
Q625 - Electrical, Electronic, & Control Engineering

1. While monitoring an impressed current cathodic hull protection system, which of the following measurements should remain constant in a properly operating electronically regulated system?

- **Reference electrode voltage**
- Control amplifier output voltage
- Individual anode currents
- Total anode current

Note:
In an electronically regulated impressed current cathodic protection system, the reference electrode voltage remains constant as the system maintains a consistent hull potential by adjusting current and output voltage.

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2. In monitoring an impressed current cathodic hull protection system, it is important to ensure that the propeller screw receives the same cathodic protection as the hull. What should be checked?

- Ensure adequate individual anode current to the anode closest to the propulsion shafting as it passes through the hull.
- **Ensure adequate grounding carbon brush pressure on the rotating shaft by checking associated current.**
- No checks are necessary since the propeller screw is bronze and needs no protection.
- Nothing can be done short of checking the propeller screw at drydock availabilities.

Note:
The propeller receives impressed current cathodic protection through a functioning shaft grounding brush, which should be verified by checking its pressure and associated current.

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3. Before any work on electrical or electronic equipment is performed, which of the following precautions should be carried out?

- Bypass the interlocks.
- Station a man at the circuit supply switch.
- De-energize the applicable switchboard bus.
- **Secure and tag the supply circuit breaker in the open position.**

Note:
To ensure safety when working on electrical or electronic equipment, secure and tag the supply circuit breaker in the open position to prevent accidental re-energization. This practice involves physically isolating the equipment and implementing lockout/tagout procedures, which are superior to relying on personnel or bypassing safety interlocks. Proper precautions include opening the circuit breaker, securing it to prevent closure, and tagging it to warn others, ensuring a de-energized state and preventing accidental power restoration.

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4. When placed in a magnetic field, which of the materials listed has the highest permeability?

- Bakelite
- Aluminum
- Glass
- **Iron**

Note:
Iron exhibits the highest magnetic permeability due to its ferromagnetic properties, which readily allow magnetic field lines to pass through it compared to bakelite, aluminum, or glass.

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5. At a minimum threshold, how many milliamps of current through the body produces a painful sensation that most people would perceive as an electric shock?

- **3 to 7 mA**
- 10 to 16 mA
- 30 mA
- 100 mA for 2.5 sec.

Note:
A current of 3 to 7 mA is the minimum level at which most people experience a painful electric shock.

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6. Contact with any energized electrical system conductor is potentially hazardous and precautions should be taken to prevent exposure. With all other factors considered equal (such as voltage, conducting path through the body and the duration of contact), contact with an energized electrical system conductor of which system type would produce the most damaging effect?

- DC systems
- **60 Hz AC systems**
- 10 kHz AC systems
- All the above systems would be equally as damaging

Note:
Contact with energized electrical systems is hazardous. Among DC, 60 Hz AC, and 10 kHz AC systems, 60 Hz AC is most damaging because it most efficiently disrupts the heart and nervous system at lower currents, given equal voltage, conducting path, and contact time.

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7. Which of the following devices would be forbidden to use as a primary means of electrical isolation?

- fused disconnect switch
- **start/stop push button station**
- circuit breaker
- non-fused disconnect switch

Note:
A start/stop push button station is a control device that does not physically isolate power conductors and therefore cannot be used as the primary means of electrical isolation.

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8. In order for a live-line tester to be used to test and prove dead a high voltage circuit, what must be done to verify the ability of the tester to detect a voltage?

- The live-line tester need not be checked prior to testing the circuit to be worked upon as long as it has not been declared inoperative.
- The live-line tester should be checked by connecting to a known high voltage source only before testing the circuit to be worked upon.
- **The live-line tester should be checked by connecting to a known high voltage source before and after the circuit to be worked upon is tested.**
- The live-line tester should be checked by connecting to a known high voltage source only after testing the circuit to be worked upon.

Note:
A live-line tester must be verified on a known live source before and after use to ensure continuous functionality and reliable voltage detection.

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9. Which of the substances listed can be used to shield sensitive equipment from static magnetic fields?

- Bakelite
- Glass
- Mica
- **Iron**

Note:
Iron is the correct answer; ferromagnetic materials like iron divert magnetic field lines, providing shielding. Bakelite, glass, and mica are non-magnetic insulators and offer no magnetic shielding.

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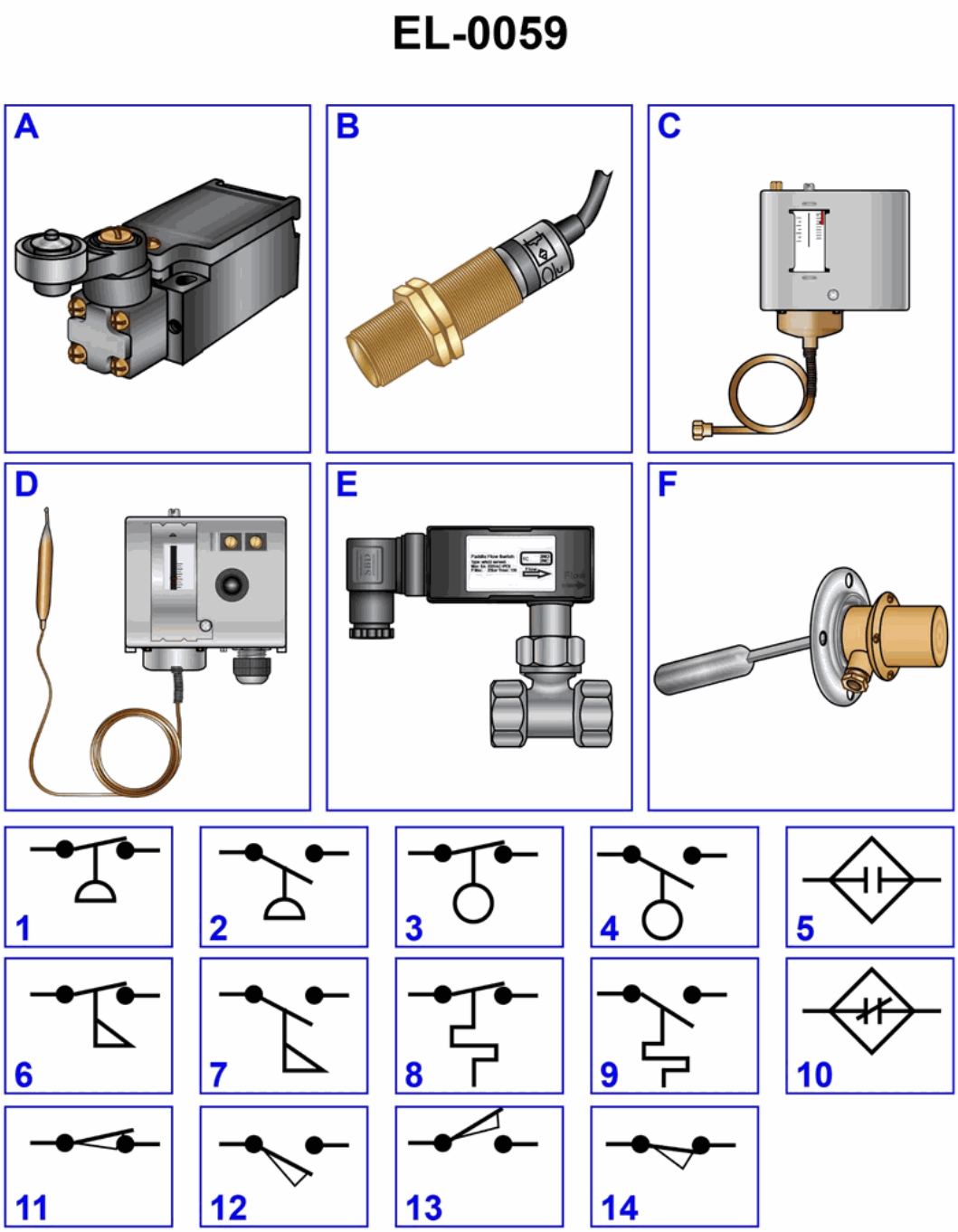
10. Which of the electrical schematic symbols shown in the illustration represents a normally closed limit switch



- 6
- 10
- **11**
- 14

Note:
Symbol 11 represents a normally closed limit switch because it depicts a closed contact in its normal state, allowing current flow. The other symbols show open contacts or are not switch symbols.
