ERCM System Malfunction Diagnostics Process

This is a general guide. It is targeted mostly at the MMCP and monitors, but will also help to identify whether a problem exists with the OCP as well. Most problems will be identified in these steps and it can be determined what action needs to be taken. Fundamentally it comes down to verifying the connections and checking the fuses and relays to determine where the problem lies so that a good assessment can be made for what needs to be done. The ability to use a volt-ohmmeter will be needed.

Note that for new installations, experience has shown that most problems can be related back to interconnection issues. All panels and monitors have been functionally tested before they are shipped.

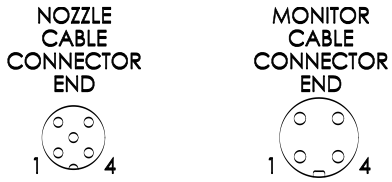
For older systems the problem could be from a number of sources. The process below will help in determining what the problem is. Experience has shown that finding the problem is relatively simple and can be easily done. While there is no one best process to use, things usually go quicker and better if done from one end of the system (monitor) to the other (control panel) rather than randomly starting with some point in the middle. Usually the monitor can be verified at the MMCP and then work toward the control end.

Caution! There are high voltages in the panel along with 24vdc voltages. Always use caution when working inside electrical panels and refer to the drawings before proceeding. Service should be performed by qualified personnel.

1. Inspect the monitor and nozzle for signs of physical damage.
    a. Freezing can cause the monitor joints to become jammed, damaged, or misaligned, causing difficulty in movement.
    b. A broken or damaged gear case can cause gears to bind, but this is very unlikely.
    c. Verify that the electrical connections at the motor are tight.
2. Try to move the monitors with the manual override wheels. If the monitor and nozzle can be moved it indicates that there is a high probability that the motor is not the problem. If the manual override cannot be moved the motor may be bad assuming that there is no other physical damage.
    a. Replace the monitor motor if the monitor cannot be moved manually.
    b. If the motor can be moved manually, exchange the cable connections between the vertical and horizontal motors and see if the same motor will not move or if the problem moves with the cable.
    c. The motors are interchangeable and can easily be exchanged to verify if the operational issue is with a particular motor. This step could be left for later as it will take longer than some other checks.
3. Verify the nozzle motor.
    a. Replace the actuator if the nozzle motor cannot be moved manually.
    b. If another nozzle can be exchanged and the problem goes away then the nozzle actuator would be the problem and needs to be replaced. This step could be left for later as it will take longer than some other checks.
4. If the problem is still present verify the wiring connections inside the panels. If this is an older system that has been operating and there have been no cable or wiring changes it is likely that the monitor junction box wiring is correct but the terminal blocks could have come loose and

therefore need to be checked for tightness. Refer to the system documentation for correct connections and insure that all are tight.

Monitor Cable Pin Assignments



MONITOR AND NOZZLE CABLE COLOR CODE		
FUNCTION	COLOR	PIN
STRAIGHT	BLUE	2
FOG	BLACK	3
NEUTRAL	BROWN	4
GROUND	WHITE	1
UP	BLACK	1
DOWN	RED	3
NEUTRAL	WHITE	2
GROUND	GREEN	4
LEFT	RED	3
RIGHT	BLACK	1
NEUTRAL	WHITE	2
GROUND	GREEN	4

5. If the motor buzzes while trying to operate it then the motor is getting power. It also may move only without water flowing or moves erratically. If the monitor movement can be stopped relatively easily by hand the connections are suspect. The correct wiring and motor condition can easily be verified as below:

   Each motor has 4 wires: a ground, a common, and one for each winding. If the common becomes exchanged with one of the winding connections the monitor may appear to operate but will be erratic and may move in the wrong direction, or even change direction. The motor will also not generate the amount of torque it should. If the fuses F1 through F8 are opened the resistance of the motor windings can easily be measured between the fuse block terminals in the MMCP. The correct values should be the same between the common wire and each of the windings and should be approximately 260 ohms for the nozzle motor and 17 ohms for the monitor motors. A reading of twice these values should be read between the two fuse terminals for each motor. (Example – Resistance between terminal 7 and 8 should read approximately 2x17=34 ohms).

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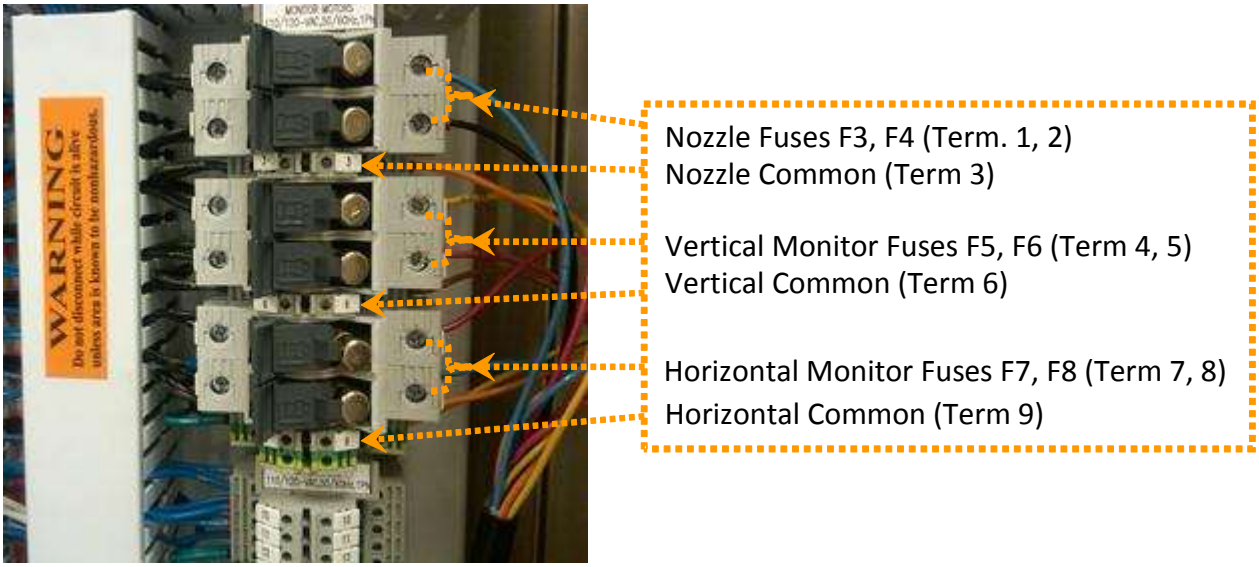

Generally, this procedure from the FAQ is most likely to be useful on a new installation where the wiring may be incorrect, or where cabling has been replaced, but will also confirm that the motor connections are valid. Most of our issues on new installations are due to miss-installed wiring. However, it is possible that something in the interconnect wiring has come loose and the same procedure will help to identify the problem. While it is possible that there are other components that are the problem, it is highly unlikely and it would be much faster and easier to correct a loose wire or a blown fuse than to replace motors that are not needed. For recent systems there should be an MMCP wiring diagram on the inside of the MMCP door to help in tracing the signals and power inside the panels. For older systems (pre 20011?) it will be necessary to refer to the drawings sent with the system.

6. Verify that all other interconnect wiring is securely fastened in the terminal blocks for all the panels. See your documentation for terminal connections on your system.
7. Verify that the fuses are good and power is at the panel. The power indicator light should show if power is there. If the light is out proceed with caution as the light could have failed.
    a. Fuses F3 through F8 in the MMCP (most panels) supply the power to the motors from the MMCP.
    b. Fuses F1and F2 in the MMCP (most panels) supply the main power to the MMCP.
    c. Verify that all other fuses are also good in the MMCP and other panels.. They supply power to other parts of the system
8. If the suspected monitor motor does not seem to be functioning it can be exchanged with another monitor motor that is working.
    a. If the problem moves with the motor then the motor is malfunctioning and needs to be replaced.
    b. If the problem is still present, look toward the interconnection wiring or inside the panels.

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9. Verify the connections at the resistors and capacitors at the top of the MMCP panel. All crimp connections on the wires should be secure.
10. Verify the control relays are functioning correctly. The grey control relays (about 1-1/4 inch cubes) can be exchanged between the vertical, horizontal, and nozzle motor controls. Usually you can hear them click when energized and de-energized, but that may not mean that the contacts are working correctly.
    a. If the problem moves when the relays are moved, then a relay problem is confirmed.
    b. Generally the relay assignments are:
        i. Nozzle – 1CR and 2CR
        ii. Vertical – 3CR and 4CR
        iii. Horizontal – 5CR and 6CR
11. Verify that the correct 24vdc signals are being applied from the OCP (operator control panel - with Joysticks) to the input terminals of the MMCP (monitor motor control panel).
    a. This can be done by measuring each terminal with a voltmeter while the functions are activated at the OCP. These are the monitor control signals.
    b. For newer panels (since 2011?) the terminal assignments are 61 through 70 on both panels, 52 is the common terminal for all of them. Refer to your system drawing package for older systems or custom designs.
    c. If there is a missing signal at the MMCP terminal block check the output of the OCP and the interconnect wiring between the OCP and the MMCP to determine where the problem is.
    d. Most likely it will be with the interconnect wiring at one end or the other (loose or crossed connections).
    e. Verify that the 24VDC common connection (terminal 52) is good between the MMCP and the OCP.
        i. Depending on the panel design this could also be designated as 0 VDC
        ii. This is necessary for the control signals to work.
12. If a monitor operates from a local OCP but not from the remote OCP or the HMI touchscreen, it is most likely that the problem is a communication setting or a disconnected/damaged network cable. Verify the PLC setup parameters in the detailed setup guide. Copies are available on our web site or with the original system documentation.