: AB 872C-A15N30-A2 AC proximity switch and the cut-sheet wiring diagram

2. Locate the proximity switch on the NSCC wiring boards. Identify the wire colors and how the unit will be wired from Figure 1. Notice the brown wire is the L1, hot wire feeding the proximity switch. The blue wire is the output wire that will be wired to the load. The green/yellow wire is for grounding to minimize electro-magnetic interference that could be induced into the proximity switch.

Product Selection							
Barrel Diameter	Nominal Sensing Distance [mm (in.)]	Shielded	Output Configuration	Switching Frequency [Hz]	Cat. No.		
					Cable Style	Mini QD Style	Micro QD Style
8 mm	1.5 (0.06)	Y	N.O.	25	872C-A1N8-A2	—	—
			N.C.		872C-A1C8-A2	—	—
	2 (0.08)	N	N.O.		872C-A2N8-A2	—	—
			N.C.		872C-A2C8-A2	—	—
12 mm	2 (0.08)	Y	N.O.	15	872C-A2N12-A2	—	872C-A2N12-R3
			N.C.		872C-A2C12-A2	—	872C-A2C12-R3
	4 (0.16)	N	N.O.		872C-A4N12-A2	—	872C-A4N12-R3
			N.C.		872C-A4C12-A2	—	872C-A4C12-R3
18 mm	5 (0.20)	Y	N.O.		872C-A5N18-A2	872C-A5N18-N3	872C-A5N18-R3
			N.C.		872C-A5C18-A2	872C-A5C18-N3	872C-A5C18-R3
	10 (0.39)	N	N.O.		872C-A10N18-A2	872C-A10N18-N3	872C-A10N18-R3
			N.C.		872C-A10C18-A2	872C-A10C18-N3	872C-A10C18-R3
30 mm	10 (0.39)	Y	N.O.		872C-A10N30-A2	872C-A10N30-N3	872C-A10N30-R3
			N.C.		872C-A10C30-A2	872C-A10C30-N3	872C-A10C30-R3
	15 (0.59)	N	N.O.		872C-A15N30-A2	872C-A15N30-N3	872C-A15N30-R3
			N.C.		872C-A15C30-A2	872C-A15C30-N3	872C-A15C30-R3
Recommended standard QD cordset (-6F • 1.8 m (6 ft), -2 • 2 m (6.5 ft))						889N-F3AFC-6F	889R-F3ECA-2

Figure 2: The AB 872C-A15N30-A2 proximity switch product selection sheet

3. From the product selection chart in Figure 2, notice that the selector switch used in this lab, would have a N.O. contact to drive the load, and a 15 mm sensing distance. When the metal object gets close to this sensing distance, the proximity switch will activate, turning on the output.

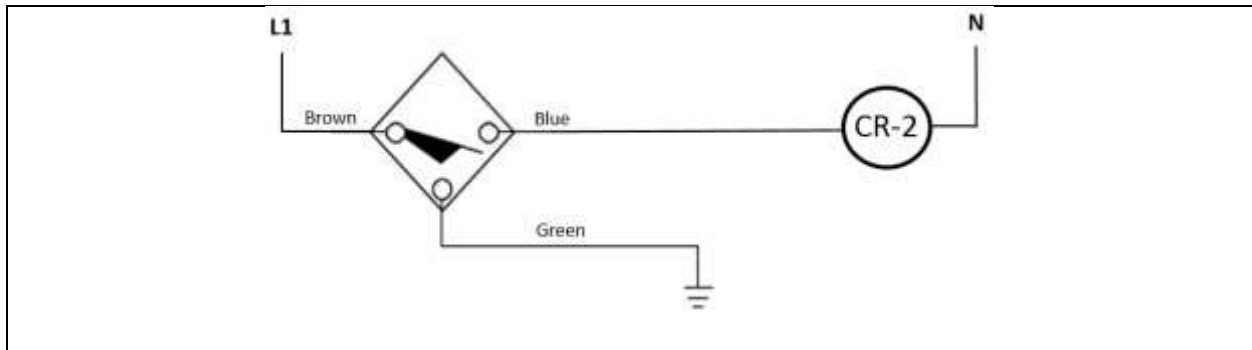


Figure 3: wiring diagram for the AC proximity switch

4. Wire the circuit from Figure 3 on the NSCC wiring boards. Notice use the coil of the ice cube relay marked as CR-2 on the DIN rail of the wiring board. See Figure 4 for the terminal number marking on the octal base mounted on the DIN rail.
5. Once the circuit is wired, power it up. Move the metal blade of a screw driver close to the proximity switch head.

Does it activate the proximity switch? _____

Is there an LED that comes on when the proximity switch is activated? _____

What is the voltage coming out of the proximity switch output when it is off? _____

What is the voltage coming out of the proximity switch output when it is on? _____



Figure 4: Connections for the ice cube relay coils used in this lab

Part 2:

1. Identify the photo-electric switch on the wiring board. Identify the cable (yellow) that will plug into the photo-electric switch. Identify the four wires coming out of the cable and their wire colors. Terminate these wires on the terminal strip.

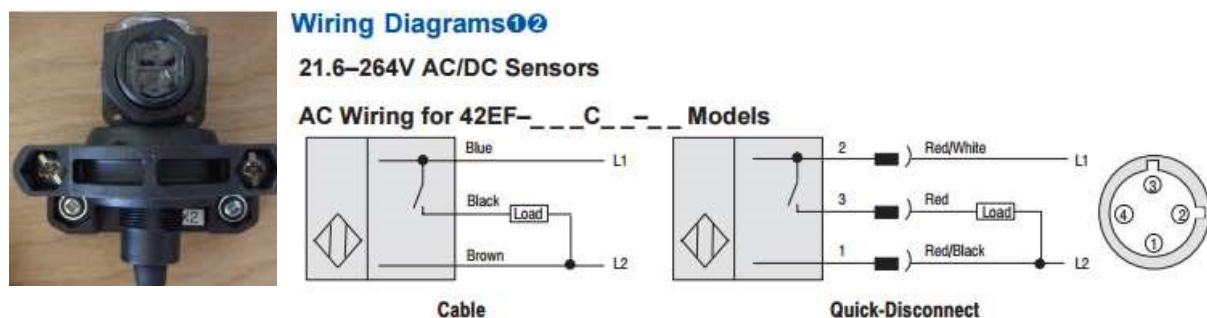


Figure 5: The photo-electric switch on the NSCC wiring board and the cut sheet wiring for the AB 42ED-D1RCAK-G4 photo-electric switch

2. Notice that since this photo-electric does not have a reflector, or fiber optic cables for sender/receiver signals, the switch is used in the diffuse scanning mode. Notice that the photo-electric has three LED indicators (Yellow, Orange and Green). It is important for a Technician to know if the device is activated.

Which LED is on if the device is activated (energizing output)? _____

LED Indicators			
Label	Color	State	Status
Output	Yellow	OFF	Output de-energized
		ON	Output energized
		Flashing	SCP active
Margin	Orange	OFF	Margin < 2.5
		ON	Margin > 2.5
		Flashing	Output SCP active (AC models only)
Status	Green	OFF	Sensor not powered, SCP active, output active
		ON	Sensor powered

Figure 6: AB 42ED-D1RCAK-G4 photo-electric LED indicators

- Check the resistance of the contacts on the contactor portion of the motor starter.
- From the product selection chart from the manufacturers cut sheet, the photo-electric used has the 4 pin plug, it is light activated, and it works at 120VAC.

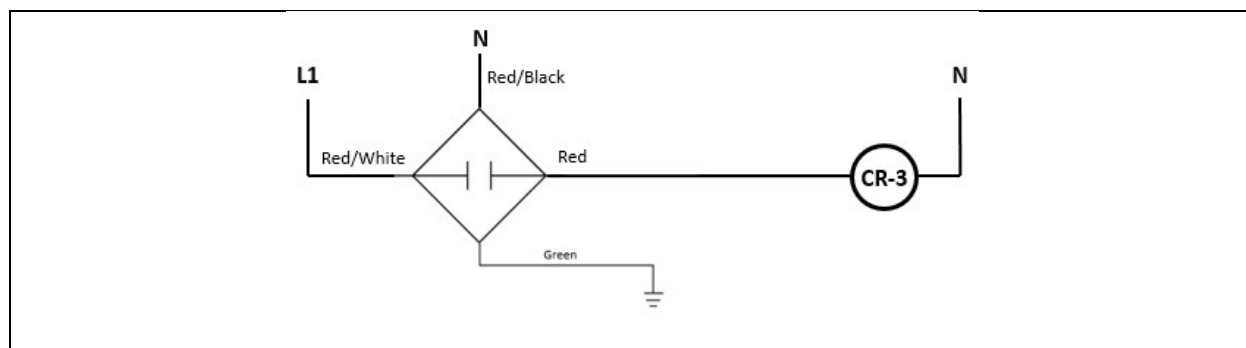


Figure 7: The wiring diagram for the photo-electric switch

- Wire the circuit found in Figure 7 on the NSCC wiring boards. Verify the wiring diagram with the wiring diagram from the cut sheet. Wire the coil of the ice cube relay to the output of the photo-electric switch.
- Power the circuit. Move your hand from about 2 feet above the photo-electric eyes down toward the device. Eventually the photo-electric should activate.

How far above the PE lenses does the device trip? _____

7. Adjust the sensitivity screw at the top of the photo-electric head to see how it changes this distance.
8. Move your hand in from the north, south, east and west direction to determine how large the sensing envelope is for the photo-electric.
9. Measure the output voltage from the photo-electric switch:

When it is not activated – Voltage output? _____

When it is activated – Voltage output? _____

Questions:

1. True or False? The photo-electric used in this lab exercise is dark activated.
2. What does it mean on the photo-electric switch if the green LED is on?
3. True or False? The proximity switch used in this lab is normally open.
4. What does the sensitivity adjustment on the photo-electric switch change?
5. True or False? The proximity switch in this lab requires a neutral wire to run to it in order for it to operate properly.
6. What are the two pin numbers for the coil of an ice cube relay used in this lab?

The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: _____

Faculty Signature: _____ Date: _____

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